2024

वार्षिक प्रतिवेदन

ANNUAL REPORT

भाकृअनुप-राष्ट्रीय पशु आनुवंशिक संसाधन ब्यूरो

ICAR-National Bureau of Animal Genetic Resources

Vision

Striving for excellence in innovative research to identify genetic potential of indigenous livestock for improvement and conservation.

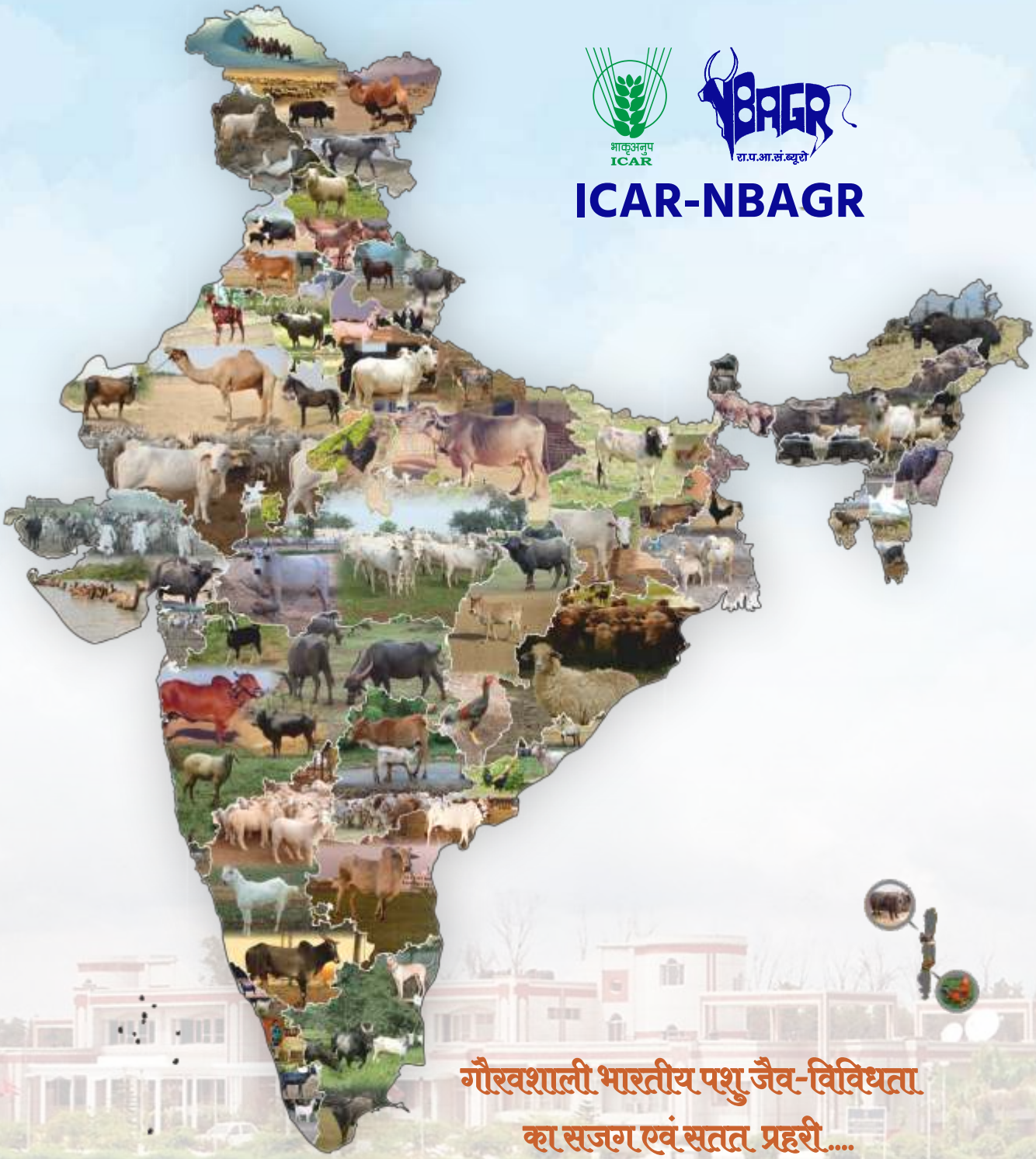
Mission

To protect and conserve indigenous Farm Animal Genetic Resources for sustainable utilization and livelihood security.

Mandate

Identification, evaluation, characterization, conservation and sustainable utilization of livestock and poultry genetic resources of the country.

Coordination and capacity building in animal genetic resources management and policy issues.



भाकृअनुप
ICAR

NBAGR
रा.प.आ.सं.ब्यूरो

ICAR-NBAGR

गौरवशाली भारतीय पशु जैव-विविधता
का सजग एवं सतत प्रहरी....

वार्षिक प्रतिवेदन | ANNUAL REPORT

2024

भाकृअनुप-राष्ट्रीय पशु आनुवंशिक संसाधन ब्यूरो

ICAR-National Bureau of Animal Genetic Resources

CONTENTS

CREDIT LINE

Published by

Dr. NH Mohan, Director
ICAR-National Bureau of Animal Genetic Resources
Karnal - 132001 (Haryana) India

Production & designed by

Dr. S K Niranjan, Pr Scientist & I/c PME Cell

Editors

Dr. RK Gandham, Head, AB Division
Dr. A K Mishra, Pr Scientist
Dr. Rekha Sharma, Pr Scientist
Dr. S K Niranjan, Pr Scientist & I/c PME Cell
Dr. Amod Kumar, Sr Scientist

Compiled by

Ms. Teena Saini, YP-II, PME Cell

Photographs

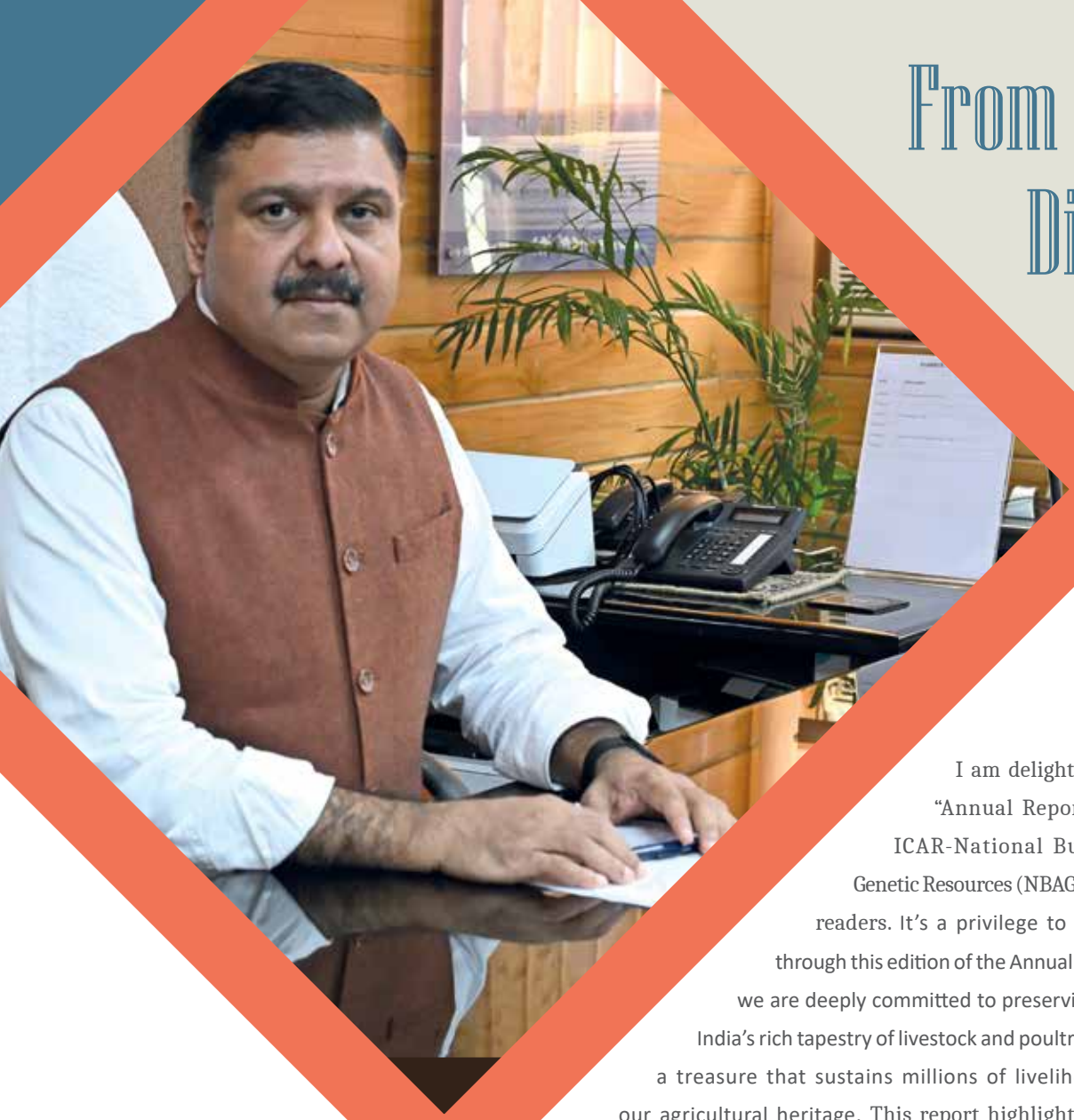
P&E Unit, Project Investigators etc.

Supported by

Smt. Anita Chanda, PS, Director Cell

Printing

Intech Printers & Publishers
343, 1st Floor, Mughal Canal Market,
Karnal - 132001, Haryana
E-mail: admn.intech@gmail.com



From the Director's Desk

I am delighted to present the "Annual Report - 2024" of the ICAR-National Bureau of Animal Genetic Resources (NBAGR) to our esteemed readers. It's a privilege to reach out to you through this edition of the Annual Report. At Bureau, we are deeply committed to preserving and promoting India's rich tapestry of livestock and poultry genetic diversity, a treasure that sustains millions of livelihoods and shapes our agricultural heritage. This report highlights the exceptional achievements of ICAR-NBAGR throughout the year, as we have remained committed to our scientific pursuits in the identification, characterization, conservation, evaluation, and sustainable utilization of Animal Genetic Resources (AnGR). It is with great pride that we share our efforts to document and preserve the diverse AnGR biodiversity in India.

Our commitment to the Mission towards Zero Non-Descript AnGR gained substantial momentum this year. This mission has provided us with a solid foundation to describe the vast livestock and poultry diversity across the country. We have conducted countrywide surveys in collaboration with State AHDs, SAUs, NGOs, and stakeholders, marching steadily towards our target of zero non-descript AnGR. Our dedicated team of scientists has organized interface meetings with state animal husbandry departments and universities to sensitize them about native AnGR and devise strategies for their documentation. Through field surveys, we have identified numerous prospective populations that are currently undergoing characterization. Witnessing our progress, we are confident in achieving our envisioned goals. We conducted AnGR surveys in 26 States and UTs including remote and challenging terrains like Lakshadweep, Ladakh, and Arunachal Pradesh.

A significant achievement this year was the characterization of 18 new native livestock and poultry populations from 10 States/UTs. Many of the indigenous populations are under the characterization through Network Project on AnGR. Further, in a landmark development, seven indigenous breeds and one synthetic breed, were officially gazette-notified by DARE, Ministry of Agriculture & Farmers Welfare. Through this, total 220 animal breeds have been Gazette notified

by 2024. On the conservation front, we cryopreserved semen and somatic cells representing 29 breeds, achieving nearly two-third of recognized indigenous breeds. We established a conservation unit for Tibetan sheep in Arunachal Pradesh, along with sustained *in-situ* conservation activities.

Our genomic research yielded key insights into breed-specific adaptations ranging from high-altitude resilience in Ladakhi cattle and yaks, to epigenetic stress markers in Murrah buffalo semen. SNP Chips- Gau and Mahish for indigenous cattle and buffalo, developed by the NDDB and NBAGR have been dedicated to the nation by Hon'ble Prime Minister of India. Our research endeavors have achieved significant breakthroughs in the trait characterization of native germplasm using molecular approaches. Notable achievements include identifying metabolic signatures in the colostrum and milk of yak and cattle of Ladakh, discovering genes and pathways associated with disease resistance in Indian cattle, uncovering immune genes for anaplasmosis and Lumpy Skin Diseases in cattle, identifying genomic signatures in Changthangi goat, characterizing milk exosomes in cattle, and understanding the molecular basis of seasonal variation in seminal attributes in buffalo bulls. The Genetic Testing Laboratory at ICAR-NBAGR achieved NABL accreditation for six molecular tests in cattle and buffalo, further strengthening our scientific capabilities.

In 2024, the Bureau played a pivotal role in the 21st Livestock Census, a landmark national exercise shaping the future of animal husbandry policy and planning. In partnership with the Department of Animal Husbandry and Dairying (DAHD), Bureau scientists organised 11 regional training programs across all states and union territories to build capacity among State and District Nodal Officers. Public engagement was at the heart of our mission this year. Events like International Biodiversity Day (Arunachal Pradesh), the International Year of Camelids celebration (Ladakh), and our Foundation Day, showcased our commitment to breed conservation awareness. The launch of a dedicated YouTube channel, release of breed calendars, and the Breed Conservation Awards-2024 honoring five exemplary farmers and institutions demonstrate our drive to involve communities in this vital cause.

Our research activities have gained significant momentum through 33 institutional projects and five externally funded projects, all meticulously screened by the Institute Research Committee, Research Advisory Committee, and external funding agencies. I extend my best wishes to all the scientists and research scholars of the institute for their research publications in esteemed national and international journals, as well as their recognitions at various scientific platforms.

I extend my congratulations to all the scientists, technical, administrative, and other staff members of the institute for their remarkable contributions to the progress of the Bureau and their personal and professional achievements. Words of encouragement and appreciation from esteemed visitors have consistently motivated the Bureau staff to strive for excellence and fulfill the entrusted mandate. I express my heartfelt gratitude to Dr. M L Jat, Hon'ble Secretary DARE and DG, ICAR, and former Secretary Dr Himanshu Pathak, for his continuous motivation and insightful guidance. I also acknowledge the cooperation and guidance received from Dr. Raghavendra Bhatta, Hon'ble DDG (AS) ICAR, and Dr. G K Gaur, ADG (AP&B) ICAR in all the activities of the Bureau.

I sincerely hope that the "Annual Report 2024" of ICAR-NBAGR will serve as a valuable source of information for all custodians of AnGR in the country. We welcome suggestions for further improvement as we strive to advance our mission.

Jai Hind

(NH Mohan)

निदेशक की कलम से...

मुझे अपने सम्मानित पाठकों के समक्ष भाकृअनुप-राष्ट्रीय पशु आनुवंशिक संसाधन ब्यूरो (एनबीएजीआर) की "वार्षिक रिपोर्ट - 2024" प्रस्तुत करते हुए अत्यंत प्रसन्नता हो रही है। वार्षिक रिपोर्ट के इस संस्करण के माध्यम से आप तक पहुँचना मेरे लिए सौभाग्य की बात है। एनबीएजीआर, भारत की समृद्ध पशुधन और कुक्कुट आनुवंशिक विविधता को संरक्षित और संवर्धित करने के लिए पूरी तरह प्रतिबद्ध है, यह एक ऐसा खजाना है जो लाखों लोगों की आजीविका का आधार है और हमारी कृषि विरासत को आकार देता है। यह रिपोर्ट पूरे वर्ष आईसीएआर-एनबीएजीआर की असाधारण उपलब्धियों पर प्रकाश डालती है, क्योंकि हम पशु आनुवंशिक संसाधनों (एएनजीआर) की पहचान, लक्षण-निर्धारण, संरक्षण, मूल्यांकन और सतत उपयोग में अपने वैज्ञानिक प्रयासों के प्रति प्रतिबद्ध रहे हैं। हमें भारत में विविध एएनजीआर जैव विविधता के दस्तावेजीकरण और संरक्षण के अपने प्रयासों को साझा करते हुए अत्यंत गर्व हो रहा है।

शून्य अवर्णनीय एएनजीआर के मिशन के प्रति हमारी प्रतिबद्धता इस वर्ष उल्लेखनीय रही है। इस मिशन ने हमें देश भर में विशाल पशुधन और कुक्कुट विविधता का वर्णन करने के लिए एक ठोस आधार प्रदान किया है। हमने राज्य पशुपालन विभाग, राज्य कृषि विश्वविद्यालयों, गैर सरकारी संगठनों और हितधारकों के साथ मिलकर देशव्यापी सर्वेक्षण किए हैं और शून्य अवर्णित एएनजीआर के अपने लक्ष्य की ओर निरंतर अग्रसर हैं। वैज्ञानिकों की समर्पित टीम ने राज्य पशुपालन विभागों और विश्वविद्यालयों के साथ इंटरफेस बैठकें आयोजित की हैं ताकि उन्हें देशी एएनजीआर के बारे में जागरूक किया जा सके और उनके दस्तावेजीकरण की रणनीति तैयार की जा सके। क्षेत्रीय सर्वेक्षणों के माध्यम से, हमने कई संभावित आबादियों की पहचान की है जिनका वर्तमान में लक्षण-निर्धारण किया जा रहा है। प्रगति को देखते हुए, हमें अपने निर्धारित लक्ष्यों को प्राप्त करने का पूरा विश्वास है। लक्षद्वीप, लद्दाख और अरुणाचल प्रदेश जैसे दूरस्थ और चुनौतीपूर्ण इलाकों सहित 26 राज्यों और केंद्र शासित प्रदेशों में एएनजीआर सर्वेक्षण किए गए।

इस वर्ष एक महत्वपूर्ण उपलब्धि 10 राज्यों/केंद्र शासित प्रदेशों से 18 नए देशी पशुधन और मुर्गी पालन आबादियों का लक्षण-निर्धारण करना था। कई स्वदेशी आबादियां एएनजीआर पर नेटवर्क परियोजना के माध्यम से लक्षण-निर्धारण के अधीन हैं। इसके अलावा सात देशी नस्लों और एक सिंथेटिक नस्ल को कृषि एवं किसान कल्याण मंत्रालय के DARE द्वारा आधिकारिक तौर पर राजपत्रित किया गया। इसके माध्यम से, 2024 तक कुल 220 पशु नस्लों को राजपत्र में अधिसूचित किया गया है। संरक्षण के मोर्चे पर, हमने 29 नस्लों को वीर्य और दैहिक कोशिकाओं के माध्यम से क्रायोप्रिजर्व किया, जिससे पंजीकृत स्वदेशी नस्लों का लगभग दो-तिहाई भाग पूरा हुआ । हमने अरुणाचल प्रदेश में तिब्बती भेड़ों के लिए एक संरक्षण इकाई की स्थापना की, साथ ही इन-सीटू संरक्षण गतिविधियों को जारी रखा।

हमारे जीनोमिक अनुसंधान ने लद्दाखी मवेशियों और याक में ऊंचाई से सम्बन्धित तथा मुर्रा भैंस के वीर्य में

एपिजेनेटिक मार्करों तक नस्ल-विशिष्ट अनुकूलन में महत्वपूर्ण अंतर्दृष्टि प्रदान की। एनडीडीबी और एनबीएजीआर द्वारा विकसित स्वदेशी गोवंश और भैंसों के लिए एसएनपी चिप्स- गौ और महिष को भारत के माननीय प्रधान मंत्री द्वारा राष्ट्र को समर्पित किया गया है। उल्लेखनीय उपलब्धियों में लद्दाख के याक और गोवंश के कोलोस्ट्रम और दूध में उपापचयी लक्षणों की पहचान, भारतीय मवेशियों में रोग प्रतिरोधक क्षमता से जुड़े जीन और मार्गों की खोज, गोवंश में एनाप्लाज़मोसिस और लम्पी स्किन डिजीज़ के लिए प्रतिरक्षा जीन की खोज, चांगथांगी बकरी में जीनोमिक लक्षणों की पहचान, मवेशियों में दूध के एक्सोसोम की विशेषताएँ निर्धारित करना, और भैंस के सांडों में वीर्य गुणों में मौसमी बदलाव के आणविक आधार को समझना शामिल है। आईसीएआर-एनबीएजीआर स्थित आनुवंशिक परीक्षण प्रयोगशाला ने गोवंश और भैंसों में छह आणविक परीक्षणों के लिए एनएबीएल प्रमाणन प्राप्त किया है, जिससे हमारी वैज्ञानिक क्षमताएँ और मज़बूत हुई हैं।

2024 में, ब्यूरो ने 21वीं पशुधन जनगणना में महत्वपूर्ण भूमिका निभाई, जो पशुपालन नीति और योजना के भविष्य को आकार देने वाला एक ऐतिहासिक राष्ट्रीय अभ्यास था। पशुपालन और डेयरी विभाग (DAHD) के साथ साझेदारी में, ब्यूरो ने राज्य और जिला नोडल अधिकारियों के बीच क्षमता निर्माण के लिए सभी राज्यों और केंद्र शासित प्रदेशों में 11 क्षेत्रीय प्रशिक्षण कार्यक्रम आयोजित किए। इस वर्ष हमारे मिशन में सार्वजनिक भागीदारी केन्द्रित थी। अंतर्राष्ट्रीय जैव विविधता दिवस (अरुणाचल प्रदेश), अंतर्राष्ट्रीय ऊंट वर्ष समारोह (लद्दाख), और हमारे स्थापना दिवस जैसे आयोजनों ने नस्ल संरक्षण जागरूकता के प्रति हमारी प्रतिबद्धता को प्रदर्शित किया। एक समर्पित यूट्यूब चैनल का शुभारंभ, नस्ल कैलेंडर का विमोचन, और पांच अनुकरणीय किसानों और संस्थानों को सम्मानित करने वाले नस्ल संरक्षण पुरस्कार-2024 इस महत्वपूर्ण कारण में समुदायों को शामिल करने के हमारे प्रयास को प्रदर्शित करते हैं। मैं संस्थान के सभी वैज्ञानिकों और शोधार्थियों को प्रतिष्ठित राष्ट्रीय और अंतर्राष्ट्रीय पत्रिकाओं में उनके शोध प्रकाशनों के साथ-साथ विभिन्न वैज्ञानिक मंचों पर प्राप्त सम्मान के लिए अपनी शुभकामनाएं देता हूँ।

मैं संस्थान के सभी वैज्ञानिकों, तकनीकी, प्रशासनिक और अन्य कर्मचारियों को ब्यूरो की प्रगति में उनके उल्लेखनीय योगदान और उनकी व्यक्तिगत एवं व्यावसायिक उपलब्धियों के लिए बधाई देता हूँ। सम्मानित आगंतुकों के प्रोत्साहन और प्रशंसा के शब्दों ने ब्यूरो के कर्मचारियों को उत्कृष्टता के लिए प्रयास करने और सौंपे गए कार्य को पूरा करने के लिए निरंतर प्रेरित किया है। मैं डॉ. एम. एल. जाट, माननीय सचिव, डेयर और महानिदेशक, आईसीएआर, और पूर्व सचिव डॉ. हिमांशु पाठक के प्रति उनकी निरंतर प्रेरणा और व्यावहारिक मार्गदर्शन के लिए हार्दिक आभार व्यक्त करता हूँ। मैं ब्यूरो की सभी गतिविधियों में डॉ. राघवेंद्र भट्टा, माननीय उपमहानिदेशक (एएस) आईसीएआर, और डॉ. जी. के. गौर, सहायक महानिदेशक (एपी एंड बी) आईसीएआर से प्राप्त सहयोग और मार्गदर्शन के लिए भी आभार व्यक्त करता हूँ।

मुझे पूरी उम्मीद है कि आईसीएआर-एनबीएजीआर की “वार्षिक रिपोर्ट 2024” देश में एएनजीआर के सभी संरक्षकों के लिए सूचना का एक मूल्यवान स्रोत साबित होगी। हम अपने मिशन को आगे बढ़ाने के लिए सुधार के सुझावों का स्वागत करते हैं।

जय हिंद

(एनएच मोहन)

Executive Summary

भारत का राजपत्र
The Gazette of India

EXTRAORDINARY

PUBLISHED BY AUTHORITY

NEW DELHI, MONDAY, DECEMBER 9, 2024/AGRAHAYANA 18, 1946

Institute's profile

ICAR-National Bureau of Animal Genetic Resources (NBAGR), one of the six Bureaus under the Indian Council of Agricultural Research (ICAR) has been established in 1984, with a mission to protect and conserve indigenous farm Animal Genetic Resources (AnGR) for sustainable utilization and livelihood security in the country. With the specific mandate - 1) Identification, evaluation, characterization, conservation and utilization of livestock and poultry genetic resources of the country; and 2) Coordination and capacity building in animal genetic resources management and policy issues; the Bureau has a number of activities including conducting survey to explore and characterize new potential populations, further document and register such populations; prioritization and conservation of indigenous breeds, identifying unique traits and their evaluation and utilization, encompassing all the states. The Bureau is nodal agency for the breed registration in the country. The Framework for the registration and Gazette Notification of animal breeds, evolved by the Bureau is unique in the world. As an animal Bureau of the country, it also coordinates with various national and international agencies including the UN's Food & Agriculture Organization, pertaining to the AnGR. It is also a nodal agency for UN's Sustainable Development Goal (SDG) 2 Indicator 2.5.1 and 2.5.2.

Mission towards Zero Non-Descript AnGR of India

Bureau initiated the "*Mission towards Zero Non-Descript AnGR of India*" on 11th August, 2021. Under the Mission, Bureau organized State Interface Meets with various animal stakeholders including Animal Husbandry Deptts. State Agricultural/Veterinary Universities, Livestock Development Boards/Biodiversity Boards/ NGOs of the states to sensitize them for documentation of AnGR in the respective states.

By the end of 2024, 10 projects under the mission encompassed 15 states/UTs (Chhattisgarh, Himachal Pradesh, Goa, Andhra Pardesh, Gujarat, Uttar Pradesh, Uttarakhand, Madhya Pradesh, Rajasthan, Kerala, Tamil Nadu, Maharashtra, Telangana, and Union Territories of Andaman & Nicobar and Ladakh) of the country are onglong for survey and documentation of AnGR in various states in collaboration with state stakeholders. Further, the survey for identification and documentation of AnGR was completed in 4 states: Arunachal Pradesh, Mizoram, Nagaland, and Odisha.

Gazette notification of animal breeds

In 2024, the Government of India Gazette notified 10 breeds (Andmani goat, Andamani pig and Andamani duck of Andaman & Nicobar Islands, Bhimthadi horse of Maharashtra, Anjori goat of Chhattisgarh, Macherla sheep of Andhra Pradesh, Aravali chicken of Gujarat, and Frieswal synthetic cattle breed) registered on December 5, 2023. Registration of new breeds initiates various development programs and policy formation in the country.

Identification & characterization of native AnGR

Phenotypic characterization of several newly identified homogeneous populations was carried out across various states, including in the NEH region. This year characterization of Mirzapuri sheep, Mirzapuri cattle, and Mirzapuri buffalo of Uttar Pradesh, Mathura Labhani cattle, Varhadi cattle, Jalkot cattle, and Pashmi dog of Maharashtra, Luti dog of Goa, Lakshadivi Goat of Lakshadweep, Cattle population of Kalsi and Chakrata, Dehradun, Uttarakhand, Cattle population of Kolli hills in Namakkal, Tamil Nadu, and Cattle population of Attappady, Kerala been initiated. The brief description of these AnGR has been mentioned below:

Mirzapuri sheep: It is medium-sized sheep population known as *Hasari* or *Lalkai* (pink face). It is distributed in Mirzapur, Sonebhadra and surrounding region in

Uttar Pradesh. It is reared for both wool and mutton production. The adult body weight of males is approximately 40 Kg. The population is characterized by a white coat with small light to dark brown or black patches of varying sizes on the face, ears, and muzzle. The nose line exhibits a typical Roman type.

Mirzapuri cattle: It is small-sized cattle, distributed in the Mirzapur district. The cattle population is white and light roan in colour and producing about 1-2 Kg of milk per day. These animals are docile in nature and graze freely in the field throughout day and night.

Mirzapuri buffalo: Along with the sheep and cattle, a native buffalo population is also found in the Mirzapur district. However, the Murrah breed is being utilized to upgrade this buffalo population, necessitating immediate intervention to protect the native breed.

Mathura Labhani cattle: This cattle reared by the Mathura Labhan community in the district of Nanded, Maharashtra. The animals are characterised by its white coat, medium-sized, curved horns and a long neck. The animals are reared in zero input system for milk and draft purposes. They provide an average of 2-4 litres of milk per day. The animals are decorated during their main festival of Janmashtami and are used for processions.

Varhadi cattle: Varhadi cattle have their breeding tract in the districts of Akola, Amaravathi and Buldhana. They are medium to large-sized cattle, typically have a white coat, though some may exhibit a pale red or pinkish hue. These animals are valued for both milk production and draft purposes, producing an average of 1.5 to 2 litres of milk per day managed with zero input systems. The draftability of the animals in the black cotton soil of the region and sustainability in summer season makes these animals preferred by the local farmers.

Pashmi dog: This dog is found in the Latur district of Maharashtra. It is intelligent, sensitive, loyal land courageous dog. Coat colour is mainly black but light brown colour is also found. They are kept for hunting and guarding purpose.

Jalkot cattle: The Banjara community of Nanded district raises the Jalkot cattle. They are animals with a reddish-tan coat, often with white patches. These animals are used for both milk production and draft purposes, typically yielding 1-2 litres of milk per day and are managed under zero input system.

Luti dog: Luti dog is a hunting type dog reared by the natives of the Permentaluka and adjoining region of Goa. The colour of this dog is light black or brown.

Lakshadivi Goat: Locally known as '*Naadan Aadu,*' is an indigenous breed of Lakshadweep. It is medium-sized, with a long neck, small triangular face, and prominent supraorbital ridges. Its horizontal, flaccid ears and overall appearance give it a distinctive deer-like look. This goat has adapted to the unique hot-humid agro-ecological conditions of the Lakshadweep islands.

Cattle population of Kolli hills: Cattle are medium-sized with roan or grey coats, and are valued for ploughing, dung, and milk production. Predominant coat colour is roan (60%), followed by grey coat (30%) and about 10% of the animals are mixed coat colour.

Cattle population of Attappady: The indigenous cattle of Attappady are medium-sized animals, averaging 115-125 cm in height. Their coat color is predominantly red, although white, brown, and mixed patterns are also observed. Most cattle are horned with large horns. These cattle are maintained by the Irular tribes in the Attapady area.

Genomic diversity of native AnGR

Two non-descript populations, namely Jharkhandi and Local cattle of Ranchi/Hazaribag (Jharkhand, one described cattle population Shahabadi and 18 registered/exotic breeds were analysed as part of our exploration into breed identification and classification using SNP chip. It was revealed that

all the registered breeds/population of Bihar viz. Bachur, Gangatiri, Purnea, Shahabadi along with Sahiwal clustered with the Hariana breed of cattle while rest of the registered breeds viz. Ongle, Deoni, Kangyam, Gir, Ongole, Tharparkar and two exotic breeds viz. Jersey and Holstein clustered separately.

The genetic diversity and evolutionary history of riverine and swamp buffaloes in India, utilizing complete mitochondrial genome sequences was explored. The results uncovered the existence of 212 variable sites in riverine buffaloes, yielding 67 haplotypes with high haplotype diversity (0.991), and in swamp buffaloes, 194 variable sites resulting in 12 haplotypes, displaying haplotype diversity of 0.950. Phylogenetic analyses categorized Indian swamp buffaloes predominantly into the SA haplogroup. Conversely, riverine buffaloes conformed to established sub-haplogroups RB1, RB2, and RB3, underscoring the notion of Northwestern India as a pivotal domestication site for riverine buffaloes.

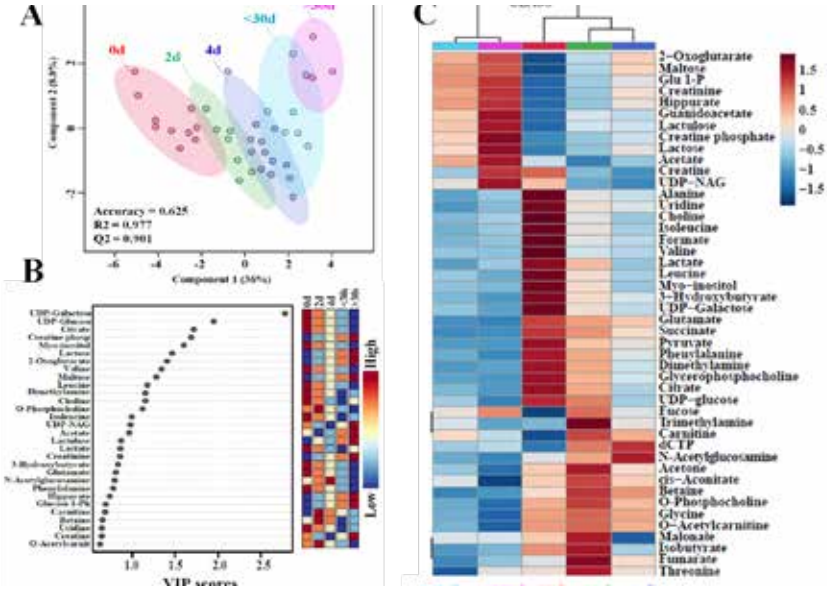
Whole genome sequences of 180 chicken samples from 16 indigenous breeds, along with the Red Jungle Fowl were utilized for a panel of 70K genome wide SNPs for comparative genome analysis. Breeds originating from the eastern regions of India exhibited higher genomic diversity, indicative of a rich repository of distinct germplasm. The average inbreeding coefficient (FIS) of 0.084 cautions on the need to mitigate risks associated with inbreeding. The genetic structuring indicated a relationship among breeds based on geographical proximity, underscored by varying levels of admixture.

High-resolution chromosome-level genome assembly of Indian Red Jungle fowl was generated using PacBio HiFi, Hi-C, and Illumina-based whole-genome sequencing. The pangenome graph reference was built using 10 complete chicken assemblies including our Ggm assembly. Ggm assembly achieved superior quality metrics, including a contig N50 of 44.69 Mb, a scaffold N50 of 91.4 Mb, and 99.1% BUSCO completeness. The Red Jungle fowl genome has been assembled and is found to be better than existing assemblies of Ref seq assembly. The pangenome graph reference included 158,786 nodes, 222,739 edges, and 41 connected components. The pangenome demonstrated significantly improved mapping accuracy compared to traditional linear references such as GRCg7b, underscoring its utility.

Evaluation and trait characterization of native AnGR

Lipidome signature of Ladakhi cows: In lipidome data, a total of 541 lipid molecules were identified, dividing into eight main lipid categories: sphingolipids, glycerophospholipids, fatty acyls, glycerolipids, sterol lipids, prenol lipids, polyketides, and saccharolipids in Ladakhi cow milk. The highest number of lipids grouped into category of glycerophospholipids (226), followed by fatty acyls (128), sphingolipids (91), glycerolipiods (79), sterol-lipids (34), uncategorized (27), phenol lipids (13), polyketides (11).

Assessing immune modulatory parameters in milk of Sahiwal and Ladakhi cows: The trial was conducted to evaluate any toxic/adverse effect of feeding colostrum powder of Ladakhi and Sahiwal cows in different dosages (low dosage group: 75 g/kg body weight; medium dosage group: 150 g/kg body weight; and high dosage group: 225 g/kg body weight) to mice for 12 weeks. The results showed notable correlation between the amount



of colostrum feeding and body weight. Specifically, the group administered with 225 g/kg body weight of colostrum powder of Ladakhi and Sahiwal cows exhibited significantly higher body weight gain (24.98 gm ± 1.01 and 25.23 gm ± 1.22, respectively) compared to the groups receiving moderate or low amounts of colostrum powder. Various parameters related to complete blood count (CBC) were also evaluated, suggesting no major changes in the CBC parameters in any of the groups irrespective of colostrum dosage. The histological examination of spleen, small intestine, and liver tissues of C57BL/6 mice did not reveal any adverse effect of supplementing of Ladakhi and Sahiwal colostrum.

Baseline composition of milk of Ladakhi cows and Ladakhi yak: A total of 124 milk and colostrum samples of Ladakhi cows and yak were analyzed. Additionally, the level of immunoglobulins, lactoferrin, lactoperxidase etc. were also measure using ELISA. In Ladakhi cows, fat percentage was highest in colostrum (5.23±0.76) and lowest in mid-lactation (4.69±0.03). Protein content declined from colostrum (4.27±0.12) to late lactation (3.38±0.07), while lactose increased from colostrum (2.71±0.09) to late lactation (4.16±0.46). A similar trend was seen in yaks, with fat (6.3±0.56) and protein (5.40±0.11) highest in colostrum. Additionally, the antioxidant activity in term of FRAP, DPPH, and GSH, was highest in colostrum and declined through lactation, while lipid peroxidation (LPO) increased. Immunoglobulins (IgG1, IgG2, IgM, IgA) were highest in colostrum, with IgG1 in cows decreasing from 145.19 mg/mL (colostrum) to 1.6 mg/mL (late lactation). Antimicrobial peptides such as lactoferrin (0.6 µg/mL), lysozyme (1.1 µg/mL), and lactoperoxidase (2.2 µg/mL) were highest in colostrum and declined with lactation, except LPO, which increased. Colostrum in Ladakhi cows and yaks has the highest fat, protein, immunoglobulins, and antioxidants, crucial for neonatal immunity.

Characterizing milk metabolome of Ladakhi yak: Metabolome signature of colostrum, transition and mature milk samples of Ladakhi yak (n=40) was generated using NMR spectroscopy. The analysis of spectrum has resulted in identification of 46 metabolites comprising of monosaccharides, disaccharides, organic acids, nitrogenous organic acids, amino acids, nucleotides and other compounds. The colostrum metabolome appears to provide a number of nutrients beneficial for growth and development of the new-born mammal, such as branched chain amino acids, other essential amino acids, pyruvate, succinate and choline. In the days post-parturition, the levels of these beneficial nutrients are reduced as it evolves to a regular milk composition with significant increases in lactose content. Overall analysis indicated that colostrum metabolome of Ladakhi yak is quite dynamic in nature where in large number of metabolites concentrations dropped from 0-day to transition (2-day and 4-day) and mature milk (<30-days and >30-days).

Transcriptome profiling of heart tissue of Changthangi and Jamunapari goats: Comparison between the two breeds led to the discovery of 372 unique transcripts in Changthangi and 282 in Jamunapari, while 13944 transcripts were common to both breeds. The highest expressed genes common to both breeds were mainly related to mitochondrial electron transport, ATP synthesis coupled electron transport and cardiac muscle contraction. Gene ontology analysis identified functions such as regulation of dopamine secretion, aggrephagy, ATP-dependent microtubule motor activity and heme transporter activity enriched in Changthangi goat. The most significant pathway in Changthangi breed was the Apelin signaling pathway which is involved in control of blood flow and blood pressure, dilation and vasoconstriction as well as strengthening of the cardiac contractility and angiogenesis. This

study offers an insight into the differentially expressed genes and pathways in heart tissue of two goat breeds adapted to diverse climatic conditions.

Selection signature contributing to high altitude adaptation in Changthangi goat: Selection sweep analyses using inter-population approaches were performed. Functional enrichment analysis of the candidate genes revealed significant involvement in processes such as positive regulation of angiogenesis, cardiac muscle cell development, regulation of vasoconstriction, keratinocyte proliferation. In addition, genes encoding keratins (KRTs) and keratin-associated proteins (KRTAPs) were identified, highlighting their crucial role in cashmere fiber production and contributing to the high-altitude adaptation of the Changthangi goat. The genes identified, including BCL2, CACNG6, MAP3K9, SHISA9, ANGPTL3, NOS2, MAPKI0, BCL7C, PIK3CA, ACVR2B, ADGRB3, ADGRG6, are likely integral to the adaptation of the Changthangi goat to high-altitude environments.

Molecular insights into Pashmina fiber production: The skin transcriptomic patterns of both Changthangi goats and sheep were compared. Drawing upon previously conducted studies, a collective of 225 genes correlated with fiber characteristics were extracted from the differentially expressed genes observed between the two species. The comparative transcriptomic analysis showed a marked upregulation of genes in pathways including Wnt, MAPK, PI3K-Akt, and Hedgehog in Changthangi goats, all critical to fiber formation and its quality attributes. Additional insights were gained into cell adhesion molecules and ECM-receptor interactions, which are crucial for hair follicle structure, growth, and signaling. This investigation offers an in-depth understanding of the molecular intricacies governing Pashmina production in Changthangi goats.

Biomarkers of semen quality in buffaloes: Whole genome sequencing data on nine bulls of each group; seasonally affected and not-affected were generated. Genes with significant allele frequency variation were documented and most enriched GO terms were catalytic, binding, cellular structure, biological regulation, and cellular process. Possible impact of mis-sense SNPs on protein structure, and function analysed and the genes related to apoptosis, inflammation, chromatin remodelling, immune response and sperm structure and motility were identified. Genotype analysis of selected mis-sense SNPs in specific genes linked with semen quality in bulls showed significant differences, suggesting these SNPs in the target genes as potential markers for semen quality differentiation during hot summer.

Conservation of native AnGR

During 2024, 45 indigenous breeds belonging to five livestock species: Cattle-15, buffalo-8, sheep-9, goat-12, and horse-1, were conserved as somatic cells under CRP on Agro bio diversity project. Nine of these falls under the critical, endangered, or vulnerable categories as per the Breed Watch List 2022, (ICAR- NBAGR, Karnal). So far, 110 livestock breed of 10 species have been cryopreserved in the ICAR-NBAGR National gene bank. It includes 27 of 38 critical/endangered/vulnerable populations.

The effort contributes towards fulfilling the national obligation embedded in the United Nations Sustainable Development Goal 2.5.1.

National Bovine Genomic Centre - Indigenous breeds

Honorable Prime Minister, Shri Narendra Modi launched the Unified Genomic Chip for cattle and buffalo on October 5, 2024, at Washim, Maharashtra. He inaugurated the "Gau Chip" for cows and the "Mahish Chip" for buffaloes. These innovations are expected to bring transformative improvements to livestock breeding in India. These Genomic Chips are developed by National Dairy Development Board and ICAR-National Bureau of Animal Genetic Resources under Rastriya Gokul Mission. Further, a total of 2750 blood samples of cattle and buffalo were received from various centres of NDDB, Anand at NBGC-IB, ICAR-NBAGR, Karnal for SNP genotyping. The samples were belonging to 4 cattle and 2 buffalo breeds. Out of the total, 1637 samples were from cattle and 1113 samples from buffalo breeds.

Network Project on AnGR

In Sync to the Mission, Network Project (NWP) Centres were established in various states for documentation of indigenous AnGR and characterization and registration of potential populations in respective states. In 2023-24, 27 NWP centres and in 2024-25, total 32 NWP Centres in 26 states/UTs were established. During 2024, phenotypic characterization of 68 potential populations of indigenous livestock and poultry was carried out. These included 15 populations of cattle, 7 buffalo, 8 sheep, 14 goat, 2 pig, 14 chicken, 2 duck, 2 dog, 3 Horse and pony and one Yak. For characterization of 68 indigenous livestock and poultry populations and conservation of five critical breeds (Tibettan and Karnah sheep, Mewari camel, Zanskari pony and Halari donkey), total 27 centers were involved.

Research projects and publications

The research endeavors of the bureau were accomplished under 39 research projects, including 12 externally funded projects and one IAEA International project. During the year, the scientists of the Bureau published 51 research papers, of which 38 published in international journals.

Awards and recognitions

Research efforts of the Bureau scientists and scholars were appreciated in the form of best presentation awards during conferences/seminars and fellowship of scientific Societies. These awards highlights the role of Bureau in the area of

management and conservation of animal genetic resources.

Capacity building

Bureau has organized two Training Programme on "*Characterization, registration and conservation of native animal genetic resources (AnGR)"* for the field veterinarians of Odisha state.

Farmers awareness programme & Celebrations

Bureau organized several SCSP / farmers awareness programs and set up exhibitions at various parts of the country.

Bureau organized "Breed Conservation Award-2024" on 23rd December, 2024 on "National Farmers Day" and felicitated animal breeders/ farmers and institutions, across the country, for their efforts for conserving the indigenous animal breeds. Total 5 farmers/livestock keepers and five institutions/organizations were awarded for conservation and improvement of indigenous breeds. International Biodiversity Day, Rashtriya Ekta Diwas, Mahila Kisan Diwas, World Food Day, National Unity Day, Republic Day, and Independence Day were celebrated with full zeal during the year. Active participation of the Bureau staff was evident in various events such as Rashtriya Swachhta Abhiyan and Waste to Wealth campaign.

Meetings

Review of progress of different research projects was ensured by timely organization of Institute Research Committee (IRC), Research Advisory Committee (RAC) and annual review meeting of network project. Bureau has also participated in Technical Committee-Livestock Census 2024 meeting organized by Animal Husbandry Statistics, DAHD at DAHD, New Delhi on 9th January, 2024 and discussed the modalities for conducting Breed-wise Livestock Census in the Country, and Meeting of Steering Committee of Network Project on "Agricultural Bioinformatics and Computational Biology" was held on May 21, 2024. The externally funded projects of the institute were also reviewed by the respective funding agencies. Various management issues of the institute were discussed during the Institute Management Committee meeting.

Personnel

During 2024, three technical personnel and two SSS joined the Bureau. Meanwhile, one scientist and one technical staff member retired, and one administrative staff member was transferred from the institute. Many distinguished personnel visited the bureau.

कार्यकारी सारांश

भारत का राजपत्र
The Gazette of India

EXTRAORDINARY
PUBLISHED BY AUTHORITY

NEW DELHI, MONDAY, DECEMBER 9, 2024/AGRAHAYANA 18, 1946

संस्थान का परिचय

भारतीय कृषि अनुसंधान परिषद के अंतर्गत छह ब्यूरो में से एक, भाकृअनुप-राष्ट्रीय पशु आनुवंशिक संसाधन ब्यूरो की स्थापना 1984 में हुई थी। इसका उद्देश्य देश में सतत उपयोग और आजीविका सुरक्षा के लिए स्वदेशी कृषि पशु आनुवंशिक संसाधनों (एएनजीआर) का संरक्षण और संरक्षण करना है। इसके विशिष्ट कार्य हैं - 1) देश के पशुधन और कुक्कुट आनुवंशिक संसाधनों की पहचान, मूल्यांकन, लक्षण-निर्धारण, संरक्षण और उपयोग; और 2) पशु आनुवंशिक संसाधन प्रबंधन और नीतिगत मुद्दों में समन्वय और क्षमता निर्माण; ब्यूरो के अंतर्गत कई गतिविधियाँ संचालित होती हैं, जिनमें नई संभावित आबादियों का पता लगाने और उनका लक्षण-निर्धारण करने के लिए सर्वेक्षण करना, ऐसी आबादियों का आगे दस्तावेज़ीकरण और पंजीकरण करना; स्वदेशी नस्लों का प्राथमिकता निर्धारण और संरक्षण, विशिष्ट लक्षणों की पहचान और उनका मूल्यांकन और उपयोग शामिल है, जो सभी राज्यों को शामिल करता है। ब्यूरो देश में नस्ल पंजीकरण के लिए एक नोडल एजेंसी है। ब्यूरो द्वारा विकसित पशु नस्लों के पंजीकरण और राजपत्र अधिसूचना की रूपरेखा दुनिया में अद्वितीय है। देश के एक पशु ब्यूरो के रूप में, यह एएनजीआर से संबंधित संयुक्त राष्ट्र के खाद्य एवं कृषि संगठन सहित विभिन्न राष्ट्रीय और अंतर्राष्ट्रीय एजेंसियों के साथ समन्वय भी करता है। यह संयुक्त राष्ट्र के सतत विकास लक्ष्य 2 के संकेतक 2.5.1 और 2.5.2 के लिए एक नोडल एजेंसी भी है।

भारत में शून्य अवर्णनीय एएनजीआर की दिशा में मिशन

ब्यूरो ने 11 अगस्त, 2021 को "भारत में शून्य अवर्णनीय एएनजीआर मिशन" की शुरुआत की। इस मिशन के अंतर्गत, ब्यूरो ने पशुपालन विभागों, राज्य कृषि/पशु चिकित्सा विश्वविद्यालयों, पशुधन विकास बोर्डों/जैव विविधता बोर्डों/राज्यों के गैर-सरकारी संगठनों सहित विभिन्न पशु

हितधारकों के साथ राज्य इंटरफेस बैठकें आयोजित कीं ताकि उन्हें संबंधित राज्यों में एएनजीआर के दस्तावेजीकरण के लिए संवेदनशील बनाया जा सके।

2024 के अंत तक, मिशन के तहत 10 परियोजनाएँ देश के 15 राज्यों/केंद्र शासित प्रदेशों (छत्तीसगढ़, हिमाचल प्रदेश, गोवा, आंध्र प्रदेश, गुजरात, उत्तर प्रदेश, उत्तराखंड, मध्य प्रदेश, राजस्थान, केरल, तमिलनाडु, महाराष्ट्र, तेलंगाना और केंद्र शासित प्रदेश अंडमान और निकोबार तथा लद्दाख) को शामिल करते हुए राज्य के हितधारकों के सहयोग से विभिन्न राज्यों में एएनजीआर के सर्वेक्षण और दस्तावेजीकरण के लिए तैयार हैं। इसके अलावा, चार राज्यों: अरुणाचल प्रदेश, मिज़ोरम, नागालैंड और ओडिशा में एएनजीआर की पहचान और दस्तावेज़ीकरण के लिए सर्वेक्षण पूरा हो चुका है।

पशु नस्लों की राजपत्र अधिसूचना

2024 में, भारत सरकार के राजपत्र ने 10 नस्लों (अंडमान और निकोबार द्वीप समूह की अंडमानी बकरी, अंडमानी सुअर और अंडमानी बत्तख, महाराष्ट्र का भीमथड़ी घोड़ा, छत्तीसगढ़ की अंजोरी बकरी, आंध्र प्रदेश की मचेरला भेड़, गुजरात की अरावली मुर्गी और फ्राइज़वाल सिंथेटिक मवेशी नस्ल) को 5 दिसंबर, 2023 को पंजीकृत करने की अधिसूचना जारी की। नई नस्लों के पंजीकरण से देश में विभिन्न विकास कार्यक्रमों और नीति निर्माण की शुरुआत होती है।

देशी एएनजीआर का लक्षण-निर्धारण

पूर्वोत्तर पर्वतीय क्षेत्र सहित विभिन्न राज्यों में कई नई पहचानी गई समरूप आबादियों का फिनोटिपिक लक्षण-निर्धारण किया गया। इस वर्ष उत्तर प्रदेश की मिर्जापुरी भेड़, मिर्जापुरी गाय और मिर्जापुरी भैंस, महाराष्ट्र की मथुरा लभानी गाय, वरहदी गाय, जलकोट गाय और पश्मी कुत्ता, गोवा का लुटी कुत्ता, लक्षद्वीप की लक्षद्वीप बकरी, उत्तराखंड के देहरादून के कालसी और चकराता की गायों की आबादी, तमिलनाडु के नमक्कल में कोल्ली पहाड़ियों की गायों की आबादी और केरल के अट्टापडी

की गायों की आबादी का लक्षण-निर्धारण शुरू किया गया है। इन एएनजीआर का संक्षिप्त विवरण नीचे दिया गया है:

मिर्जापुरी भेड़: यह मध्यम आकार की भेड़ों की आबादी है जिसे हसारी या लालकाई (गुलाबी चेहरा) के रूप में जाना जाता है। यह उत्तर प्रदेश के मिर्जापुर, सोनभद्र और आसपास के क्षेत्र में वितरित है। इसे ऊन और मटन उत्पादन दोनों के लिए पाला जाता है। नर का वयस्क शरीर का वजन लगभग 40 किलोग्राम होता है। इस आबादी की विशेषता एक सफेद कोट है जिसके चेहरे, कानों और थूथन पर अलग-अलग आकार के छोटे हल्के से गहरे भूरे या काले धब्बे होते हैं। नाक की रेखा एक विशिष्ट रोमन प्रकार को दर्शाती है।

मिर्जापुरी गोवंश: ये गोवंश सफेद और हल्के भूरे रंग के होते हैं और प्रतिदिन लगभग 1-2 किलोग्राम दूध देते हैं। ये जानवर स्वभाव से शांत होते हैं और दिन-रात खेतों में खुलेआम चरते हैं।

मिर्ज़ापुरी भैंस: भेड़ और गोवंश के साथ-साथ, मिर्ज़ापुर जिले में देशी भैंसों की भी आबादी पाई जाती है। हालाँकि, इस भैंस की आबादी बढ़ाने के लिए मुर्रा नस्ल का उपयोग किया जा रहा है, जिससे देशी नस्ल के संरक्षण के लिए तत्काल हस्तक्षेप आवश्यक हो गया है।

मथुरा लभानी गोवंश: यह गोवंश महाराष्ट्र के नांदेड़ जिले में मथुरा लभान समुदाय द्वारा पाला जाता है। इन जानवरों की पहचान इनके सफेद बाल, मध्यम आकार के घुमावदार सींग और लंबी गर्दन हैं। इन जानवरों को दूध और भारवाही उद्देश्यों के लिए शून्य इनपुट प्रणाली में पाला जाता है। ये प्रतिदिन औसतन 2-4 लीटर दूध प्रदान करते हैं। जन्माष्टमी के मुख्य त्योहार के दौरान इन जानवरों को सजाया जाता है और जुलूसों में इस्तेमाल किया जाता है।

वरहदी गोवंश: वरहदी गोवंश का प्रजनन क्षेत्र अकोला, अमरावती और बुलढाणा जिलों में पाया जाता है। ये मध्यम से बड़े आकार के मवेशी होते हैं, आमतौर पर इनका कोट सफेद होता है, हालाँकि कुछ का रंग हल्का लाल या गुलाबी भी हो सकता है। ये पशु दूध उत्पादन और भार ढोने के लिए मूल्यवान हैं, ये प्रतिदिन औसतन 1.5 से 2 लीटर दूध का उत्पादन करते हैं, और इनका प्रबंधन शून्य इनपुट सिस्टम से किया जाता है। इस क्षेत्र की काली कपासी मिट्टी में पशुओं की भार ढोने की क्षमता और गर्मियों के मौसम में टिकाऊपन के कारण स्थानीय किसान इन पशुओं को पसंद करते हैं।

पश्मी कुत्ता: यह कुत्ता महाराष्ट्र के लातूर जिले में पाया जाता है। यह एक बुद्धिमान, संवेदनशील, वफादार और साहसी कुत्ता है। इसके कोट का रंग मुख्यतः काला होता है, लेकिन हल्का भूरा रंग भी पाया जाता है। इन्हें शिकार और रखवाली के लिए रखा जाता है।

जलकोट गोवंश: नांदेड़ जिले का बंजारा समुदाय जलकोट मवेशियों को पालता है। ये लाल-भूरे रंग के कोट वाले जानवर हैं, जिन पर अक्सर सफेद धब्बे होते हैं। इन पशुओं का उपयोग दूध उत्पादन और भारवाहन, दोनों उद्देश्यों के लिए किया जाता है। ये आमतौर पर प्रतिदिन 1-2 लीटर दूध देते हैं और इनका प्रबंधन शून्य इनपुट प्रणाली के अंतर्गत किया जाता है।

लूटी कुत्ता: लूटी कुत्ता एक शिकारी कुत्ता है जिसे गोवा के परमेंटालुका और आसपास के क्षेत्र के मूल निवासी पालते हैं। इस कुत्ते का रंग हल्का काला या भूरा होता है।

लक्षद्वीप बकरी: स्थानीय रूप से 'नादान आडू' के नाम से जानी जाने वाली यह बकरी लक्षद्वीप की एक देशी नस्ल है। यह मध्यम आकार की होती है, जिसकी गर्दन लंबी, चेहरा छोटा त्रिकोणीय और उभरी हुई ऊपरी कक्षा की लकीरें होती हैं। इसके क्षैतिज, ढीले कान और समग्र रूप इसे एक विशिष्ट हिरण जैसा रूप देते

हैं। यह बकरी लक्षद्वीप द्वीपसमूह की अनूठी गर्म-आर्द्र कृषि-पारिस्थितिक परिस्थितियों के अनुकूल हो गई है।

कोल्ली पहाड़ियों की गोवंश: गोवंश मध्यम आकार के होते हैं, जिनके बाल भूरे या भूरे रंग के होते हैं, और ये जुताई, गोबर और दूध उत्पादन के लिए मूल्यवान हैं। मुख्य रूप से बालों का रंग भूरा (60%), उसके बाद भूरे रंग का (30%) और लगभग 10% जानवर मिश्रित रंग के होते हैं।

अट्टापडी की गोवंश: अट्टापडी के देशी गोवंश मध्यम आकार के होते हैं, जिनकी औसत ऊँचाई 115-125 सेमी होती है। इनके बालों का रंग मुख्यतः लाल होता है, हालाँकि सफेद, भूरे और मिश्रित पैटर्न भी देखे जाते हैं। अधिकांश गोवंश बड़े सींग वाले होते हैं। इन गोवंश का पालन-पोषण अट्टापडी क्षेत्र में इरुलर जनजातियाँ करती हैं।

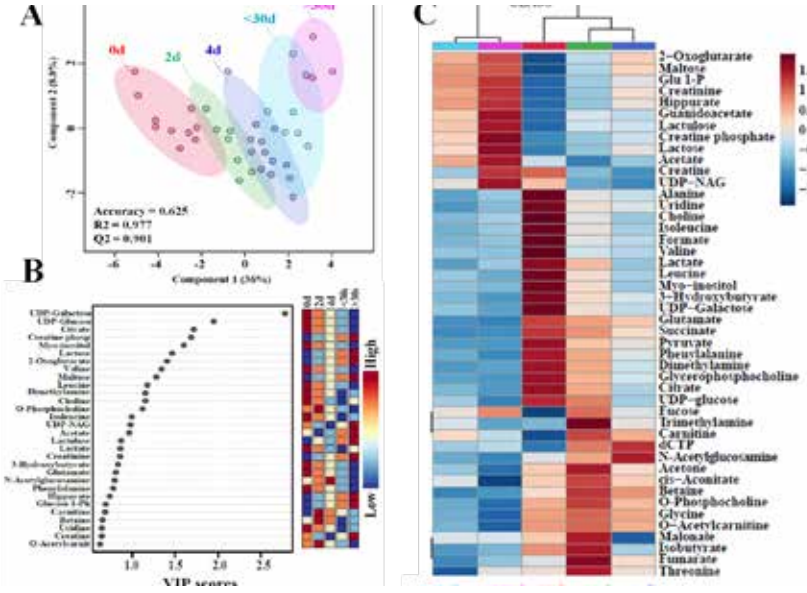
देशी एएनजीआर में जीनोमिक विविधता

नस्ल पहचान और वर्गीकरण में हमारे अन्वेषण के हिस्से के रूप में दो गैर-वर्णित आबादी, अर्थात् रांची/हजारीबाग (झारखंड) के झारखंडी और स्थानीय मवेशी, एक वर्णित मवेशी आबादी शाहाबादी और 18 पंजीकृत/विदेशी नस्लों (का विश्लेषण किया गया। यह पता चला कि बिहार की सभी पंजीकृत नस्लें/आबादी अर्थात बछुर, गंगातिरी, पूर्णिया, शाहाबादी के साथ साहीवाल मवेशियों की हरियाणा नस्ल के साथ समूहबद्ध हैं, जबकि शेष पंजीकृत नस्लें अर्थात ओंगले, देवनी, कंग्याम, गिर, ओंगोल, थारपारकर और दो विदेशी नस्लें अर्थात जर्सी और होल्स्टीन अलग से समूहबद्ध हैं।

भारत में नदी और दलदली भैंसों की आनुवंशिक विविधता और विकासवादी इतिहास, पूर्ण माइटोकॉन्ड्रियल जीनोम अनुक्रमों का उपयोग करके पता लगाया गया था। परिणामों ने नदी भैंसों में 212 परिवर्तनशील स्थलों के अस्तित्व को उजागर किया, परिवर्तनशील स्थलों के परिणामस्वरूप 12 हैप्लोटाइप प्राप्त हुए, जिनमें 0.950 की हैप्लोटाइप विविधता प्रदर्शित हुई। जातिवृत्तीय विश्लेषणों ने भारतीय दलदली भैंसों को मुख्यतः SA हैप्लोग्रुप में वर्गीकृत किया। इसके विपरीत, नदीय भैंसें स्थापित उप-हैप्लोग्रुप RB1, RB2, और RB3 के अनुरूप थीं, जिससे नदीय भैंसों के लिए एक प्रमुख पालतूकरण स्थल के रूप में उत्तर-पश्चिमी भारत की धारणा पर बल मिला।

तुलनात्मक जीनोम विश्लेषण हेतु 70K जीनोम-व्यापी एसएनपी के एक पैनल के लिए लाल जंगली मुर्गे के साथ 16 देशी नस्लों के 180 मुर्गी के नमूनों के संपूर्ण जीनोम अनुक्रमों का उपयोग किया गया। भारत के पूर्वी क्षेत्रों से उत्पन्न नस्लों ने उच्च जीनोमिक विविधता प्रदर्शित की, जो विशिष्ट जर्मप्लाज्म के समृद्ध भंडार का संकेत है। 0.084 का औसत अंतःप्रजनन गुणांक अंतःप्रजनन से जुड़े जोखिमों को कम करने की आवश्यकता पर आगाह करता है। आनुवंशिक संरचना ने भौगोलिक निकटता के आधार पर नस्लों के बीच संबंध का संकेत दिया।

भारतीय लाल जंगली मुर्गे की उच्च-रिज़ॉल्यूशन गुणसूत्र-स्तरीय जीनोम असेंबली PacBio HiFi, Hi-C और Illumina-आधारित संपूर्ण-जीनोम अनुक्रमण का उपयोग करके उत्पन्न की गई थी। पैनजीनोम ग्राफ संदर्भ हमारे Ggm असेंबली सहित 10 पूर्ण चिकन असेंबलियों का उपयोग करके बनाया गया था। Ggm



असेंबली ने बेहतर गुणवत्ता वाले मेट्रिक्स हासिल किए, जिसमें 44.69 एमबी का कॉन्टिग N50, 91.4 एमबी का स्कैफोल्ड N50 और 99.1% BUSCO पूर्णता शामिल है। लाल जंगली मुर्गे के जीनोम को असेंबल किया गया है और यह जीनोम असेंबली की मौजूदा असेंबलियों से बेहतर पाया गया है। पैनजीनोम ग्राफ संदर्भ में 158,786 नोड्स, 222,739 किनारे और 41 जुड़े हुए घटक शामिल थे

देशी एएनजीआर का मूल्यांकन और लक्षण-वर्णन

लद्दाखी गायों के लिपिडोम लक्षण: लिपिडोम डेटा में, कुल 541 लिपिड अणुओं की पहचान की गई, जिन्हें आठ मुख्य लिपिड श्रेणियों में विभाजित किया गया: स्फिंगोलिपिड्स, ग्लिसरोफॉस्फोलिपिड्स, फैटी एसाइल्स, ग्लिसरोलिपिड्स, स्टेरोल लिपिड्स, प्रीनोल लिपिड्स, पॉलीकेटाइड्स और सैक्रोलिपिड्स। लिपिड की सबसे अधिक संख्या ग्लिसरोफॉस्फोलिपिड्स (226) की श्रेणी में वर्गीकृत की गई, इसके बाद फैटी एसाइल्स (128), स्फिंगोलिपिड्स (91), ग्लिसरोलिपिड्स (79), स्टेरोल-लिपिड्स (34), अवर्गीकृत (27), फिनोल लिपिड (13), पॉलीकेटाइड्स (11) का स्थान रहा।

साहीवाल और लद्दाखी गायों के दूध में प्रतिरक्षा नियामक मापदंडों का आकलन: यह परीक्षण चूहों को 12 सप्ताह तक अलग-अलग खुराक (कम खुराक समूह: 75 ग्राम/किग्रा शरीर के वजन; मध्यम खुराक समूह: 150 ग्राम/किग्रा शरीर के वजन; और उच्च खुराक समूह: 225 ग्राम/किग्रा शरीर के वजन) में लद्दाखी और साहीवाल गायों के कोलोस्ट्रम पाउडर खिलाने के किसी भी विषाक्त/प्रतिकूल प्रभाव का मूल्यांकन करने के लिए किया गया था। परिणामों ने कोलोस्ट्रम खिलाने की मात्रा और शरीर के वजन के बीच उल्लेखनीय सहसंबंध दिखाया। विशेष रूप से, लद्दाखी और साहीवाल गायों के कोलोस्ट्रम पाउडर के 225 ग्राम/किग्रा शरीर के वजन वाले समूह ने कोलोस्ट्रम पाउडर की मध्यम या कम मात्रा प्राप्त करने वाले समूहों की तुलना में काफी अधिक शरीर के वजन में वृद्धि (क्रमशः 24.98 ग्राम ± 1.01 और 25.23 ग्राम ± 1.22) प्रदर्शित की। पूर्ण रक्त गणना (सीबीसी) से संबंधित विभिन्न मापदंडों का भी मूल्यांकन किया गया, जिससे पता चला कि कोलोस्ट्रम की खुराक के बावजूद, किसी भी समूह में सीबीसी मापदंडों में कोई बड़ा बदलाव नहीं आया। C57BL/6 चूहों की प्लीहा, छोटी आंत और यकृत के ऊतकों की ऊतकवैज्ञानिक जाँच में लद्दाखी और साहीवाल कोलोस्ट्रम के पूरक के कोई प्रतिकूल प्रभाव सामने नहीं आए।

लद्दाखी गायों और लद्दाखी याक के दूध की आधारभूत संरचना: लद्दाखी गायों और याक के कुल 124 दूध और कोलोस्ट्रम के नमूनों का विश्लेषण किया गया। इसके अतिरिक्त, एलिसा का उपयोग करके इम्युनोग्लोबुलिन, लैक्टोफेरिन, लैक्टोपेरक्सीडेज आदि के स्तर को भी मापा गया। लद्दाखी गायों में, वसा प्रतिशत कोलोस्ट्रम में सबसे अधिक (5.23±0.76) और मध्य-स्तनपान अवस्था में सबसे कम (4.69±0.03) था। प्रोटीन की मात्रा कोलोस्ट्रम (4.27±0.12) से स्तनपान के अंतिम चरण (3.38±0.07) तक कम हो गई, जबकि लैक्टोज़ की मात्रा कोलोस्ट्रम (2.71±0.09) से स्तनपान के अंतिम चरण (4.16±0.46) तक बढ़ गई। याक में भी यही प्रवृत्ति देखी गई, जहाँ कोलोस्ट्रम में वसा (6.3±0.56) और प्रोटीन (5.40±0.11) सबसे अधिक थे। इसके अतिरिक्त, FRAP, DPPH, और GSH के रूप में एंटीऑक्सीडेंट गतिविधि कोलोस्ट्रम में सबसे अधिक थी और स्तनपान के दौरान कम होती गई, जबकि लिपिड पेरोक्सीडेशन (LPO) में वृद्धि हुई। इम्यूनोग्लोबुलिन (IgG1, IgG2, IgM, IgA) कोलोस्ट्रम में सबसे अधिक थे, जबकि गायों में IgG1 की मात्रा 145.19 mg/mL (कोलोस्ट्रम) से घटकर 1.6 mg/mL (स्तनपान के अंतिम चरण) हो गई। कोलोस्ट्रम में लैक्टोफेरिन (0.6 µg/mL), लाइसोजाइम (1.1 µg/mL), और लैक्टोपरोक्सीडेज (2.2 µg/mL) जैसे रोगाणुरोधी पेप्टाइड्स की मात्रा सबसे अधिक थी और स्तनपान के साथ इनकी मात्रा

कम होती गई, सिवाय LPO के, जिसकी मात्रा बढ़ गई। लद्दाखी गायों और याकों के कोलोस्ट्रम में वसा, प्रोटीन, इम्युनोग्लोबुलिन और एंटीऑक्सीडेंट सबसे अधिक होते हैं, जो नवजात शिशु की प्रतिरक्षा के लिए अत्यंत आवश्यक हैं।

लद्दाखी याक के दूध के मेटाबोलोम का अभिलक्षणन: लद्दाखी याक के कोलोस्ट्रम, संक्रमण और परिपक्व दूध के नमूनों के मेटाबोलोम चिह्न NMR स्पेक्ट्रोस्कोपी का उपयोग करके तैयार किए गए। स्पेक्ट्रम के विश्लेषण से 46 मेटाबोलाइट्स की पहचान हुई, जिनमें मोनोसैकेराइड, डाइसैकेराइड, कार्बनिक अम्ल, नाइट्रोजनयुक्त कार्बनिक अम्ल, अमीनो अम्ल, न्यूक्लियोटाइड और अन्य यौगिक शामिल हैं। कोलोस्ट्रम मेटाबोलोम नवजात स्तनपायी की वृद्धि और विकास के लिए लाभकारी कई पोषक तत्व प्रदान करता प्रतीत होता है, जैसे शाखित श्रृंखला अमीनो अम्ल, अन्य आवश्यक अमीनो अम्ल, पाइरूवेट, सक्सीनेट और कोलीन। प्रसव के बाद के दिनों में, इन लाभकारी पोषक तत्वों का स्तर कम हो जाता है क्योंकि यह लैक्टोज़ की मात्रा में उल्लेखनीय वृद्धि के साथ एक नियमित दूध संरचना में विकसित हो जाता है। समग्र विश्लेषण से पता चला कि लद्दाखी याक का कोलोस्ट्रम मेटाबोलोम प्रकृति में काफी गतिशील है, जहाँ बड़ी संख्या में मेटाबोलाइट्स की सांद्रता 0-दिन से संक्रमण (2-दिन और 4-दिन) और परिपक्व दूध (<30-दिन और >30-दिन) तक कम हो जाती है।

चांगथांगी और जमुनापारी बकरियों के हृदय ऊतक की ट्रांसक्रिप्टोम प्रोफाइलिंग: दोनों नस्लों की तुलना से चांगथांगी में 372 और जमुनापारी में 282 विशिष्ट ट्रांसक्रिप्ट की खोज हुई, जबकि दोनों नस्लों में 13944 ट्रांसक्रिप्ट समान थे। दोनों नस्लों में सबसे अधिक अभिव्यक्त जीन मुख्य रूप से माइटोकॉन्ड्रियल इलेक्ट्रॉन परिवहन, एटीपी संश्लेषण-युग्मित इलेक्ट्रॉन परिवहन और हृदय पेशी संकुचन से संबंधित थे। जीन आन्टोलॉजी विश्लेषण ने चांगथांगी बकरी में डोपामाइन स्राव के नियमन, एग्रीफैगी, एटीपी-निर्भर सूक्ष्मनलिका मोटर गतिविधि और हीम ट्रांसपोर्टर गतिविधि जैसे कार्यों की पहचान की। चांगथांगी नस्ल में सबसे महत्वपूर्ण मार्ग एपेलिन संकेतन मार्ग था जो रक्त प्रवाह और रक्तचाप, फैलाव और वाहिकासंकीर्णन के नियंत्रण के साथ-साथ हृदय संकुचनशीलता और एंजियोजेनेसिस को मजबूत करने में शामिल है। यह अध्ययन विभिन्न जलवायु परिस्थितियों के अनुकूल दो बकरी नस्लों के हृदय ऊतक में भिन्न रूप से अभिव्यक्त जीन और मार्गों की जानकारी प्रदान करता है।

चांगथांगी बकरी में ऊंचाई अनुकूलन में योगदान देने वाले चयन चिह्न: अंतर-जनसंख्या दृष्टिकोणों का उपयोग करते हुए चयन स्वीप विश्लेषण किए गए। उम्मीदवार जीनों के कार्यात्मक संवर्धन विश्लेषण से एंजियोजेनेसिस के सकारात्मक नियमन, हृदय पेशी कोशिका विकास, वाहिकासंकीर्णन के नियमन, केराटिनोसाइट प्रसार जैसी प्रक्रियाओं में महत्वपूर्ण भागीदारी का पता चला। इसके अलावा, केराटिन (केआरटी) और केराटिन-संबंधित प्रोटीन (केआरटीएपी) को कूटबद्ध करने वाले जीनों की पहचान की गई, जिससे कश्मीरी रेशे के उत्पादन में उनकी महत्वपूर्ण भूमिका और चांगथांगी बकरी के उच्च-ऊंचाई अनुकूलन में योगदान पर प्रकाश डाला गया। पहचाने गए जीन, जिनमें BCL2, CACNG6, MAP3K9, SHISA9, ANGPTL3, NOS2, MAPKI0, BCL7C, PIK3CA, ACVR2B, ADGRB3, ADGRG6 शामिल हैं, संभवतः

चांगथांगी बकरी के ऊंचाई वाले वातावरणों के अनुकूलन के लिए अभिन्न अंग हैं।

पश्मीना रेशा उत्पादन में आणविक अंतर्दृष्टि: चांगथांगी बकरियों और भेड़ों, दोनों की त्वचा के ट्रांसक्रिप्टोमिक पैटर्न की तुलना की गई। पूर्व में किए गए अध्ययनों के आधार पर, दोनों प्रजातियों के बीच देखे गए भिन्न रूप से अभिव्यक्त जीनों से रेशे की विशेषताओं से सहसंबद्ध 225 जीनों का एक समूह निकाला गया। तुलनात्मक ट्रांसक्रिप्टोमिक विश्लेषण ने चांगथांगी बकरियों में Wnt, MAPK, PI3K-Akt और हेजहॉग सहित विभिन्न मार्गों में जीनों के उल्लेखनीय अपरेगुलेशन को दर्शाया, जो रेशा निर्माण और उसकी गुणवत्ता विशेषताओं के लिए महत्वपूर्ण हैं। कोशिका आसंजन अणुओं और ECM-ग्राही अंतःक्रियाओं के बारे में अतिरिक्त अंतर्दृष्टि प्राप्त हुई, जो रोम कूपों की संरचना, वृद्धि और संकेतन के लिए महत्वपूर्ण हैं। यह अध्ययन चांगथांगी बकरियों में पश्मीना उत्पादन को नियंत्रित करने वाली आणविक जटिलताओं की गहन समझ प्रदान करता है।

भैंसों में वीर्य की गुणवत्ता के बायोमार्कर: प्रत्येक समूह के नौ सांडों पर, मौसमी रूप से प्रभावित और अप्रभावित, संपूर्ण जीनोम अनुक्रमण डेटा तैयार किया गया। महत्वपूर्ण एलील आवृत्ति भिन्नता वाले जीनों का दस्तावेजीकरण किया गया और उत्प्रेरक, बंधन, कोशिकीय संरचना, जैविक विनियमन, कोशिकीय प्रक्रिया GO शब्द थे, जो सबसे समृद्ध थे। प्रोटीन संरचना और कार्य पर गलत अर्थ वाले SNP के संभावित प्रभाव का विश्लेषण किया गया और एपोप्टोसिस, सूजन, क्रोमेटिन रीमॉडलिंग, प्रतिरक्षा प्रतिक्रिया और शुक्राणु संरचना और गतिशीलता से संबंधित जीनों की पहचान की गई। सांडों में वीर्य की गुणवत्ता से जुड़े विशिष्ट जीनों में चयनित गलत अर्थ वाले SNP के जीनोटाइप विश्लेषण से महत्वपूर्ण अंतर दिखाई दिए, जिससे पता चला कि लक्ष्य जीन में ये SNPS भीषण गर्मी के दौरान वीर्य की गुणवत्ता में अंतर के संभावित मार्कर हैं।

देशी एएनजीआर का संरक्षण

2024 के दौरान, पाँच पशुधन प्रजातियों से संबंधित 45 देशी नस्लों: मवेशी-15, भैंस-8, भेड़-9, बकरी-12, और घोड़ा-1, को दैहिक कोशिकाओं के रूप में संरक्षित किया गया। इनमें से नौ नस्ल ब्यूरो द्वारा बनाई गई निगरानी सूची 2022 के अनुसार गंभीर, संकटग्रस्त या कमजोर श्रेणियों में आती हैं। अब तक, आईसीएआर-एनबीएजीआर राष्ट्रीय जीन बैंक में 10 प्रजातियों की 110 पशुधन नस्लों को क्रायोप्रिजर्व किया जा चुका है। इसमें 38 संकटग्रस्त/संकटग्रस्त/असुरक्षित आबादियों में से 27 शामिल

हैं। यह प्रयास संयुक्त राष्ट्र सतत विकास लक्ष्य 2.5.1 में निहित राष्ट्रीय दायित्व को पूरा करने में योगदान देता है।

राष्ट्रीय गोजातीय जीनोमिक केंद्र - स्वदेशी नस्लें

माननीय प्रधानमंत्री श्री नरेंद्र मोदी ने 5 अक्टूबर, 2024 को महाराष्ट्र के वाशिम में मवेशियों और भैंसों के लिए एकीकृत जीनोमिक चिप का शुभारंभ किया। उन्होंने गायों के लिए "गौ चिप" और भैंसों के लिए "महिष चिप" का उद्घाटन किया। इन नवाचारों से भारत में पशुधन प्रजनन में क्रांतिकारी सुधार आने की उम्मीद है। ये जीनोमिक चिप्स राष्ट्रीय डेयरी विकास बोर्ड और आईसीएआर-राष्ट्रीय पशु आनुवंशिक संसाधन ब्यूरो द्वारा राष्ट्रीय गोकुल मिशन के तहत विकसित किए गए हैं। इसके अलावा, एसएनपी जीनोटाइपिंग के लिए एनडीडीबी, आणंद के विभिन्न केंद्रों, एनबीजीसी-आईबी, आईसीएआर-एनबीएजीआर, करनाल से मवेशियों और भैंसों के कुल 2750 रक्त नमूने प्राप्त हुए। ये नमूने 4 मवेशियों और 2 भैंस नस्लों के थे। कुल नमूनों में से 1637 नमूने मवेशियों और 1113 नमूने भैंस नस्लों के थे।

एएनजीआर पर नेटवर्क परियोजना

मिशन के अनुरूप, विभिन्न राज्यों में स्वदेशी एएनजीआर के दस्तावेज़ीकरण और संभावित आबादियों के लक्षण-निर्धारण एवं पंजीकरण हेतु नेटवर्क परियोजना (NWP) केंद्र स्थापित किए गए। 2023-24 में 27 NWP केंद्र और 2024-25 में 26 राज्यों/केंद्र शासित प्रदेशों में कुल 32 NWP केंद्र स्थापित किए गए। 2024 के दौरान, स्वदेशी पशुधन और कुक्कुट की 68 संभावित आबादियों का लक्षण-प्ररूपी लक्षण-निर्धारण किया गया। इनमें 15 आबादियाँ गाय, 7 भैंस, 8 भेड़, 14 बकरी, 2 सुअर, 14 मुर्गियाँ, 2 बत्तख, 2 कुत्ते, 3 घोड़े और टट्टू और एक याक शामिल थे। 68 स्वदेशी पशुधन और कुक्कुट आबादियों के लक्षण-निर्धारण और पाँच महत्वपूर्ण नस्लों (तिब्बती और करनाह भेड़, मेवाड़ी ऊँट, ज़ांस्करी टट्टू और हलारी गधा) के संरक्षण के लिए कुल 27 केंद्र शामिल थे।

अनुसंधान परियोजनाएँ और प्रकाशन

ब्यूरो के अनुसंधान प्रयास 39 अनुसंधान परियोजनाओं के अंतर्गत संपन्न हुए, जिनमें 12 बाह्य वित्तपोषित परियोजनाएँ और एक IAEA अंतर्राष्ट्रीय परियोजना शामिल है। वर्ष के दौरान, ब्यूरो के वैज्ञानिकों ने 51 शोध पत्र प्रकाशित किए, जिनमें से 38 अंतर्राष्ट्रीय पत्रिकाओं में प्रकाशित हुए।

पुरस्कार और मान्यताएँ

ब्यूरो के वैज्ञानिकों और विद्वानों के अनुसंधान प्रयासों को सम्मेलनों/सेमिनारों और वैज्ञानिक समितियों की फेलोशिप के दौरान सर्वश्रेष्ठ प्रस्तुति पुरस्कारों के रूप में सराहा गया। ये पुरस्कार पशु आनुवंशिक संसाधनों के प्रबंधन और संरक्षण के क्षेत्र में ब्यूरो की भूमिका को रेखांकित करते हैं।

क्षमता निर्माण

ब्यूरो ने ओडिशा राज्य के क्षेत्रीय पशु चिकित्सकों के लिए "देशी पशु आनुवंशिक संसाधनों (एएनजीआर) का लक्षण वर्णन, पंजीकरण और संरक्षण" पर दो प्रशिक्षण कार्यक्रम आयोजित किए।

किसान जागरूकता कार्यक्रम एवं समारोह

ब्यूरो ने देश के विभिन्न भागों में विभिन्न एससीएसपी/किसान जागरूकता कार्यक्रम आयोजित किए और प्रदर्शनियाँ लगाईं। ब्यूरो ने 23 दिसंबर, 2024 को "राष्ट्रीय किसान दिवस" पर "नस्ल संरक्षण पुरस्कार-2024" का आयोजन किया और देश भर के पशुपालकों/किसानों और संस्थाओं को देशी पशु नस्लों के संरक्षण हेतु उनके प्रयासों के लिए सम्मानित किया। देशी नस्लों के संरक्षण और सुधार के लिए कुल 5 किसानों/पशुपालकों और पाँच संस्थाओं/संगठनों को सम्मानित किया गया। वर्ष के दौरान अंतर्राष्ट्रीय जैव विविधता दिवस, राष्ट्रीय एकता दिवस, महिला किसान दिवस, विश्व खाद्य दिवस, राष्ट्रीय एकता दिवस, गणतंत्र दिवस और स्वतंत्रता दिवस पूरे उत्साह के साथ मनाए गए। राष्ट्रीय स्वच्छता अभियान और अपशिष्ट से धन अभियान

जैसे विभिन्न आयोजनों में ब्यूरो कर्मचारियों की सक्रिय भागीदारी स्पष्ट रही।

बैठकें

संस्थान अनुसंधान समिति (आईआरसी), अनुसंधान सलाहकार समिति (आरएसी) और नेटवर्क परियोजना की वार्षिक समीक्षा बैठक के समय पर आयोजन द्वारा विभिन्न अनुसंधान परियोजनाओं की प्रगति की समीक्षा सुनिश्चित की गई। ब्यूरो ने 9 जनवरी, 2024 को पशुपालन सांख्यिकी विभाग, पशुपालन विभाग द्वारा पशुपालन विभाग, नई दिल्ली में आयोजित तकनीकी समिति-पशुधन गणना 2024 की बैठक में भी भाग लिया और देश में नस्लवार पशुधन गणना आयोजित करने के तौर-तरीकों पर चर्चा की। इसके अलावा, 21 मई, 2024 को "कृषि जैव सूचना विज्ञान और कम्प्यूटेशनल जीव विज्ञान" पर नेटवर्क परियोजना की संचालन समिति की बैठक भी आयोजित की गई। संस्थान की बाह्य वित्तपोषित परियोजनाओं की भी संबंधित वित्त पोषण एजेंसियों द्वारा समीक्षा की गई। संस्थान प्रबंधन समिति की बैठक में संस्थान के विभिन्न प्रबंधन मुद्दों पर चर्चा की गई।

कार्मिक

वर्ष 2024 के दौरान, तीन तकनीकी कर्मचारी और दो वरिष्ठ प्रशासनिक अधिकारी ब्यूरो में शामिल हुए। इस दौरान, एक वैज्ञानिक और एक तकनीकी कर्मचारी सेवानिवृत्त हुए, और एक प्रशासनिक कर्मचारी का संस्थान से स्थानांतरण हुआ। कई प्रतिष्ठित कर्मचारियों ने ब्यूरो का दौरा किया।

INSTITUTE'S PROFILE

भाकृअनुप
ICAR

NBAGR
रा.प.आ.सं.ब्यूरो

Bureau at a Glance

Established on 21st September 1984, ICAR-National Bureau of Animal Genetic Resources (NBAGR) is working with a mission to protect and conserve indigenous Farm Animal Genetic Resources for sustainable utilization and livelihood security, with many important national and international commitments, to date. The bureau has achieved a number of milestones, including registration of 220 and Gazette notification of 212 animal breeds from all parts of the country. This has enabled the recognition of around 50 percent of native livestock of the country as descript. Further, with a target of zero non-descript AnGR in the country, the Bureau has also initiated a country-wide survey since August 2021 in collaboration with State AHDs, ICAR institutes, SAUs, NGOs, etc. in mission mode. Since inception, hundreds of new potential breeds, were identified and characterized. For the long-term conservation program as also included under SDG Indicator 2.5.1, the Bureau has cryopreserved the germplasm for native breeds in form of semen and somatic cells. Further, the Bureau has also conserved many threatened breeds, in their native tracts through involving livestock keepers and stakeholders under the network program. The knowledge about genetic diversity and genomic uniqueness of native breeds has been enriched through genomics research. The molecular genetic work carried out at NBAGR has resulted in some important technologies including SNP chips for most of the animal species. Research at the Bureau has also enabled to identify unique traits like thermotolerance, endurance as well as the uniqueness of the products of native breeds; which would help in the value addition of native breeds. The quality of research carried out by NBAGR scientists is authenticated by published articles in national and international research journals of very high impact factors and their citations. Apart from the research, NBAGR is actively involved in creating awareness about the indigenous livestock, their upkeep and conservation through interactions with farmers during their visits to the breeding tracts. Despite of its small scientific strength, the Bureau has born the greatest responsibility towards native animals and their keepers and strived hard to protect the precious animal biodiversity.

Vision

Striving for excellence in innovative research to identify genetic potential of indigenous livestock for improvement and conservation.

Mission

To protect and conserve indigenous Farm Animal Genetic Resources for sustainable utilization and livelihood security.

Mandate

- Identification, evaluation, characterization, conservation and sustainable utilization of livestock and poultry genetic resources of the country
- Coordination and capacity building in animal genetic resources management and policy issues.

Objectives

- To conduct systematic surveys to characterize, evaluate and catalogue farm livestock and poultry genetic resources and to establish their National Data Base.
- To design methodologies for *ex-situ* conservation and *in-situ* management and optimal utilization of farm animal genetic resources.
- To undertake studies on genetic characterization using modern techniques of molecular biology.
- To conduct training programmes as related to evaluation, characterization and utilization of animal genetic resources.

Organogram

ICAR- National Bureau of Animal Genetic Resources

- Research Advisory Committee
- Director
- Institute Research Committee
- Institute Management Committee
  - Administration
    - Establishment Section
    - Finance & Accounts Section
    - Cash & Bill Section
    - Purchase Section
    - Stores Section
  - Management
    - Director Cell
    - PME Cell
    - ITMU
    - IBSC
    - Breed Registration Cell
    - Rajbhasha Cell
    - Grievance Cell
    - Women Cell
    - IJSC
    - HRD Cell
  - Research
    - Division of Animal Genetic Resources
      - National Gene Bank
      - LIMU
    - Division of Animal Genetics
    - Division of Animal Biotechnology
      - Genetic Testing Lab.
    - Survey Groups
      - NEH Groups (8)
      - Functional Groups (7)
    - Network Project on AnGR
      - Survey Unit
      - Conservation Unit
    - Central Facilities
      - Library
      - Central Instrumentation Facility
      - Photography and Exhibition Unit
      - Computer Section
      - Farm Section
      - Estate Section
      - Guest House
      - Community Centre

History and Organisational Setup

Institute's history

With the realization of unique significance of tropical animal and poultry genetic resources and their potential utilization at global level, a need was felt for an organization which could undertake the responsibility of evaluating, certifying and conserving the rich and varied germplasm resources available in the country and whose genetic base is shrinking fast. Thus, the establishment of National Bureau of Animal Genetic Resources/National Institute of Animal Genetic in 1984 was a culmination of sustained efforts made by the leading geneticists in the country over the years.

The establishment of National Bureau of Animal Genetic Resources/Institute of Animal Genetics was approved in principal during IV-Five Year Plan. In this regard, effective follow-up steps were taken in the V and VI Five Year Plans. Finally, the Institute was set up on 21st September, 1984 at the campus at National Dairy Research Institute (Southern Regional Station), Bangalore. Subsequently on 19th July, 1985 the Institute was shifted to Karnal and temporarily located in the campus of National Dairy Research Institute, Karnal.

Landmark

1984
Birth place of institute at NDRI, Banglore

1985
Shifting of Institute To Karnal

Foundation stone of NBAGR/NIAG

1995
NBAGR & NIAB merged

New office building foundation laid for NBAGR

1998
NBAGR building inaugurated

2002
First Information System AGR-IS

2008
Initiation of Breed Registration process in India Registration of 129 extant breeds.

Bureau designated as repository for domestic animals by MoEF under BDA 2002

2009
Bureau celebrated Silver Jubilee

2010
Cryopreservation of 100 Thousand semen doses

2012
Release of first river buffalo genome draft

2013
Initiating Breed wise Census based on registered breeds of Bureau

Establishing Divisions

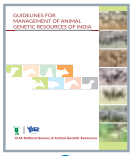
2015
Registration of lines initiated by ICAR-NBAGR

The foundation stone of NBAGR/NIAG was laid by Hon'ble Union Minister of Agriculture Sh. Buta Singh Ji, on 19th July, 1985. In 1995 the National Bureau of Animal Genetic Resources and National Institute of Animal Genetics were merged to function as a single unit, known as National Bureau of Animal Genetic Resources (NBAGR). The new office cum lab building of NBAGR was inaugurated on 28th November, 1998 by Hon'ble Sh. Som Pal Ji, Minister of State for Agriculture, Govt. of India.

Institute's organisational setup

Since it's inception, ICAR-NBAGR has been evolved both in its organizational as well as functional setup. The institute engages in a variety of activities & posseses all traditional establishments such as divisions and sections. Additionally, it also has some of establishments unique to its kind, including National Gene Bank, for cryopreservation of germplasm of native breeds, Functional Groups for conducting survey in various states and regions and Breed Registration Cell for registering the breeds and other germplasm in the country. Three Divisions, although existed since long, were formally approved by the ICAR in 2013 (ICAR letter. No. AS 5/21/2012.IA.I dated 22.07.2013). The division currently works in coordination to achieve the institute's mandated targets and objectives. Further,

Events

2016

Guidelines for the management of AnGR of India released

Cryopreservation of Somatic Cells

2017
Breed Conservation Award initiated by ICAR-NBAGR

2018
Establishment of NBGC-IB

2019
Gazette Notification of breeds by Govt. of India

bureau included in SDG2-NIF

2020
Indigenous Dog breeds registered for the first time in India

SNP chip for indigenous livestock & poultry developed

2021
Strengthening DNA repository of Indian breeds

Mission towards Zero Non-Descript AnGR of India initiated by ICAR-NBAGR

Establishing Breed Registration Cell

2022

Release of National Watchlist 2022

Germplasm cryopreservation for 29 breeds, the highest in any year

2023
India elected Vice-chair in 12th session of ITWG-AnGR of the FAO

2024

Hon'ble Prime Minister released Unified SNP Chips *(Gau & Mahish)*

NABL accreditation of Genetic Testing Lab

institute also serves as coordinating centre for Network Program on Animal Genetic Resources (NWP-AnGR) to characterize and conserve the native breeds in collaboration with various agencies in the country. In 2018, DAHD, GoI has also established a National Bovine Genomic Centre for Indigenous Breeds at NBAGR. A brief description of the organizational set up of NBAGR and its functioning is given below:

Animal Genetic Resource Division: The Animal Genetic Resources (AGR) division came into existence after a number of transformations. At present the AGR division is engaged in phenotypic characterization, sustainable utilization and conservation of indigenous livestock and poultry breeds. Based on the information, new strategies have been formulated for improvement and conservation of the breeds under field conditions. The *in-situ* conservation has been implemented for breeds of various livestock species. In addition, the division is actively working in the frontier areas of long-term cryopreservation of germplasm with fully functional 'National Gene Bank'.

Animal Genetics Division: The AG division first time established in year 1996, and finally got the nod by the ICAR in 2013. The division's objective is 'Molecular, immunological, biochemical, cytogenetic characterization and candidate gene analysis of livestock species'. At present, the division is engaged in molecular characterization and population diversity analysis of native breeds of livestock and poultry species using genome-wide molecular markers such as microsatellites and SNPs. Cytogenetic and immunogenetics studies are also being pursued, cytogenetic testing lab provides service, support to all state animal husbandry department semen stations.

Animal Biotechnology Division: This Division was established in 2013 after re-organizing the erstwhile DNA Fingerprinting Unit. The division has the objective of 'Evaluation of functional genes/biomolecules for enhancing AnGR utilization'. Animal Biotechnology Division is dedicated to conduct the research on identification and evaluation of genes, and transcripts involved in adaptation, disease resistance and various production related traits of livestock species. DNA bank under this division provide support to National Gene Bank.

Network Project Unit: The Network project was established in 1996 with the following objectives- 1. To characterize the breeds in terms of both qualitative and quantitative traits, 2. To conduct molecular genetic characterization and candidate gene studies in indigenous breeds, 3. To develop the breed descriptors and conserve germplasm. Initially, there were eight centers in VII plan for characterization of breeds, which increased to 17 in XII plan. Presently, state wise centres are proposed in the current plan (2021-26).

Livestock Information Management Unit: This unit is engaged in digitalizing of information on AnGR in the country an easily retrievable format for the users.

NEH & State Functional Groups: Apart from the divisions, the state specific groups were created to conduct surveys of native AnGR in their respective state. There are eight North-East Hill (NEH) state groups, one for each eight NEH states. For other twenty states and

two Union Territories, seven functional groups also exist in the bureau.

Functional Group 1: Uttarakhand, Uttar Pradesh & Karnataka

Functional Group 2: Andhra Pradesh, Telangana, Kerala & Tamil Nadu

Functional Group 3: Bihar, Jharkhand, Punjab & Haryana

Functional Group 4: Goa, Maharashtra, Gujarat & Himachal Pradesh

Functional Group 5: Madhya Pradesh, Chhattisgarh & Rajasthan

Functional Group 6: West Bengal, Odisha, Ladakh (UT) & Jammu & Kashmir (UT)

Functional Group 7: Union Territories (other than Jammu & Kashmir and Ladakh)

NEH Groups (1-8): Mizoram, Meghalaya, Arunachal Pradesh, Sikkim, Tripura, Nagaland, Manipur and Assam

National Gene Bank: A National Gene Bank has been established at NBAGR with the objective of maintaining the indigenous livestock biodiversity of the country. The Gene Bank preserves germplasm in the form of semen and somatic cells of native breeds for long term preservation. At present, the Gene Bank has the cryopreserved germplasm of 50 native breeds/ populations in form of semen (~2.5 Lakh doses) and 110 breeds/populations in form of somatic cells.

DNA Bank: A DNA bank has been established in the bureau as a DNA repository of native livestock and poultry breeds. At present DNA of 169 animal breeds/populations has been cryopreserved for medium term conservations.

Breed Registration Cell: This unit has been created in 2021 as a separate entity for registration of the breeds and other germplasm of the animal genetic resources in the country. It has well established framework of the registration of breeds from the entire country.

Photography and Exhibition Unit: This unit is working towards documenting the photographs and videos of native breeds and their production systems. The unit is also involved in raising awareness among farmers and stakeholders about native breeds through exhibitions and livestock fairs.

Central Instrumentation Facility and research labs: The institute possesses total 17 divisional and one Central Instrumentation Facility (CIF) laboratories for conducting lab-based research. All the labs are equipped with advanced molecular technology tools, required equipments and facilities.

Computer Section: This section provides LAN, Internet and computing facility to the institute.

Priorities and Activities

High Performance Computing facility: This facility was established in 2014 to provide the computational power for various bioinformatics-based research. With the help of the HPC, a large whole genome-based sequences of native breeds are being analyzed.

Testing services: The institute also provides various testing services to the stakeholders. It offers services such as karyotyping, genetic disease screening, and A1-A2 milk testing of breeding bulls and cows to the various governmental agencies and farmers at nominal charges.

Institute Library: Institute has its own library with thousands of books specific to Animal Genetic Resources in country and world. It possesses all the monographs, bulletins, books and other scientific literature specific to native breeds and germplasm. The library also subscribes many National and International Journals in the specialized area of AnGR.

National Bovine Genome Centre for Indigenous Breeds (NBGC-IB): Department of Animal Husbandry and Dairying, Govt. of India, established National Bovine Genomics Center at ICAR-National Bureau of Animal Genetic Resources Karnal in 2018 to initiate the genomic selection in native cattle and buffalo breeds under Rastriya Gokul Mission. Seven breeds of cattle and four breeds of buffaloes have been prioritized for implementing in the first phase of Genomic Selection.

Institute's Priorities

Documenting all native AnGR in country with Zero non-descript target: AnGR documentation is the most crucial activity in management of AnGR biodiversity in country. The NBAGR with all its efforts has documented about 46 percent of all AnGR of the country. The institute priority is to document remaining 54 percent native AnGR in coming years. The mission of achieving zero non-discript AnGR has already been initiated in collaboration of state and central agencies.

Identification of new native breeds: NBAGR has recognized more than 100 new breeds and homogenous population in country. However, there are still several of unique populations of native AnGR which needs to be identified. Zero non-descript AnGR mission aims to recognize about 100 or more new breeds in country.

Completing breed inventory and providing statutory recognition: A total of 219 indigenous breeds & 1 synthetic breed have been registered by the NBAGR and 212 indigenous breeds have also been notified through Official Gazette to provide statutory recognition. In comming years, more than 100 new breeds would be given statutory recognition after their registration.

Cryopreservation of germplasm of all native AnGR in country: The institute is already engaged in cryopreservation of germplasm in form of semen, somatic cells, and DNA to protect the native germplasm and to prevent the future extinction, also assessing temporal genomic changes in a breed. Germplasm of all kind of breeds/distinct populations would be preserved in gamete, somatic cell and embryo form on priority.

Assessing genetic diversity in native AnGR: Genetic diversity is the key factor for sustained improvement and adaptiveness to the future challenges. Assessing genetic diversity at population, breed and species level, is a continuous activity, with use of modern techniques like WGS, SNP chip etc.

Trait characterization of native AnGR: Identifying unique traits and characterizing them at phenotypic, biochemical and molecular levels will help in identifying specific alleles, genes, proteins or metabolites, pathways that can be utilized further. Traits like climatic adaptation, endurance, disease resistance, unique produce etc of native breeds will be characterized further. Validation of traditional knowledge pertaining to AnGR will also be essential in coming years.

Statutory framework for Protection of indigenous breeds and Livestock keepers' Rights: Establishing statutory framework is essential to provide benefits to community and livestock owners. Developing breed societies and maintaining Breed Register for each breed will be essential for implementing improvement programs and ensuring market benefits. Bureau is striving towards providing legel protection to indigenous breeds.

Fulfilling National and international commitments: NBAGR is fulfilling United Nations' Sustainable Development Goal 2 (Zero Hunger) for Target 2.5 (Indicator 2.5.1: Number of plant and animal genetic resources for food and agriculture secured in either medium or long-term conservation facilities. NBAGR cryopreservation activities included as National Indicator Framework (NIF) 2.5.1 of the National Statistical Office. Documentation of native AnGR is as per FAO's Global Plan of Action, CBD's Aichi and Delhi Declaration' 2016 targets. Further NBAGR is also committed to fulfil the targets of different National Programs and Prime Minister's announcements and NITI Ayog- Output Outcome Framework.

Institute's activities

The institute has following major activities to fulfill the objectives and priorities:

Identification, Characterization and documentation of native AnGR in country

- Survey and documentation of entire livestock and poultry population in country with a target towards Zero Non- Descript AnGR in country.
- Identification and characterization of homogenous populations qualifying for breed.
- Registration and notification of all types of livestock and poultry populations.

Conservation of native breeds of livestock and poultry species

- *In-situ* conservation of threatened breeds of livestock and poultry.
- Cryopreservation of germplasm of registered breeds.
- Assessing risk status of native breeds and prioritising for conservation.

Genomics for population structure and diversity of native AnGR

- Assessing genomic diversity and uniqueness of all registered livestock and poultry breeds.
- Developing molecular signature for breed standard of native breeds.
- Creation of *genome* assemblies for native breeds of high importance.

Trait characterization of native AnGR for value addition

- Characterization of unique products of native germplasm for value addition and GI
- Identification of biomolecules in milk and meat of native germplasm and their effect/utility for human nutrition and health
- Transcriptome and metabolome for evaluating adaptive and other traits of native breeds

Policy support and Capacity building for AnGR management

- Creation of databases and other ICT on AnGR for policy support in the country.
- Developing policy support for AnGR management in states.
- Organizing training and sensitization programs for management of AnGR.
- Providing consultancy services to government agencies for policy support.

What NBAGR can offer

- Registration of animal breeds/lines, applied by any citizen of India
- Expertise for policy formation and trainings on AnGR management and development in country
- Methodology for breed survey, identification, characterization, conservation
- Scientific literature and information on native breeds
- Karyotyping and DNA Testing for genetic diseases, A1A2 allele testing in bovines
- Recognising stakeholders for conserving native germplasm by conferring National level Awards
- Training programme on AnGR management

Major achievements and impact

INSTITUTE'S MAJOR ACHIEVEMENTS

- Characterization and documentation of 248 breed/populations of native livestock and poultry in country.
- Registration of 220 animal breeds and Gazatte notification of 212 indigenous animal breeds.
- Cryopreservation of germplasm of around 50% Indigenous animal breeds.
- *In situ* conservation of 17 native animal breeds.
- Omics based trait characterization of native breeds.
- AGR-IS database on native AnGR of India.
- SNP chips for native animal breeds.

INSTITUTE'S IMPACT

International

- Inducted in SDG-NIF/GBF goals: Nodal point for SDG 2.5.1 and 2.5.2.

National

- Statutory recognition & germplasm protection of 212 native animal breeds after notification.
- Descript livestock population increased upto about 46%.
- 91 new animal breeds described around 25 million livestock in country.
- Initiated Breed-wise Livestock Census in the country by DAHD, GoI.
- Induction of NBAGR registered breeds under National Kamdhenu Breeding Centre.
- Climate resilience in native breeds addressed the future need.

State

- Linkages with all states AHD for AnGR management in the country.
- Breeding policies for registered breeds being developed by respective states.
- Recognising more germplasm/ breeds from remote areas (NEH).
- *In situ* conservation of threatened animal breeds.
- Genetic testing of about 3300 tested bulls used for semen production in State Govt. agencies (SAHD/SLDB).
- Awareness about AnGR management among state AHD.

STAKEHOLDERS

- Increased registration of animal breeds applied by stakeholders.
- Establishing breed societies by the local livestock keepers.
- Recognition of farmers/stakeholders through Breed Conservation Award.

ब्यूरो एक नजर में

21 सितंबर 1984 को स्थापित, भाकृअनुप-राष्ट्रीय पशु आनुवंशिक संसाधन ब्यूरो (रापआनुसं ब्यूरो) कई महत्वपूर्ण राष्ट्रीय और अंतरराष्ट्रीय प्रतिबद्धताओं के साथ, स्वदेशी कृषि पशु आनुवंशिक संसाधनों की रक्षा, संरक्षण एवं सतत उपयोग एवं लोगों की आजीविका सुरक्षा मिशन के साथ काम कर रहा है। ब्यूरो ने अब तक देश के सभी हिस्सों से 220 पशुधन की नस्लों के पंजीकरण एवं 212 देशी नस्लों की अधिसूचना सहित अनेक महत्वपूर्ण उपलब्धियां हासिल की है। इससे देश के लगभग 46 प्रतिशत देशी पशुधन को विवरण प्राप्त नस्ल के रूप में मान्यता मिल सकी है। इसके अलावा, देश में शून्य गैर-वर्णित पशु आनुवंशिक संसाधन के लक्ष्य के साथ, ब्यूरो ने मिशन मोड में राज्यों के पशुपालन विभाग एवं राज्य कृषि विश्वविद्यालयों के सहयोग से अगस्त 2021 से देशव्यापी सर्वेक्षण भी शुरू किया है। स्थापना के बाद से, सैकड़ों नई देशी पशु नस्लों की पहचान की गई और उनकी विशेषताओं का वर्णन किया गया। एसडीजी संकेतक 2.5.1 में सम्मिलित किए गए दीर्घकालिक संरक्षण कार्यक्रम के लिए, ब्यूरो ने वीर्य और दैहिक कोशिकाओं के रूप में देशी नस्लों के लिए जर्मप्लाज्म को संरक्षित रखा है। इसके अलावा, ब्यूरो ने नेटवर्क कार्यक्रम के तहत पशुधन रखने वालों और हितधारकों को शामिल करके विलुप्ति के कगार पर आई कई नस्लों को उनके मूल इलाकों में संरक्षित किया है। देशी नस्लों की आनुवंशिक विविधता और जीनोमिक विशिष्टता के बारे में ज्ञान को जीनोमिक्स अनुसंधान के माध्यम से समृद्ध किया गया। एनबीएजीआर में किए गए आणविक आनुवंशिक अनुसन्धान कार्यों के परिणामस्वरूप कई पशुधन और कुक्कुट प्रजातियों के लिए एसएनपी चिप सहित अनेक महत्वपूर्ण प्रौद्योगिकियां विकसित की गई हैं। ब्यूरो में हुए अनुसंधान कार्यों से देशी नस्लों के तापमान सहिष्णुता, सहनशक्ति जैसे अद्वितीय लक्षणों की पहचान के साथ-साथ उनके उत्पादों की विशिष्टताओं का वर्णन भी संभव हो सका है; जो देशी नस्लों के मूल्यांकन में मदद करेगा। वैज्ञानिकों द्वारा किए गए शोध की गुणवत्ता उच्च श्रेणी के राष्ट्रीय और अंतर्राष्ट्रीय शोध पत्रिकाओं में प्रकाशित लेखों द्वारा प्रमाणित होती है। अनुसंधान के अलावा, संस्थान किसानों में स्वदेशी पशुधन, उनका रखरखाव और संरक्षण के बारे में जागरूकता पैदा करने में सक्रिय रूप से शामिल है। छोटे वैज्ञानिक संसाधनों के बावजूद, ब्यूरो ने देश की पशु जैव विविधता की रक्षा के लिए कड़ी एवं सतत् मेहनत की है।

विजन

- स्वदेशी पशुधन की आनुवंशिक क्षमता की पहचान, सुधार और संरक्षण करने के लिए अभिनव अनुसंधान में उत्कृष्टता के लिए प्रयास करना।

मिशन

- स्थायी उपयोग और आजीविका के लिए स्वदेशी पशु आनुवंशिक संसाधनों की रक्षा और संरक्षण।

अधिदेश

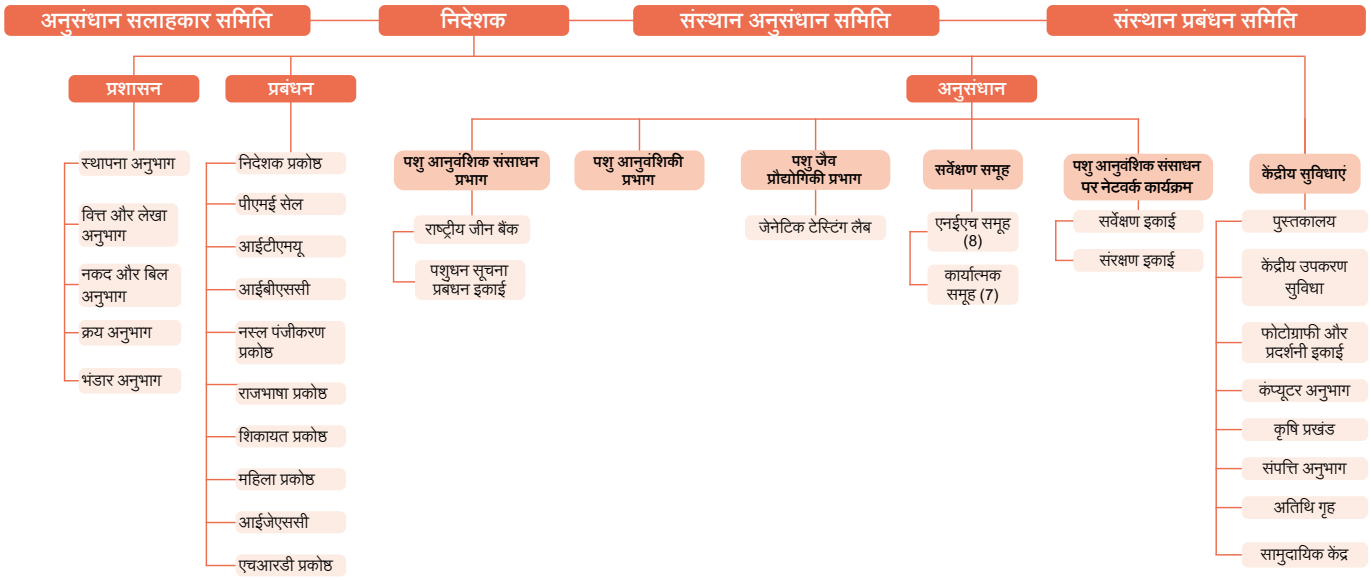
- देश के पशुधन और कुक्कुट आनुवंशिक संसाधन की पहचान, मूल्यांकन, लक्षण वर्णन, संरक्षण और सतत उपयोग।
- पशु आनुवंशिक संसाधन प्रबंधन और नीतिगत मुद्दों में समन्वय और क्षमता निर्माण।

उद्देश्य

- पशुधन और कुक्कुट आनुवंशिक संसाधनों की विशेषता, मूल्यांकन और सूची बनाने के लिए व्यवस्थित सर्वेक्षण करना और उनके राष्ट्रीय डाटा बेस को स्थापित करना।
- पशु आनुवंशिक संसाधन के एक्स-सीटू संरक्षण, इन-सीटू प्रबंधन और इष्टतम उपयोग के लिए कार्यप्रणाली तैयार करना।
- आणविक जीव विज्ञान की आधुनिक तकनीकों का उपयोग करते हुए आनुवंशिक लक्षण वर्णन पर अध्ययन करना।
- पशु आनुवंशिक संसाधन के मूल्यांकन, लक्षण वर्णन और उपयोग से संबंधित प्रशिक्षण कार्यक्रम आयोजित करना।

संगठनात्मक चार्ट

भाकृअनुप - राष्ट्रीय पशु आनुवंशिक संसाधन ब्यूरो



इतिहास एवं संगठनात्मक स्थापना

ब्यूरो का इतिहास

देश में विविध पशु और कुक्कुट आनुवंशिक संसाधन के अद्वितीय महत्व और वैश्विक स्तर पर उनके संभावित उपयोग को ध्यान में रखते हुए एक ऐसे संस्थान की ज़रूरत महसूस हुई, जो देश में उपलब्ध विविध जर्मप्लाज्म के मूल्यांकन और संरक्षित करने की जिम्मेदारी ले सके। इस प्रकार, वर्ष 1984 में राष्ट्रीय पशु आनुवंशिक संसाधन ब्यूरो/पशु आनुवंशिकी संस्थान की स्थापना देश के अग्रणी आनुवंशिकीविदों द्वारा किए गए प्रयास की परिणति थी। राष्ट्रीय पशु आनुवंशिक संसाधन ब्यूरो/पशु आनुवंशिकी संस्थान की स्थापना चतुर्थ पंचवर्षीय योजना के दौरान मूल रूप से स्वीकृत हुई। इस संबंध में पांचवी और छठी पंचवर्षीय योजना में प्रभावी अनुवर्ती कदम उठाए गए। अंत में, संस्थान 21 सितंबर 1984 को राष्ट्रीय डेयरी अनुसंधान संस्थान के दक्षिणी क्षेत्रीय स्टेशन, बंगलौर परिसर में स्थापित किया गया। संस्थान को अस्थायी रूप से 19 जुलाई 1985 को राष्ट्रीय डेयरी अनुसंधान संस्थान, करनाल परिसर में स्थानांतरित कर दिया गया।

माननीय केंद्रीय कृषि मंत्री श्री बूटा सिंह जी द्वारा 19 जुलाई 1985 को संस्थान की आधारशिला रखी गई। राष्ट्रीय पशु आनुवंशिक संसाधन

ऐतिहासिक

1984 — Birth place of institute at NDRI, Banglore

1985 — Shifting of Institute To Karnal; Foundation stone of NBAGR/NIAG

1995 — NBAGR & NIAB merged; New office building foundation laid for NBAGR

1998 — NBAGR building inaugurated

2002 — First Information System AGR-IS

2008 — Initiation of Breed Registration process in India Registration of 129 extant breeds.; Bureau designated as repository for domestic animals by MoEF under BDA 2002

2009 — Bureau celebrated Silver Jubilee

2010 — Cryopreservation of 100 Thousand semen doses

2012 — Release of first river buffalo genome draft

2013 — Initiating Breed wise Census based on registered breeds of Bureau; Establishing Divisions

2015 — Registration of lines initiated by ICAR-NBAGR

ब्यूरो और राष्ट्रीय पशु आनुवंशिकी संस्थान का 1995 में राष्ट्रीय पशु आनुवंशिक संसाधन ब्यूरो के रूप में विलय कर दिया गया। नए कार्यालय और प्रयोगशाला भवन का उद्घाटन 28 नवंबर 1998 को माननीय श्री सोमपाल जी, राज्य कृषि मंत्री, भारत सरकार द्वारा किया गया। आरंभ से ही, संस्थान का संगठनात्मक और कार्यात्मक विकास हुआ है। विभिन्न गतिविधियों के साथ, संस्थान में सभी पारंपरिक प्रतिष्ठान जैसे कि प्रभाग और अनुभाग, देशी नस्लों के जर्मप्लाज्म का क्रायोप्रिजर्वेशन करने के लिए नेशनल जीन बैंक, देश के विभिन्न राज्यों में सर्वेक्षण करने के लिए कार्यात्मक समूह और नस्लों और अन्य जर्मप्लाज्म के पंजीकरण के लिए नस्ल पंजीकरण प्रकोष्ठ हैं।

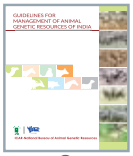
ब्यूरो की संगठनात्मक स्थापना

तीन विभाग, औपचारिक रूप से आईसीएआर द्वारा (आईसीएआर पत्र संख्या एएस 5/21/2012.आईए.आई दिनांकित 22.07.2013) 2013 में अनुमोदित हुए, जो वर्तमान में, संस्थान के अनिवार्य लक्ष्यों और उदेश्यों को प्राप्त करने के लिए समन्वय में काम करते हैं। इसके अलावा, संस्थान नेटवर्क कार्यक्रम के माध्यम से समन्वय केंद्र के रूप में देशी नस्लों का संरक्षण करने के लिए देश में विभिन्न एजेंसियों के साथ भी कार्य कर रहा है। वर्ष 2018 में भारत सरकार के पशुपालन और डेयरी विभाग द्वारा संस्थान में स्वदेशी नस्लों के लिए एक राष्ट्रीय गोजातीय जीनोमिक केंद्र भी स्थापित किया गया है।

पशु आनुवंशिक संसाधन विभाग: पशु आनुवंशिक संसाधन प्रभाग (एजीआर) कई परिवर्तनों के बाद अस्तित्व में आया। वर्तमान में एजीआर प्रभाग स्वदेशी पशुधन और कुक्कुट नस्लों के फेनोटाइपिक लक्षण वर्णन, सतत उपयोग और संरक्षण में लगा हुआ है तथा नस्लों के सुधार और संरक्षण के लिए नई रणनीतियाँ तैयार की गयी हैं। इस विभाग द्वारा विभिन्न पशुधन प्रजातियों की नस्लों के लिए यथास्थान संरक्षण लागू किया गया है। इसके साथ ही, विभाग पूरी तरह से पशुधन जर्मप्लाज्म के दीर्घकालिक क्रायोप्रिजर्वेशन के लिए नेशनल जीन बैंक के माध्यम से कार्य कर रहा है।

पशु आनुवंशिकी विभाग: यह विभाग वर्ष 1996 में स्थापित हुआ और 2013 में आईसीएआर द्वारा इसे मंज़ूरी मिली। आणविक, प्रतिरक्षाविज्ञानी, जैव रासायनिक, साइटोजेनेटिक लक्षण वर्णन और पशुधन प्रजातियों के उम्मीदवार जीन विश्लेषण इस विभाग का उद्देश्य हैं। वर्तमान में, माइक्रोसेटेलाइट्स सहित जीनोम-वाइड एसएनपी मार्कर के उपयोग से देशी पशुधन और कुक्कुट प्रजातियों में आणविक लक्षण और नस्लों

घटनाक्रम

2016

Guidelines for the management of AnGR of India released

Cryopreservation of Somatic Cells

2017
Breed Conservation Award initiated by ICAR-NBAGR

2018
Establishment of NBGC-IB

2019
Gazette Notification of breeds by Govt. of India

bureau included in SDG2-NIF

2020
Indigenous Dog breeds registered for the first time in India

SNP chip for indigenous livestock & poultry developed

2021
Strengthening DNA repository of Indian breeds

Mission towards Zero Non-Descript AnGR of India initiated by ICAR-NBAGR

Establishing Breed Registration Cell

2022

Release of National Watchlist 2022

Germplasm cryopreservation for 29 breeds, the highest in any year

2023
India elected Vice-chair in 12th session of ITWG-AnGR of the FAO

2024

Hon'ble Prime Minister released Unified SNP Chips *(Gau & Mahish)*

NABL accreditation of Genetic Testing Lab

की आनुवंशिक विविधता विश्लेषण वर्णन पर कार्य हो रहा है। साइटोजेनेटिक परीक्षण प्रयोगशाला सभी राज्यों के वीर्य स्टेशनों को गोवंश एवं भैंसों के प्रजनन हेतु नरों का क्रोमोसोमल जाँच के लिए सहायता प्रदान करती है।

पशु जैव प्रौद्योगिकी विभाग: यह विभाग डीएनए फ़िंगरप्रिंटिंग यूनिट को फिर से व्यवस्थित करने के बाद, 2013 में स्थापित किया गया। विभाग का कार्यात्मक उद्देश्य पशु आनुवंशिक संसाधन उपयोग को बढ़ावा देने के लिए जीनों/ जैव अणु का मूल्यांकन करना है। पशु जैव प्रौद्योगिकी विभाग विभिन्न पशुधन प्रजातियों के अनुकूलन क्षमता, रोग प्रतिरोधक क्षमता और उत्पादन संबंधी लक्षणों के जीन की पहचान और मूल्यांकन पर अनुसंधान करने के लिए समर्पित है। विभाग का डीएनए बैंक नेशनल जीन बैंक को सहायता प्रदान करता है।

नेटवर्क परियोजना इकाई: नेटवर्क परियोजना को 1996 में गुणात्मक और मात्रात्मक लक्षण दोनों के संदर्भ में नस्लों को चिह्नित करना, आणविक आनुवंशिक लक्षण वर्णन, स्वदेशी नस्लों में उम्मीदवार जीन अध्ययन, और नस्ल विवरणक विकसित करना और जर्मप्लाज्म संरक्षण करने जैसे उद्देश्यों के साथ स्थापित किया गया। प्रारंभ में, नस्लों के लक्षण वर्णन के लिए सातवीं योजना में आठ केंद्र थे जो बढ़कर बारहवीं योजना में 17 हो गए और वर्तमान 2021-26 योजना में राज्यवार केंद्र प्रस्तावित हैं।

पशुधन सूचना प्रबंधन इकाई: यह इकाई पशु आनुवंशिक संसाधन पर सूचना के डिजिटलीकरण में लगी हुई है।

कंप्यूटर अनुभाग: यह संस्थान के लिए लैन, इंटरनेट और कंप्यूटिंग सुविधाएं प्रदान करता है।

राज्यों के लिए कार्यात्मक समूह: पशु अनुवांशिक संसाधन के सर्वेक्षण के लिए वैज्ञानिकों को राज्यों के विशिष्ट समूहों के रूप में वर्गीकृत किया गया है। उत्तर पूर्वी हिमालयी क्षेत्र के प्रत्येक आठ राज्यों के लिए आठ एनईएच समूह हैं। अन्य बीस राज्यों और दो केंद्र शासित प्रदेशों के लिए, छह कार्यात्मक समूह ब्यूरो में विद्यमान है।

कार्यात्मक समूह 1: उत्तराखंड, उत्तर प्रदेश, कर्नाटक

कार्यात्मक समूह 2: आंध्र प्रदेश, तेलंगाना, केरल, तमिलनाडु

कार्यात्मक समूह 3: बिहार, झारखंड, पंजाब, हरियाणा

कार्यात्मक समूह 4: गोवा, महाराष्ट्र, गुजरात, हिमाचल प्रदेश

कार्यात्मक समूह 5: मध्य प्रदेश, छत्तीसगढ़, राजस्थान

कार्यात्मक समूह 6: पश्चिम बंगाल, ओडिशा, लद्दाख (यूटी) और जम्मू एवं कश्मीर (यूटी)

कार्यात्मक समूह 7: यूनियन टेरिटरीज (लद्दाख और जम्मू एवं कश्मीर के अलावा)

एनईएच समूह (1-8): मिजोरम, मेघालय, अरुणाचल प्रदेश, सिक्किम, त्रिपुरा, नागालैंड, मणिपुर और असम

राष्ट्रीय जीन बैंक: देश में स्वदेशी पशुधन जैव विविधता को बनाए रखने के उद्देश्य से राष्ट्रीय पशु आनुवंशिक संसाधन ब्यूरो में नेशनल जीन बैंक को स्थापित किया गया है। बैंक में देशी नस्लों को वीर्य और दैहिक कोशिकाओं के रूप में दीर्घकालिक संरक्षण के लिए क्रायोप्रिजर्व्ड किया जाता है। वर्तमान में, जीन बैंक के पास 50 देशी पशु नस्लों/आबादियों के वीर्य के रूप में लगभग 2.5 लाख खुराक और 20 नस्लों/आबादियों के दैहिक कोशिकाओं के रूप में 4800 खुराक क्रायोप्रिजर्व्ड हैं।

डीएनए बैंक: ब्यूरो में देशी पशुओं और कुक्कुट नस्लों के डीएनए भंडार के रूप में एक डीएनए बैंक स्थापित किया गया है। वर्तमान में 169 पशु नस्लों/आबादी के डीएनए को मध्यम अवधि संरक्षण के लिए रखा गया है।

नस्ल पंजीकरण इकाई: वर्ष 2021 में देश के पशु नस्लों एवं आनुवंशिक संसाधनों के पंजीकरण के लिए इस इकाई की स्थापना की गयी। अब यह देश के समूचे पशुधन की नस्लों को पंजीकृत करने के लिए पूर्ण रूप से स्थापित है।

फोटोग्राफी और प्रदर्शनी इकाई: यह इकाई देशी नस्लों की तस्वीरों और वीडियो के दस्तावेजीकरण की दिशा में काम करने के लिए समर्पित है। यह इकाई किसानों और हितधारकों में प्रदर्शनियों के माध्यम से देशी नस्लों के बारे में जागरूकता फैलने का कार्य भी करती है।

केंद्रीय इंस्ट्रुमेंटेशन सुविधा और अनुसंधान प्रयोगशालाएं: संस्थान के पास प्रयोगशाला आधारित अनुसंधान करने के लिए 17 विभागीय एवं एक केंद्रीय इंस्ट्रुमेंटेशन (सीआईएफ) प्रयोगशाला है। प्रयोगशाला उन्नत आणविक प्रौद्योगिकी के आवश्यक उपकरण और सुविधाओं से लैस है।

उच्च निष्पादन कंप्यूटिंग सुविधा: विभिन्न जैव सूचना विज्ञान आधारित अनुसंधान के लिए कम्प्यूटेशनल शक्ति प्रदान करने के लिए 2014 में उच्च निष्पादन कंप्यूटिंग (एचपीसी) सुविधा को स्थापित किया गया। एचपीसी की मदद से देशी नस्लों में संपूर्ण जीनोम-आधारित अनुक्रम विश्लेषण किया जाता है।

परीक्षण सेवाएं: संस्थान शुल्क पर विभिन्न सरकारी एजेंसियों और किसानों को सांडों और गायों में कैरियोटाइपिंग, आनुवंशिक रोग स्क्रीनिंग और A1-A2 दूध परिक्षण की सेवाएं भी प्रदान करता है।

संस्थान पुस्तकालय: संस्थान का अपना एक पुस्तकालय भी है जिसमे पशु आनुवंशिकी से सम्बंधित देश और दुनिया की हजारों विशिष्ट पुस्तकें का संग्रहण है। इसमें पुस्तकों के अलावा, देशी नस्लों और जननद्रव्य से सम्बंधित मोनोग्राफ, बुलेटिन और अन्य वैज्ञानिक विशिष्ट साहित्य उपलब्ध हैं। पुस्तकालय ने कई राष्ट्रीय और अंतर्राष्ट्रीय जर्नल की सदस्यता भी ले रखी है।

प्राथमिकताएं एवं गतिविधियाँ

स्वदेशी नस्लों के लिए राष्ट्रीय गोजातीय जीनोम केंद्र (एनबीजीसी-आईबी): पशुपालन और डेयरी विभाग, भारत सरकार ने 2018 में राष्ट्रीय पशु आनुवंशिक संसाधन ब्यूरो, करनाल में देशी मवेशियों और भैंस की नस्लों में जीनोमिक चयन शुरू करने के लिए राष्ट्रीय गोकुल मिशन के तहत राष्ट्रीय बोवाइन जीनोमिक्स केंद्र की स्थापना की। जीनोमिक चयन के पहले चरण में गोवंश की सात नस्लों और भैंसों की चार नस्लों को प्राथमिकता दी गई है।

संस्थान की प्राथमिकताएं

देश में शून्य अवर्णनीय पशु आनुवंशिक संसाधन के लक्ष्य के साथ सभी पशु आनुवंशिक संसाधनों का दस्तावेज़ीकरण: देश में पशु आनुवंशिक संसाधन में जैव विविधता के प्रबंधन के लिए पशु आनुवंशिक संसाधनों का प्रलेखन सबसे महत्वपूर्ण है। देश में राष्ट्रीय पशु आनुवंशिक संसाधन ब्यूरो ने अपने सभी प्रयासों के साथ पशु आनुवंशिक संसाधनों के लगभग 46 प्रतिशत को प्रलेखित किया है। अब अगले वर्षों में संस्थान का शेष 54 प्रतिशत का दस्तावेजीकरण करना सर्वोच्च प्राथमिकता है। राज्य और केंद्रीय एजेंसियों के सहयोग से मिशन मोड में कार्य शुरू कर दिया गया है।

नई देशी नस्लों की पहचान: देश में राष्ट्रीय पशु आनुवंशिक संसाधन ब्यूरो ने 100 से अधिक नई नस्लों और देश में समरूप पशु संख्या को मान्यता दी है। हालांकि, अभी भी पशु आनुवंशिक संसाधन की कई अद्वितीय आबादी हैं, जिन्हें पहचानने की जरूरत है। देश में लगभग 100 या अधिक नस्लों को शून्य गैर-विवरणित पशु आनुवंशिक संसाधन मिशन के अंतरगर्त मान्यता देने की परिकल्पना है।

नस्ल सूची को पूरा और वैधानिक मान्यता प्रदान करना: राष्ट्रीय पशु आनुवंशिक संसाधन ब्यूरो द्वारा कुल 219 देशी नस्लों एवं एक सिंथेटिक नस्ल को पंजीकृत किया गया है। कुल 212 नस्लों को आधिकारिक राजपत्र के माध्यम से अधिसूचित कर वैधानिक मान्यता

भी प्रदान की गयी है। आने वाले वर्षों में, 100 से अधिक नई नस्लों को उनके लक्षण वर्णन के बाद राजपत्र द्वारा जोड़ा जाएगा।

देश में सभी देशी पशु आनुवंशिक संसाधनों के जर्मप्लाज्म का क्रायोप्रिजर्वेशन: अस्थायी जीनोमिक परिवर्तनों के आकलन और भविष्य में विलुप्त होने से रोकने के लिए, देशी जर्मप्लाज्म का वीर्य, दैहिक कोशिकाओं और डीएनए के रूप में क्रायोप्रिजर्वेशन पहले से ही किया जा रहा है। आगे भी सभी प्रकार की नस्लों/विशिष्ट आबादी के जर्मप्लाज्म को युग्मक, कोशिका और भ्रूण रूप में संरक्षित किया जाएगा।

देशी पशु आनुवंशिक संसाधन में आनुवंशिक विविधता का आकलन: भविष्य की चुनौतियों के लिए आनुवंशिक विविधता एक महत्वपूर्ण कारक है। आनुवंशिक विविधता का जनसंख्या, नस्ल और प्रजातीय स्तर पर जीनोम-वाइड एसएनपी मार्कर/चिप जैसी आधुनिक तकनीकों, आदि द्वारा आकलन एक निरंतर गतिविधि है।

देशी पशु आनुवंशिक संसाधनों के विशेष लक्षण-वर्णन: अद्वितीय लक्षणों के लिए फेनोटाइपिक, जैव रासायनिक और आणविक स्तरों पर लक्षण वर्णन, विशिष्ट एलील और जीन की पहचान करने में मदद करेगा। लक्षण जैसे जलवायु अनुकूलन, सहनशक्ति, रोग प्रतिरोध शक्ति, अद्वितीय उपज की पहचान आवश्यक है। आने वाले वर्षों में पशु आनुवंशिक संसाधन से संबंधित पारंपरिक ज्ञान की मान्यता भी अनिवार्य रूप से आवश्यक होगी।

देशी नस्लों के संरक्षण के लिए वैधानिक ढांचा: पशुधन रखने वालों के लिए अधिकार" पशुपालकों के लिए अनिवार्य रूप से आवश्यक हैं। सुधार कार्यक्रमों को लागू करने और बाजार लाभ सुनिश्चित करने के लिए नस्ल समीतियों का विकास करना और प्रत्येक नस्ल के लिए नस्ल पंजीकरण को बनाए रखना अनिवार्य है। इस ओर ब्यूरो नस्ल संरक्षण को वैधानिक मान्यता देने की ओर अग्रसर है।

राष्ट्रीय और अंतरराष्ट्रीय प्रतिबद्धताओं को पूरा करना: राष्ट्रीय पशु अनुवांशिक संसाधन ब्यूरो संयुक्त राष्ट्र के सतत विकास लक्ष्य 2 (शून्य भूख) के लिए लक्ष्य 2.5 (संकेतक 2.5.1: भोजन और कृषि के लिए पौधे और पशु आनुवंशिक संसाधनों का मध्यम या दीर्घकालिक संरक्षण) को पूरा कर रहा है। ब्यूरो की क्रायोप्रिजर्वेशन गतिविधियाँ राष्ट्रीय सांख्यिकी कार्यालय (एनआईएफ) के 2.5.1 राष्ट्रीय संकेतक ढांचे में शामिल हैं। देशी पशु आनुवंशिक संसाधनों का दस्तावेजीकरण एफएओ की वैश्विक कार्य योजना, सीबीडी और दिल्ली घोषणा 2016 के अनुसार है। इसके अलावा राष्ट्रीय पशु आनुवंशिक संसाधन ब्यूरो विभिन्न राष्ट्रीय कार्यक्रमों और नीति आयोग- आउटपुट आउटकम फ्रेमवर्क के लक्ष्यों को पूरा करने के लिए भी प्रतिबद्ध है।

संस्थान की गतिविधियां

संस्थान के पास निम्नलिखित प्रमुख गतिविधियां हैं जिन्हें पूरा करना संस्थान का उद्देश्य और प्राथमिकता है:

- देश में देशी पशु आनुवंशिक संसाधन की पहचान, विशेषता और दस्तावेज़ीकरण करना।
- देश में शून्य गैर-विवरणित पशु आनुवंशिक संसाधन के लक्ष्य के साथ संपूर्ण पशुधन और कुक्कुट आबादी का सर्वेक्षण और प्रलेखन करना।
- नस्ल के लिए योग्य समरूप आबादी की पहचान और लक्षण वर्णन करना।
- पशुधन और कुक्कुट आबादी का पंजीकरण एवं उनकी अधिसूचना।

पशुधन की देशी नस्लों और कुक्कुट प्रजाति का संरक्षण

- विलुपत होने वाली पशुधन और कुक्कुट नस्लों का यथास्थान संरक्षण करना।
- सभी पंजीकृत नस्लों के जर्मप्लाज्म का क्रायोप्रिजर्वेशन करना।
- देशी नस्लों की जोखिम स्थिति का आकलन एवं संरक्षण के लिए नस्लों का प्राथमिकता देना।

देशी पशु आनुवंशिक संसाधन की जनसंख्या संरचना और विविधता के लिए जीनोमिक्स अनुसंधान

- सभी पंजीकृत पशुधन और कुक्कुट नस्लों में जीनोमिक विविधता और विशिष्टता का आंकलन करना।
- देशी नस्लों के लिए नस्ल आणविक हस्ताक्षर विकसित करना।
- उच्च महत्व की देशी नस्लों के लिए जीनोम असेंबलियों का निर्माण करना।

पशु आनुवंशिक संसाधन के मूल्यवर्धन के लिए विशेषता पहचान और लक्षण वर्णन

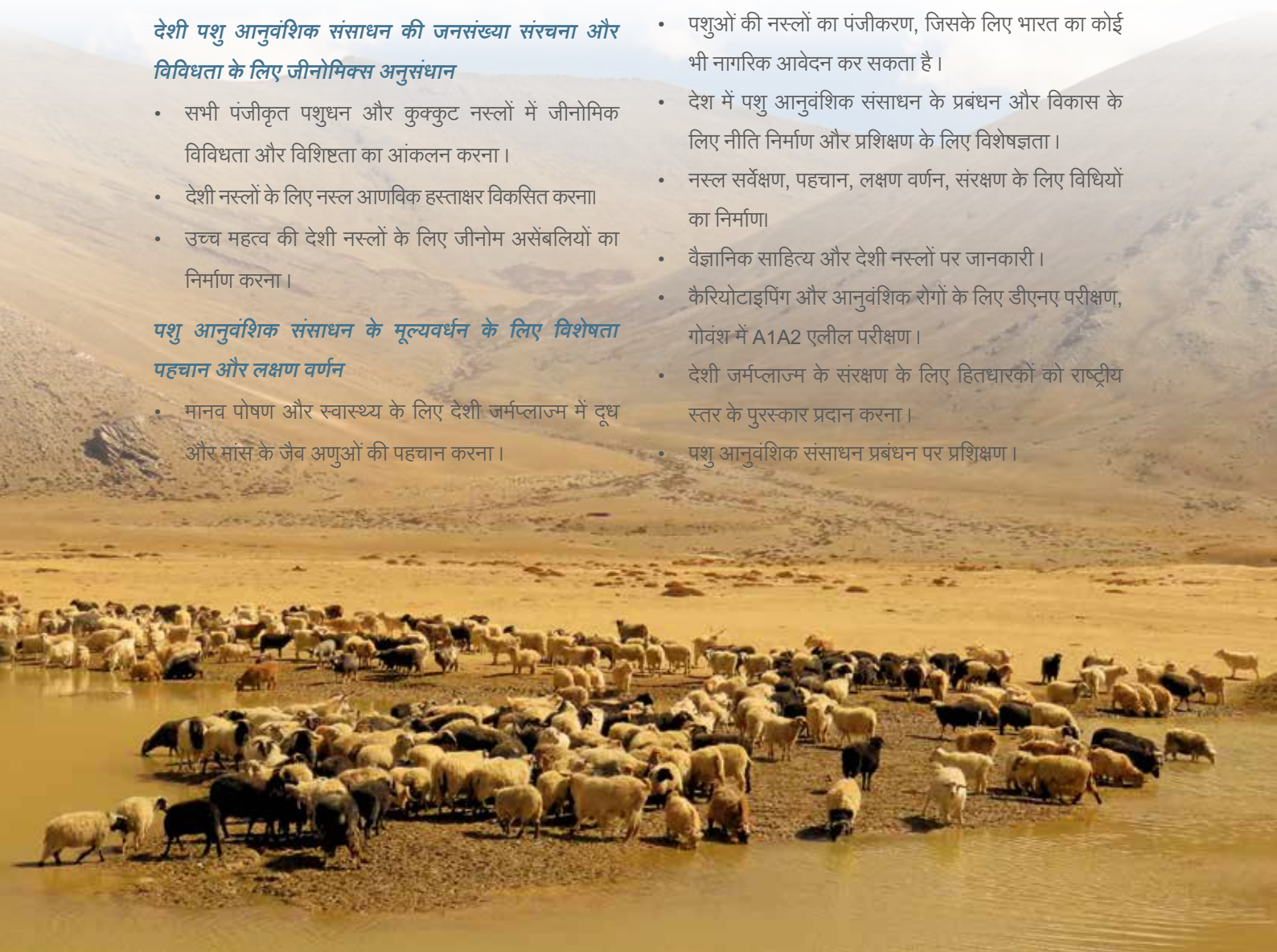
- मानव पोषण और स्वास्थ्य के लिए देशी जर्मप्लाज्म में दूध और मांस के जैव अणुओं की पहचान करना।
- मूल्यवर्धन एवं जी आई के लिए अद्वितीय उत्पादों की विशेषता और उनके प्रभाव का आकलन करना।
- देशी नस्लों में अनुकूली, सहनशक्ति और अन्य लक्षणों के मूल्यांकन के लिए अनुसंधान करना।

पशु आनुवंशिक संसाधन प्रबंधन के लिए नीति और क्षमता निर्माण

- देश में पशु आनुवंशिक संसाधन पर डेटाबेस और अन्य आईसीटी के निर्माण के लिए नीति समर्थन करना।
- राज्यों में पशु आनुवंशिक संसाधन के प्रबंधन के लिए नीति विकसित करना।
- पशु आनुवंशिक संसाधन के प्रबंधन के लिए प्रशिक्षण और संवेदीकरण कार्यक्रमों का आयोजन करना।
- नीतिगत के लिए सरकारी एजेंसीयो को परामर्श सेवाएं प्रदान करना।

ब्यूरो द्वारा प्रदत्त सेवाएं

- पशुओं की नस्लों का पंजीकरण, जिसके लिए भारत का कोई भी नागरिक आवेदन कर सकता है।
- देश में पशु आनुवंशिक संसाधन के प्रबंधन और विकास के लिए नीति निर्माण और प्रशिक्षण के लिए विशेषज्ञता।
- नस्ल सर्वेक्षण, पहचान, लक्षण वर्णन, संरक्षण के लिए विधियों का निर्माण।
- वैज्ञानिक साहित्य और देशी नस्लों पर जानकारी।
- कैरियोटाइपिंग और आनुवंशिक रोगों के लिए डीएनए परीक्षण, गोवंश में A1A2 एलील परीक्षण।
- देशी जर्मप्लाज्म के संरक्षण के लिए हितधारकों को राष्ट्रीय स्तर के पुरस्कार प्रदान करना।
- पशु आनुवंशिक संसाधन प्रबंधन पर प्रशिक्षण।



प्रमुख उपलब्धियां एवं प्रभाव

संस्थान की प्रमुख उपलब्धियां

- देशी पशुओं और कुक्कट की 248 नस्ल/आबादी की विशेषता का अध्ययन उनका और प्रलेखन।
- 220 पशु नस्लों का पंजीकरण एवं 212 देशी पशु नस्लों की गजट अधिसूचना।
- लगभग 50% से अधिक देशी पशु नस्लों के जननद्रव्य का हिमीकृत संरक्षण।
- 17 देशी पशु नस्लों का स्व-स्थानिक संरक्षण।
- ओमिक्स आधारित देशी पशु नस्लों की विशेषता व लक्षण का वर्णन।
- भारत के मूल पशु अनुवांशिक संसाधन पर एजीआर-आईएस डेटाबेस तैयार करना।
- देशी पशु नस्लों के लिए एसएनपी चिप का निर्माण।

संस्थान का प्रभाव

अंतरराष्ट्रीय

- एसडीजी-एनआईएफ/जीबीएफ लक्ष्यों में शामिल: एसडीजी 2.5.1 एवं 2.5.2 के लिए नोडल बिंदु।

राष्ट्रीय

- अधिसूचना के बाद 212 पशु नस्लों की वैधानिक मान्यता और जननद्रव्य संरक्षण।
- वर्णित पशुधन आबादी लगभग 46% तक पहुंची।
- 91 नई नस्लों ने देश में 2 करोड़ 50 लाख पशुओं को वर्णित किया।
- पशुपालन और डेयरी विभाग द्वारा देश में नस्ल-वार पशु संगणना शुरू करना।
- राष्ट्रीय कामधेनु प्रजनन केंद्र के तहत पंजीकृत नस्लों को शामिल करना।
- भविष्य की आवश्यकता को ध्यान में रखते हुए देशी नस्लों में जलवायु प्रतिरोध क्षमता का वर्णन।

राज्य

- देश में पशु अनुवांशिक संसाधन प्रबंधन के लिए सभी राज्यों के पशुपालन विभाग के साथ संबंध।
- संबंधित राज्यों द्वारा विकसित पंजीकृत नस्लों के लिए प्रजनन नीतियों का निर्धारण।
- दूरस्थ क्षेत्रों (उत्तर पूर्वी हिमालयी क्षेत्र) की और अधिक नस्लों की पहचान।
- संख्या की दृष्टि से खतरे में शामिल पशु नस्लों का स्व-स्थानिक संरक्षण।
- सरकारी एजेंसियां द्वारा वीर्य उत्पादन के लिए इस्तेमाल लगभग 3300 सांडों के नमूनों का आनुवंशिक परीक्षण।
- राज्यों के पशुपालन विभाग को पशु अनुवांशिक संसाधन प्रबंधन के बारे में जागरूकता प्रदान करना।

हितधारक

- हितधारकों में बढ़ता हुआ पशु नस्लों के पंजीकरण का रुझान।
- स्थानीय पशुपालकों द्वारा नस्ल समितियों की स्थापना।
- किसानों/हितधारकों को नस्ल संरक्षण पुरस्कार द्वारा मान्यता।

Financial Outlay

Budget Estimate under Grants & Network Project of NBAGR for the month of April, 2023 to March, 2024 along with expenditure

(Rs. In lakhs)

HEAD	Grants		Network Project	
	RE	Exp.	RE	Exp.
Capital				
Works	145.93	145.93	0.00	0.00
Other capital expenditure	59.07	57.67	75.00	75.00
Total Capital	**205.00**	**203.60**	**75.00**	**75.00**
Revenue				
Establishment expenses	1258.47	1258.47	0.00	0.00
Traveling Allowance	24.37	24.37	0.00	0.00
Research & Operational expenses	148.68	148.59	250.00	250.00
Administrative expenses	232.55	232.55	250.00	250.00
Miscellaneous expenses	9.40	9.40	0.00	0.00
Total Revenue	**1673.47**	**1673.47**	**250.00**	**250.00**
Pension & Retirement benefits	425.31	425.31	0.00	0.00
Grand Total	**2303.78**	**2302.38**	**325.00**	**325.00**

Revenue Generated for the month April, 2023 to March, 2024

Head of Account	2023-24
Sale of Publication & Advertisement	19375
Licence Fee	313283
Hostel and Guest house rent	508005
Sale of Farm Produce	415000
Sale of Other Machine Tools	169000
Others Misc. Revenue Receipt	1020809
Total	**2240472**

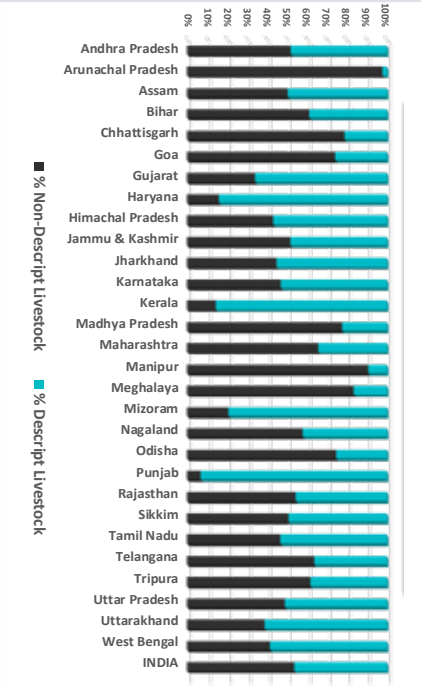
RESEARCH ACCOMPLISHMENTS

भाकृअनुप
ICAR
NBAGR
रा.प.आ.सं.ब्यूरो

Mission towards zero non-descript AnGR of India

Mission at a glance

India possesses nearly 10 percent of the global livestock population; but only 4 percent of the global breeds. The ratio of breeds to livestock population in India is one breed per 3 million animals, which is significantly lower than the world average of one breed per 0.9 million animals. This ratio is about 4 to 6.5 million for cattle, buffalo and goat, the three most populous species in India. Around 54% percent of population of different species falls under the non-descript category, as per livestock Census (2019). Further, recognition of 83 new breeds since 2010 could be able to induct only about 5% of the native livestock population, in the descript category. The country still possesses a sizeable proportion of livestock and poultry undocumented, which includes several homogenous/unique populations those may have potential to be breeds. Further, there are large proportion of mixed populations that do not conform to any of the breed due to non-homogeneity in population, and/or cross breeding and other demographic factors. The non-descript populations, along with mixed populations of different livestock also widely vary across the states.



State with non-discript population

Considering large non-documented AnGR in the country, ICAR- NBAGR has undertaken the characterization and documentation of entire native livestock and poultry in the country in Mission mode in the coming years. "Mission towards Zero Non-Descript AnGR of India" was launched by Dr. T Mohapatra, Secretary, DARE & Director General, ICAR in a National Workshop organized on 11th August, 2021 virtually by NBAGR. The mission is aimed to significantly reduce the proportion of non-descript livestock and poultry, along with identification of potential breeds in the country as well as to understand the architecture of mixed populations of livestock species. Such gigantic tasks is only be accomplished through mission mode with immense cooperation, coordination and support of all of the involved agencies including central and state agencies including AHD of all States, SAU/SVUs, other ICAR institutes, NGOs etc.

Under the mission, unique/homogenous population of different livestock and poultry species would be identified in throughout country by initial surveys. This will specifically focus on indigenous AnGR. Further, survey for characterization of homogenous population may be conducted at farmer's herds/ flocks. Stratified two stage sampling design would be adopted for the survey. Data on physical and morphometric traits, production and reproduction performances may be recorded for different species. All the unique/homogenous populations of different species may be documented in the shape of breed monographs and breed descriptors and the eligible unique/homogenous populations of different species would be registered as breed. For defining graded and

admixed population, admixture analysis would be carried out using molecular markers, which would help in identifying the graded populations as well as population/breed admixture of mixed populations. The efforts would also yield the identification of unique populations and registering as native breeds. It is expected that the strategy would yield more than 100 distinct breeds of different livestock and poultry in coming years, which would be registered and notified accordingly.

As part of its ongoing mission to conserve and document India's unique Animal Genetic Resources (AnGR), the National Bureau of Animal Genetic Resources (NBAGR) has launched the Mission Towards Zero Non-descript AnGR of India in August 2021 and expanded several initiatives to identify new indigenous breeds across the country, and thereby reducing the non-descript livestock population. The initiative has received a great prominence, when it has also been mentioned in the Report of the Parliamentary Standing Committee for Agriculture in year 2023-24.

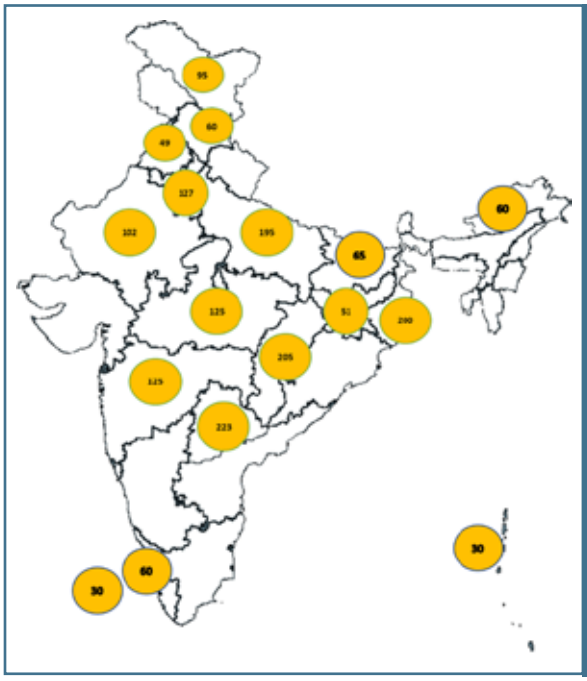
AnGR Survey

AnGR survey were conducted in Arunachal Pradesh, Nagaland, Tamil Nadu, Odisha, Uttar Pradesh, Rajasthan, Maharashtra, Karnataka, Jammu & Kashmir, Ladakh and Lakshadweep, this year. Under the Mission, total 26 states / UTs have been surveyed for documentation of AnGR till now.

Network Project on AnGR

Network project on Animal Genetic Resources (NWP-AnGR) plays a significant role in achieving the targets of the Mission. It has a vast network of State Veterinary Universities, State Animal /Veterinary Departments, ICAR institutes etc. as Network centres across the country involved in characterization of indigenous AnGR of the respective state. During 2024, six new Network Centres in various states were initiated. At present, total 33 Network centres are involved in characterization of potential populations in 26 states/ UT.

In 2024, 17 new native populations from 10 states/ UT were characterized. These populations are-



Interface Meets with states/UTs (number of participants are given in circle)

Ruhelkhandi cattle (Uttar Pradesh), Melghati buffalo (Mahrashtra), Tanjavur goat (Tamil Nadu), Totapuri goat (Uttar Pradesh), Umarda cattle (Maharashtra), Mullai goat (Tamil Nadu) , Marluk sheep, Malra goat (Ladakh), Shinl mithun (Mizoram), Battisi goat (Uttar Pradesh), Jharkhandi buffalo (Jharkhand), Mayurbhanj chicken (Jharkhand), Kaikadi donkey (Maharashtra) Malvi sheep (Madhya Pradesh), Kow-Debar sheep (Uttrakhand), Jammu Hill cattle (J&K), Periyar cattle (Kerala).

State Interface Meet on AnGR Documentation

Lakshadweep: On April 26, 2024, ICAR-NBAGR, in collaboration with CMFRI-KVK, organized the 17th State Interface Meet focused on the "Characterization and Documentation of Animal Genetic Resources (AnGR) of Lakshadweep" at Kavaratti, Union Territory of Lakshadweep. The event brought together officers from ICAR, KVK, the Animal Husbandry Department of Lakshadweep, and local livestock keepers to discuss critical issues related to indigenous AnGR management. The meet aimed to sensitize local agencies and farmers about the importance of preserving and managing indigenous animal genetic resources. Experts from NBAGR and KVK delivered insightful lectures on the various AnGR resources available in the Lakshadweep islands and outlined effective strategies for their documentation.

Goa: ICAR-NBAGR, in collaboration with the ICAR-Central Coastal Agricultural Research Institute (CCARI), held an Interface Meet on June 7-8, 2024, in Old Goa, focusing on the Characterization and Documentation of Goa's Animal Genetic Resources (AnGR). This mission-driven event aligns with the national goal of achieving a "Zero Non-Descript Population," aiming to identify and document all indigenous animal breeds within Goa, thus reducing reliance on undefined or "non-descript" breeds. Hosted at ICAR-CCARI, the meet brought together AnGR experts, state animal husbandry officials, and local livestock keepers to discuss strategies for effectively documenting and managing Goa's native breeds.

Odisha: Under the Mission towards zero non-descript AnGR of India, Bureau organized the 19th State Interface meet on 'Characterization and Documentation of Animal Genetic Resources of Odisha' in collaboration with Fisheries and Animal Resources Development Department, Govt. of Odisha and Odisha Livestock Resources Development Department (OLRDS), at Loka Seva Bhawan, Bhubaneshwar on 26 September 2024. Shri Gokulananda Mallik, Hon'ble Minister of FARD, Govt of Odisha launched a documentary on Chilika buffalo produced by ICAR-NBAGR. Shri Suresh Kumar Vashishth, Principal Secretary, Shri Ramashis Hazra, Director of Animal Husbandry & Veterinary Services, Dr. Hadibandhu Bhoi, CEO, OLRDS, Senior officers of FARD, OLRDS, Chief District Veterinary officer and members of various animal societies and filed veterinary officers attended the Meet. Dr. B.P. Mishra, Director of ICAR-NBAGR, delivered a keynote address on the mission towards zero non-descript AnGR. Bureau scientists also made presentations on AnGR documentation. Application for registration of 'Chilika Curd' as Geographical Indication (GI) was also prepared and handed over to the Odisha Livestock Resources Development Society (OLRDS) for further filing on the occasion.

भारत का राजपत्र
The Gazette of India

EXTRAORDINARY
PART II—Section 3—Sub-section (ii)
PUBLISHED BY AUTHORITY

NEW DELHI, MONDAY, DECEMBER 9, 2024/AGRAHAYANA 18, 1946

Gazette Notification of indigenous animal breeds

Seven indigenous breeds-Andamani goat, Andamani pig and Andamani duck of Andaman & Nicobar, Bhimthadi horse of Maharashtra, Anjori goat of Chhattisgarh, Macherla sheep of Andhra Pradesh, Aravali chicken of Gujarat; and one synthetic breed -Frieswal cattle registered by the ICAR-NBAGR in December, 2023 have been gazette notified by DARE, Min. of Agriculture & Farmers Welfare, Govt. of India [No. 4906 (S.O.5301 (E), 5302 (E) (Dec 09, 2024)].

Breed registration & notification process

The registration of Indian livestock and poultry germplasm revolves around the concept of a breed. Breeds of domesticated animals, which are unique, stable and uniform, and have potential attributes of academic, scientific, or commercial value can be registered. Any livestock population which has been characterized must be documented and inventoried, if having the breed characters. First, all of the information recorded during phenotypic characterization, should be formatted in a shape of breed descriptor. Such an physical characterization along with management practices can be published in different scientific journals. After phenotypic characterization, it should be clear that If the population is found distinct, then only it should to be registered as breed.

First, all of the information recorded during phenotypic characterization should be shaped as a breed descriptor. Such a physical characterization along with management practices can be published in different scientific journals. The registration involves a process for screening of the applications submitted for registration as per Guidelines developed for this purpose. The application can be submitted by any citizen of India / breed society / NGO / Govt. Agency. The application must be accompanied by a complete description of the breed using standard descriptors. All claims concerning the material submitted for registration should accompany scientific evidence for uniqueness, reproducibility, and value. The population, for consideration of registration should have at least 1000 animals. The breed should complete a minimum of 10 generations. A detailed history of the breed, Difference, distinction, and details that are specific for that breed should also be provided. Representative photographs, a list of the registered animals of the breed, letters explaining certain questions about the breed from at least three different breeders/owners of the breed should also be submitted. After registration, NBAGR provides the unique Accession number to each breed after registration. The newly registered breeds are also notified through Official Gazetted published by the Government of India. Detailed guidelines, descriptors and application form for registration of new breeds can be accessed at www.nbagr.res.in/guidelines.html.

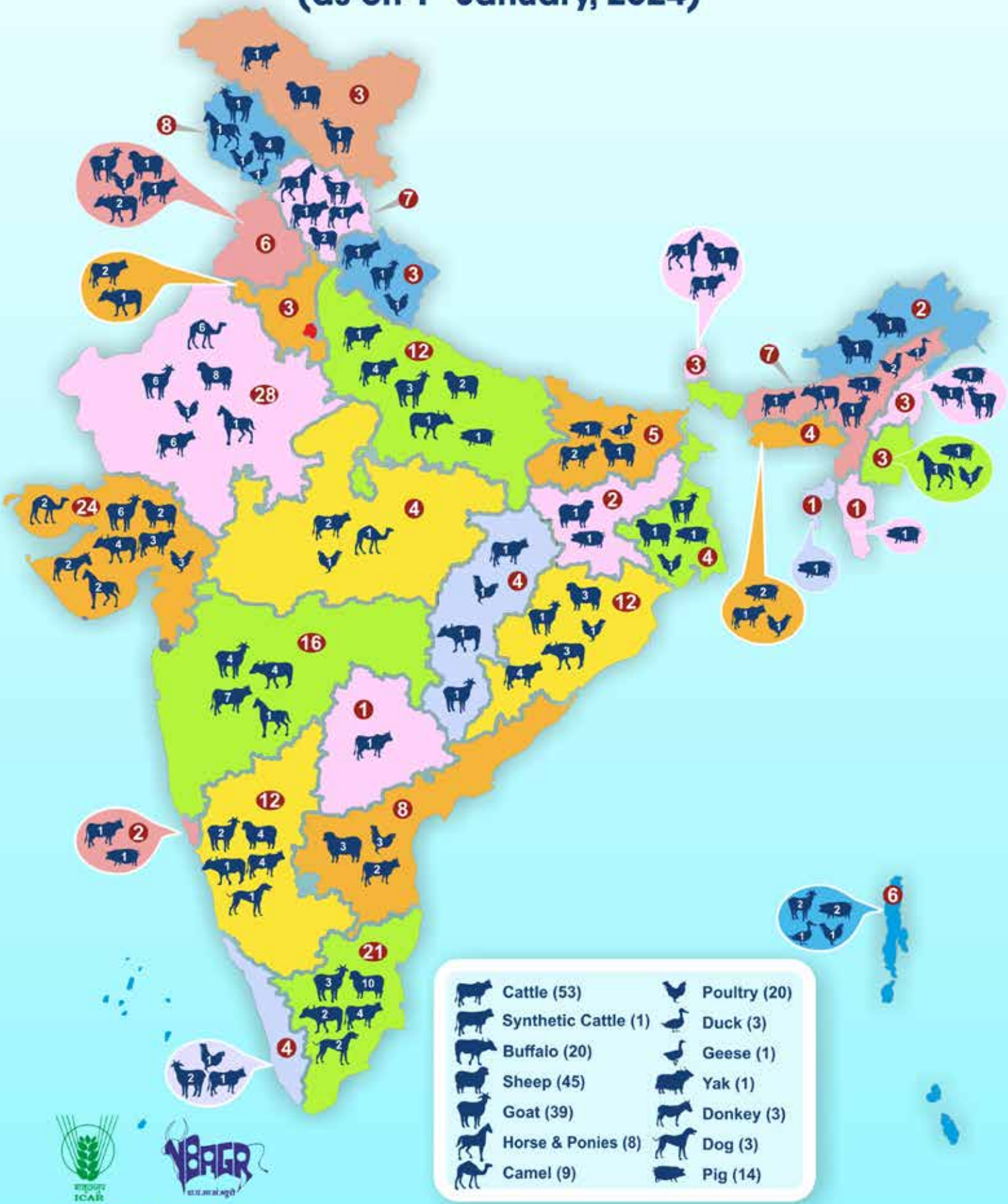
Further, Gazette notification for the livestock and poultry breeds was initiated by the Government of India in October, 2019 through publishing the Official Gazette. All registered breeds upto that year (total 184 breeds) were first time notified by the Government of India to provide statutory recognition of and claiming sovereignty over the native germplasm [Gazette Notification: Ministry of Agriculture and Farmers' Welfare, No. 3364 (S.O. 3699(E)) (October 14, 2019)] and further all newly registered breeds in subsequent years were notified through more Gazette notifications.

These breeds got the statutory recognition; and shall be the notified breeds for the whole of India for purposes of animal husbandry, production, breeding, conservation, utilization, consumption and trade from the date of publication of the notification in the official Gazette of Govt. of India. The notified breeds of the specified States received the statutory recognition; and were recognised as notified breeds for the whole of India for keeping and rearing for various purposes as mentioned in the notification.

भारतीय पंजीकृत नस्लें

Distribution of Registered Breeds of India

(as on 1st January, 2024)



ICAR-NBAGR

Identification of new populations

Uttar Pradesh

Indigenous goat of Sonbhadra: Survey revealed a desi goat population, distributed in Sonebhadra and adjoining area of Uttar Pradesh, known as Sonbhadri/ Sonpari. These are mainly reared by tribals between Vindhya and Kaimur hills range. The identified goat mainly has two-color variants i.e., black and light to dark brown. Further, the complete black-coloured goats are predominated in the population. The brown colour variant goats have light to dark or white strip on head and black coloured ring around neck in adult male. The animals are small to medium in size and the adult body weight varies from 20 to 40 Kg. Both the sexes had small to medium sized horns, which are curved shaped with backward and outward orientation. On an average, a doe gives about 250 to 300 gm of milk per day with the lactation length of about 3 months. The goats are primarily maintained on grazing (extensive system) with zero input system.

Mirzapuri sheep: A medium sized sheep population known as Hasari or Lalkai (pink face) is distributed in Mirzapur, Sonebhadra and surrounding region and is reared for wool and mutton production. The adult body weight of males is about 40 Kg. The sheep produce about 1 kg of wool per year and cost of wool is about Rs. 12 – 14/Kg. The white coat colour with small light to dark brown or black patches on face, ear and muzzle of different sizes are the important characteristics of this sheep population. The nose line is typical Roman type. The sheep are also primarily maintained on grazing (extensive system) with zero input system. The major mating season is after rainy season i.e. July to September.

Maharashtra

A field survey visit was undertaken in the 4 districts of Maharashtra viz Yavatmal, Nanded, Latur and Akola during 30th August to 2nd September, 2024. Three new populations of cattle namely Mathura Labhani, Varhadi and Jalkot cattle and one dog population Pashmi Dog were identified during this visit. Belona/Gaolao buffalo and Umarda cattle was also surveyed in their breeding tract in Yavatmal district. Interactive meeting with Gaolao cattle breeders of Wardha and discussed on various topics like conservation of Gaolao cattle and historical perspectives of AnGR was held.

Jalkot cattle: The Banjara community of Nanded district raises the Jalkot cattle. They are animals with a reddish-tan coat, often with white patches. Some animals may even have a black coat. Their horns are slender and curve backward. The cattle have black hooves and lack the black coronet (the ring-shaped area around the hoof) that is characteristic of Red Kandhari cattle. These animals are used for both milk production and draft purposes, typically yielding 1-2 litres of milk per day and are managed under zero input system.

Labhani cattle: The Mathura Labhani cattle are reared by the Mathura Labhan community in the district of Nanded, Maharashtra. The animals are characterized by its white coat, medium-sized, curved horns with blunt tips, and a long neck. It has small, flat forehead and a narrow face. The animals' muzzle and eyes are black, with almond-shaped eyes and black eyelashes. The ears are medium-sized and mostly horizontal, with a pinkish interior.

Mathura Labhani

The skin is pinkish in colour, and the hump is small in females but well-developed in males. The dewlap is also smaller and thinner in females compared to males. The animal has black hooves and long, thin limbs. The udder is small with pointed teats. The animals are reared in zero input system for milk and draft purposes. They provide an average of 2-4 litres of milk per day. The animals have an important place in the community and are decorated with homemade ornaments. The animals are decorated during their main festival of Janmashtami and are used for processions.

Varhadi cattle: Varhadi cattle have their breeding tract in the districts of Akola, Amaravathi and Buldhana. The OBC communities such as Kunbi, Mali, Teli etc. rear these animals. They are medium to large-sized cattle. These animals typically have a white coat, though some may exhibit a pale red or pinkish hue. The face is often greyish to black in colour. Their horns are black, short and stumpy. The cattle have a straight forehead that narrows towards the muzzle. Their eyes are black and almond-shaped, while their hooves are also black. These animals are valued for both milk production and draft purposes, producing an average of 1.5 to 2 litres of milk per day managed with zero input systems. The draftability of the animals in the black cotton soil of the region and sustainability in summer season makes these animals preferred by the local farmers.

Pashmi dog: This dog is found in the Latur district of Maharashtra. It is intelligent, sensitive, loya land courageous dog. Coat colour is mainly black but light brown colour is also found. It is muscular and lean dog having long neck, legs and back. Head is long and narrow with a tapering muzzle. Tail is whip like with a curve at the end. They are kept for hunting and guarding purpose.

Pashmi dog

Goa

A quick survey work was undertaken for the identification of the new potential homogenous populations which can be characterized further in details for breed documentation and registration. An unexplored dog breed of Goa named Luti was identified. This is a hunting type dog reared by the natives of the Pementaluka and adjoining region of Goa. The colour of this dog is light black or brown. This dog population if found in sufficient number can be explored further in details. Tiger stripped cattle a rare mutation in the cattle population was also observed during the survey.

Luti dog

Andaman & Nicobar Islands

During the year, survey of Andaman Islands were undertaken to explore native Animal Genetic Resources (AnGR) of these remote islands. Also new initiative to undertake Ecosystem Services (ESS) of native AnGR of the island ecosystem was carried out through questionnaire-based interactions with farmers/ livestock keepers. Interactions with local livestock keepers, farmers and the Veterinary Officer provided valuable insights, on native livestock populations, breeding programs, disease incidences, and vaccination protocols, enhancing the understanding of the breeds in Andaman and their role in the region's agro-climatic conditions.

Preliminary data on cattle, goat, duck, chicken, and pig populations were collected from more than 75 farmers, including detailed morphometric measurements and information on production, reproduction, and management practices. Data on the Ecosystem services (ESS) provided by native AnGR was also collected by FAO questionnaire-based survey. The analysis of ESS data, represented by the Rose diagram, showcases the regulating and maintenance services of goats in the Andaman and Nicobar Islands, emphasizing their contribution to six services, with the highest impact on fertilizer production and waste recycling. In comparison, pigs primarily contribute to waste recycling, along with four other ecosystem services. Further various provisioning services were analyzed which demonstrated 13 various services being provided by AnGR of Andaman Islands, maximum being savings/security.

Lakshadweep Islands

Lakshadweep has ten inhabited islands viz. Agatti, Kavaratti, Bangaram, Kadmath, Ameni, Chetlat, Bitra, Androth, Kalpeni and Minicoy. Androth is the largest while Bitra is the smallest island. Livestock and

poultry are integral to Lakshadweep's economy and food security. Small-scale, backyard farming systems dominate the sector, catering primarily to household consumption. Livestock, including cattle, goats, and poultry, has historically been a vital resource for nutrition and income generation, adapting to the islands' limited natural resources.

The unique geography and ecosystem of Lakshadweep have significantly influenced livestock farming practices. Due to the absence of grazing lands and scarce water resources, intensive livestock farming is impractical. Instead, sustainable, small-scale animal husbandry has evolved, tailored to the environmental constraints of the region.

Lakshadweep's indigenous livestock populations, including native goats and poultry, have adapted to the islands' resource-limited and isolated environment. These animals possess valuable traits such as disease resistance, heat tolerance, and efficient resource utilization, making them resilient to climate change and other environmental challenges. No information on native breeds of AnGR of Lakshadweep has been reported yet. To explore and document the AnGR of these remote Islands, an Interface meeting on 'Characterization and documentation of AnGR of Lakshadweep' was organized at KVK, ICAR-CMFRI, Kavaratti, Lakshadweep during April 2024.Further preliminary survey was carried out in Agatti, Kavaratti and Bangaram islands of Lakshadweep and collected information on history, migration and distribution of AnGR and indigenous livestock and poultry populations in Lakshadweep. Evaluated indigenous livestock and poultry for uniformity and uniqueness to explore the potential populations of indigenous goats and ducks through surveys. Physical characteristics, morphometric traits, production traits, and body weights of native goats were recorded. Measurements were taken on nine biometric traits from 48 indigenous goats, while body weights were recorded for 55 adult goats and 5 kids.. ESS data and various details on native AnGR were gathered through interactions with 30 farmers.

Lakshadivi Goat (Naadanaadu): New Potential population of goat was identified. The Lakshadweep or Lakshadivi goat, locally known as 'Naadan Aadu,' is an indigenous breed of Lakshadweep. It is medium-sized, with a long neck, small triangular face, and prominent supraorbital ridges. Its horizontal, flaccid ears and overall appearance give it a distinctive deer-like look.

This goat is found across all inhabited islands of Lakshadweep. The Local goat has adapted to the unique hot-humid agro-ecological conditions of the Lakshadweep islands. Brought by settlers around two centuries ago, these goats have evolved to thrive in the resource-scarce island environment.

Coat Color is primarily white, black, fawn, or brown with lighter shades on the lower body. Black or white markings on the face, ear margins, limbs, and other parts are common.

It is reared under Semi-intensive, backyard farming. Enclosures are built from locally available materials like wood and dried coconut leaves. About two-thirds of the enclosure is open. Diet includes coconut leaves, kitchen waste, and leaves of plants such as *Macarangapeltata (*Patti) and *Scaevolasericea* (Sea lettuce).Only few farmers supplement their diet with concentrates.

The resilient Lakshadivi goats, prized for their ability to thrive on low-quality forage, provide milk, meat, and income for smallholder farmers, particularly women, while their manure supports organic farming; most farmers typically keep 1-3 goats, which are disease-resistant and require minimal care. Twinning is common, enhancing their economic value. Goat meat

is a significant source of income, sold at around ₹700 per kg.

Madhya Pradesh

Survey was conducted in Shivpuri, Ashok nagar districts of Gwalior division and Tikamgarh, Chhatarpur and Niwari districts of Sagar Division of Madhya Pradesh state to document the native livestock and poultry and explore the homogenous native populations in the region. This Northern Plain and Central highland agro-ecological region, is characterized by sub-tropical vegetation and mixed cropping system. Most common livestock species are cattle, buffalo and goat, reared mostly semi-intensive livestock system. Native livestock and poultry are, although less productive, seem to be contributing significantly, in form of food, social and financial security mostly to the landless, marginalized and small farmers in the region. Description of various animal genetic resources available in the region is described below-

Cattle: In Tikamgarh and Chhatarpur districts of Bundelkhand. Most of the cattle were of Kenkatha type, either in pure form or its grades. However, the population of Kenkatha seemingly declining in the tract. Native cattle, reared under semi-intensive / extensive system by the small farmers, are utilized for milk, manure and Agricultural work. These native cows produce 3-4 Kg milk in a day, with highest 6 Kg/day milk production. In Ashok nagar and Shivpuri districts, a large proportion of mixed type of indigenous cattle population are found. Cattle are medium in size with reddish coat, mostly. These cattle are reared mostly under extensive system, mainly for milk and manure purpose. Milk production is also low, with mostly production of 2-4 Kg per day. There is increasing preference for the Gir and Jersey germlasm, specially by resourceful livestock keepers.

Buffalo: Most of the buffalo in the Sagar and Gwalior Division are either mixed type or grades of Murrah buffaloes. Most of the local buffaloes are being replaced by the Murrah, due to increasing preference for milkby the farmers. Local buffaloes of the region, although less in proportion, are medium in size with hairy coat. The local buffaloes produce 4-6 Kg milk / day; whereas, Murrah grades are able to produce 6-8 Kg in day. The buffalo in the region are reared under Semi intensive system, for milk and manure purposes. Buffalo population is increasing, on large scale, in the region due to the higher milk pricing and demand. No unique and homogenous buffalo population, with requisite population size was observed during the transact survey.

Goat: Most of the goats are mixed type in both of the districts of Sagar and Gwalior divisions. Animals are medium sized, with black, brown coat. Goats with spotted coat, specially as grades of Sirohi are also available. These goats are reared under semi-intensive system by poor and marginal farmers for meat and milk purpose. Goat population with preference of Sirohi is increasing in the region.

Sheep: No unique population of sheep was found in the divisions, although most of the sheep are native. Migratory flocks of Marwari sheep are also present, as a migration route from Rajasthan, transacting Madhya Pradesh districts. Native sheep are medium sized, with yellowish white coat. These local sheep are reared under semi-intensive system, along with goats, for meat and manure purpose only. These sheep produce coarse wool, and sheared twice a year. Population of the sheep seems decreasing in the region.

Kenkatha cow in its native tract

Native buffalo in Sagar Division of Madhya Pradesh

Pig and other species: Native non-descript pig population was found to be distributed across the region. Horse, camel and donkey, although very few in numbers, were also of non-defined category. No distinct population of these species was present in the region.

Poultry: Among poultry, some landless and marginalized farmers rear dual chicken verities for egg and meat, mostly under backyard system. However, no distinct and homogenous population was found.

Till now, total 16 districts of four Divisions -Chambal, Gwalior, Indore, Sagar Divisions of Madhya Pradesh have been surveyed and AnGR has been documented for these Divisions. Six new populations – Lahuri goat, Dang sheep, Malvi sheep, Nimari buffalo have been identified. Characterization of Lahuri goat of Chambal Division has been completed. Characterization of Dang sheep and Dang buffalo has also been carried out. Characterization of Malvi sheep is underway through Network Project on AnGR.

Arunachal Pradesh

Survey to document the native livestock and poultry of Arunachal Pradesh was conducted in field areas of Namsai, Lohit, Changlang, Tirap and Longding distracts of the state to document AnGR and homogenous native population(s) of livestock and poultry. Distribution of native livestock and poultry resources, information about their utility, uniqueness, distribution, production environment, management practices of native livestock species was gathered. This region of the Arunachal Pradesh comes under Eastern Himalaya agro-ecological and rich in AnGR diversity. Major livestock species are cattle, goat, pig, chicken and duck. Mithun are also available, however, in less number. Documentation of native AnGR in the region is as follows-

Cattle: Native cattle are mostly small in size with reddish or creamish coat colour in all five districts, much close to Lakhimi cattle in appearance. In lower regions adjoining to the Assam of these districts, the cattle are slightly larger in size and Lakhimi cattle type. Milk production is 1-3 kg /day with 6-8 months of lactation length. Crossbreds are also available in all districts; however population is increasing in Namsai and Lohit district. It has been observed; the crossbreds are larger in size and seems hesitant for grazing in

Native goat of Eastern Himalayan region of Arunachal Pradesh

sloppy terrains. Indigenous cattle rearing is also being banned in some of the regions of Tirap and Longding districts due to damage to agricultural crops caused by the cattle reared under free range/extensive system. No new potential cattle population seems to appear in these districts.

Goat: Native goats are homogenous in appearance in most of the regions in these districts. However, population is declining in Tirap and Longding districts due to causing the damage to agricultural crops reared under free range. These are medium sized with peculiar brownish coat with black topline. Twining is common. Reared under extensive system This population is similar in appearance and in continuity of the geographical distribution of the 'Arunachali' goat available in other districts. In one of the region in Namsai district, a highly prolific goat population able to produce 4-5 kids, however few in numbers is available. Although sparsely distributed, similar goats were also distributed in Tawang region. The native Arunachali goat is potential population for further characterization in continuity. Assam Hill and Black Bengal goats and their grades are also available in lower part of these districts. These goats are more prone to respiratory ailments and high mortality has also been observed.

Pig: Native pig, small in size and black in colour is now scarcely available. Most of the pigs are now being procured from the Assam. These pigs are crossbreds of Large Black, White Yorkshire mainly. In near future, native pigs may be completely wiped out.

Native goat of Eastern Himalayan region of Arunachal Pradesh

Native chicken in Eastern Himalayan region of Arunachal Pradesh

Buffalo: Some number of swamp buffaloes were observed in Tirap district, introduced from adjoining region of Assam.

Poultry: Chicken is the main poultry species in the region with most of indigenous type. Much of Red Jungle Fowl in appearance; however completely domesticated these are densely distributed in Tirap and Longding district. It is potential chicken population with origin in Tirap and Longding districts and distributed in a larger part of the Arunachal Pradesh. Indigenous duck is also available in small numbers in lower regions of these districts, however in more continuity with duck population of Assam.

Dog: Native "Eki" dog as potential population is also available across the region. Physical appearance and morphometric characteristics are also similar. Almost every household rear 1-3 Eki dog. Coat color is mainly reddish or cream. Small, tapering triangular face has a peculiar appearance with erect ears. It is reared for guarding the house.

AnGR diversity: Overall indigenous AnGR diversity is declining in the region. Diversification of the species has also seemed to be reduced. Species like cattle and goat have now drastically reduced in Tirap and Namsai districts in recent time due to restriction made by the village king/head. Both of the species seem to cause the damage to the agricultural crops due to their traditional extensive production system. The trend is more visible with the intensification of the agriculture in the region.

Jersey and some improver indigenous dairy breeds have been introduced for breeding (AI), however adoption seems limited to the progressive farmers. Goats -mainly Assam Hill and some Black Bengal from Assam are also being introduced in hilly districts under various schemes. Some of the pig and chicken varieties, of high production has also been introduced by the state, mostly procurement from the adjoining states specially Assam. High yielding crossbred varieties has almost replaced all of the indigenous pig population in the region. New chicken varieties have also been introduced; however native chicken seems more resilient. New species like swamp buffalo, turkey has also been introduced occasionally.

Uttarakhand

A local cattle was identified in the Chakrata block of Dehradun district. The cattle is small in size, white or light grey in colour. The cattle has well developed dewlap, prominent hump, and drooping horns.

A homogenous population of cattle was found in Kalsi and Chakrata block of Dehradun, Uttarakhand.

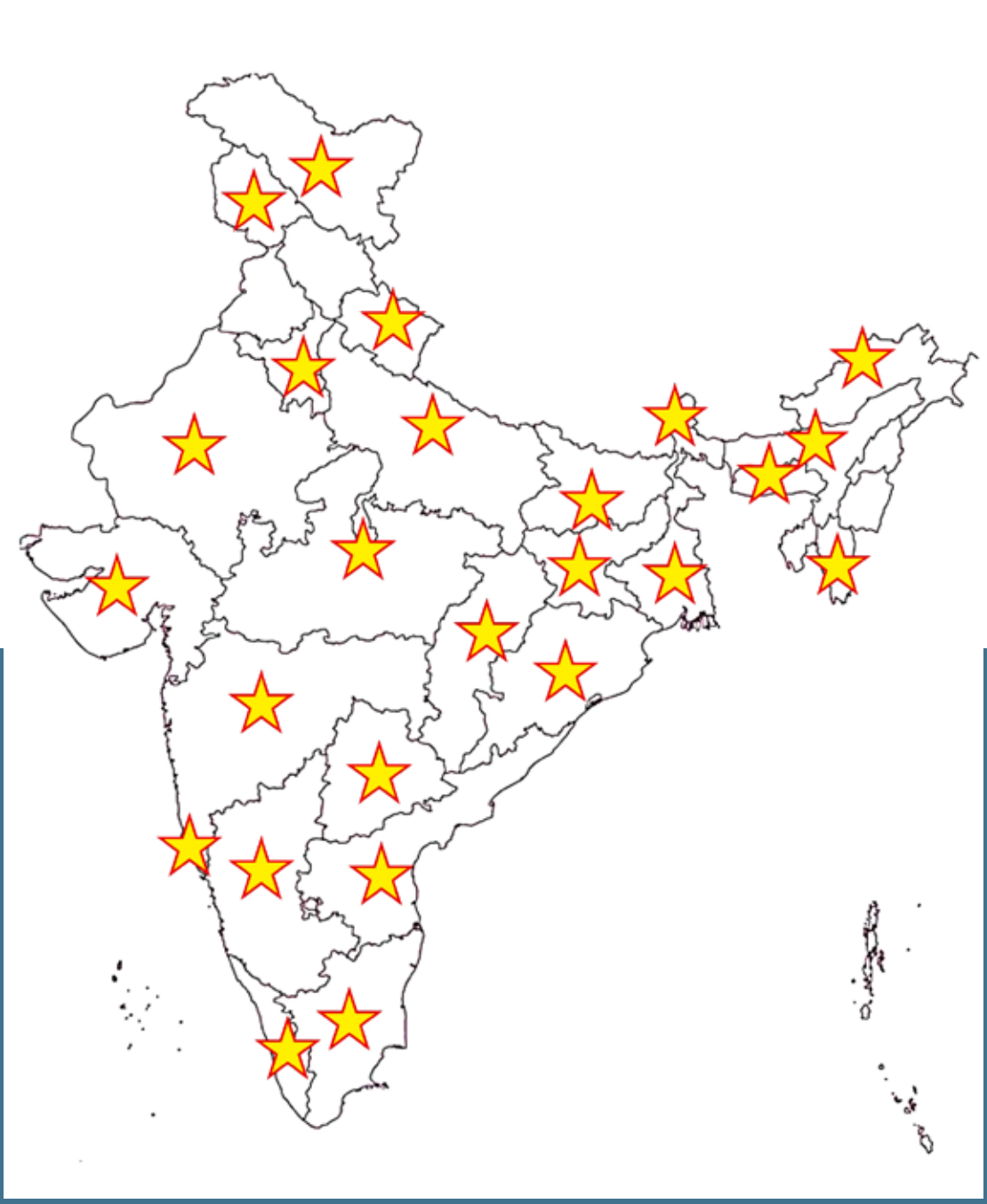
Tamil Nadu

Non-descript cattle in Tamil Nadu are predominantly distributed at the eastern part of foothills of the Western Ghats and raised under zero-input systems, these cattle support rural livelihoods in the districts of Tiruppur, Kanyakumari, Tirunelveli and Namakkal. Among the cattle populations surveyed the preliminary investigations revealed the cattle population of Kolli hills in Namakkal district appears to be distinct. The survey was conducted in 12 hamlets of Kolli hills, a part of Eastern Ghats and information related to production, reproduction performances and management practices were recorded from 50 adult animals. Cattle population distributed in the Kolli hills at 1,200 meters altitude, are medium-sized with roan or grey coats, and are valued for ploughing, dung, and milk production. Predominant coat colour is roan (60%), followed by grey coat (30%) and about 10% of the animals are mixed coat colour. The milk yield ranges from 1.5 to 2.0 litres per day with a lactation length of 200-225 days. Breeding is only through natural mating. Few farmers rear Kangayam cattle, Jersey & HF crosses. The mean of most important biometric traits (cm) viz., body length, height at withers, heart girth, paunch girth, horn length, ear length, face length, tail length and tail up to switch were 108.35±1.151, 100.22±.996, 134.45±1.635, 139.53±1.932, 19.72±.940, 15.93±.179, 39.31±0.435, 71.65±0.965 and 22.65±0.744 respectively. For the characterization of non-descript cattle of Tiruppur district the survey was conducted in the tribal settlement (Kodanthur, Amaravathi Nagar, Devanur Puthur etc.,) at the foot hills of Western Ghats in the Anaimalai Tiger Reserve. The non-descript cattle were short in height and reared under extensive system of management and the animals are allowed go for free grazing inside the forest during the morning hours and it will return back in the evening.

Kerala

The preliminary survey on indigenous cattle was conducted in about 12 farmers herd maintaining more than 500 animals distributed in Sholayur and Puthur panchayat in Attapady area of Palakkad, Kerala. The indigenous cattle of Attappady are medium-sized animals, averaging 115-125 centimeters in height. Their coat color is predominantly red, although white, brown, and mixed patterns are also observed. Most cattle are horned with large horns. Bulls exhibit prominent humps, while females have less pronounced humps. Adaptations such as strong legs and hooves make them well-suited for grazing in mountainous terrains and long-distance walking. The animals are reared under extensive system of management. These cattle are maintained by the Irular tribes in the Attapady area.

Characterization under Network Project on Animal Genetic Resources



An all-India Network Project to characterize and document indigenous livestock and poultry breeds of India was initiated in the VIII plan (January 1996) with the following objectives

- To characterize the breeds in terms of both qualitative and quantitative traits.
- Molecular genetic characterization and candidate gene studies in indigenous breeds.
- To develop the breed descriptors.
- To conserve the germplasm.

The project started with phenotypic characterization of 8 breeds wherein their distribution, morphological characteristics, growth, reproduction, and production parameters, and utility were documented. Genetic characterization and *in situ* and *ex-situ* conservation were added to the existing program in the IX plan. A paradigm shift in approach towards AnGR characterization was a hallmark of 2021, when the Bureau initiated the survey and documentation of AnGR pan India under the "Mission towards Zero Non-Descript AnGR of India'. In Sync with the mission, NWP centres were established across the country for documentation and characterization of indigenous AnGR for registration of potential populations.NWP centres increased from 3 in 2022-23 to 27 in 2023-24, and 32 in 2024-25. Currently, 26 states/Union Territories are covered under this project.

NWP centre: ICAR- Research Complex for Eastern Region, Patna

Seemanchali Sheep: These are distributed in Supaul, Madhubani, and some parts of the Araria districts of Eastern Bihar. The estimated population size of Seemanchali sheep is around 80,000. Morphometric characteristics studied at the age of 3, 6, 9, and 12 months revealed that the chest girth increased by 18.4% whereas the height increased by 26.1% between 3 and 12 months of age. Similarly, the body weights showed variation at different ages, giving scope for improving their productivity. Body weight at 3 months of age was recorded to be 9.44±0.18 kg, which increased to 14.58±0.22 kg in 6 months, registering 55.7% of incremental gain in females, while the gain was 65.8% from 6 to 12 months. Comparison of Seemanchali sheep body weights with other sheep breeds of India indicated it to be a medium-sized sheep population. Age at 1st mating and age at 1st lambing were 9.81 and 15.37 months, respectively. Mostly single kid is born at lambing, and twinning is rare.

Seemanchali Sheep

Table: Body Weight (kg)

Weight at	Male			Female		
	Average	Range	N	Average	Range	N
Birth	3.01±0.11	2.4 – 3.6	46	2.87±0.12	2.2 – 3.5	40
Weaning/ 3 months	10.18±0.23	7.8 – 13.3	316	9.44±0.18	7.7 – 12.8	297
6 months	17.34±0.28	15.2 –19.4	105	14.58±0.22	11.6 –17.8	210
1 year	27.57±0.87	23.8 – 0.4	24	24.18±0.21	21.8 – 8.0	187
Adult weight	48.16±0.51	39.5 –60.5	84	37.83±0.20	32.5 –41.7	486

Tirhuti goat: Tirhuti goats are distributed in the northwestern districts of Bihar, which include Sitamarhi, parts of Samastipur, East Champaran, and West Champaran districts. These are small to medium in size. There are four variants in this breed based on coat colour, viz. Black, Brown, White, and admixture of these colours in varying proportions. The black variant dominates among the four types. The bucks possess medium to long hairs, especially over the dorsal line of the body, whereas the does have short hairs which are never shorn. The head is small and the face is straight. Ears are drooping in most cases. Generally, Indian goats are horned, while Tirhuti population has 7.6% of polled males and 11.3% of polled does.

Tirhuti goat

Table: Body weight (kg)

Weight at	Male			Female		
	Average	Range	N	Average	Range	N
Birth	1.45±0.11	1.2 – 1.8	23	1.42±0.13	1.1 – 1.6	25
Weaning / 3 M	6.76±0.27	5.9 – 7.4	107	5.83±0.27	4.5 – 7.1	126
6 months	10.26±0.29	8.8 – 12.1	78	8.77±0.28	6.5 – 10.2	104
12 months	17.22±0.77	15.5 –20.0	33	15.87±0.21	13.2 – 18.2	122
First Kidding	--	--		17.56±0.24	15.0 – 19.8	70
Adult (6 teeth)	33.43±0.62	25.4 –41.7	18	24.13±0.21	20.0 – 28.8	223

Mala Chicken: The native chicken of Jharkhand is mainly distributed in the Ranchi district. Hackle and saddle feathers of males are rich golden yellow in males,forming 'mala' (Garland) like shape with lacing plumage pattern. Predominantly, birds have white skin colour, red earlobes, and yellow shank. The dominant plumage colour in males is black and golden mix, followed by white and black mix, whereas it is white and black,followed by brownish-white to light brown in females. The dominant comb type is single, followed by pea type. Mala chicken holds a significant place in the socio-cultural fabric of tribal life in the region. These are part of religious ceremonies, as sacrifices to deities. Additionally, due to their natural resilience and robust build, some cocks are used in cockfighting events during tribal festivities and social gatherings.

Mala chicken

Table: Egg production

Egg production characteristics	Average	Range	N
Age at first egg (months)	209.71±0.94	181-234	207
Annual egg production	49.89±1.53	24-95	157
Clutch size (days)	12.87±0.34	5-20	157
Clutch interval/Pause Period (days)	105.24±0.65	92-120	157
Laying cycle (months)	12.62±0.20	6-20	157
Age at culling (months)	23.38±0.29	18-30	157

Charka Chicken: These are distributed in Ranchi, Khunti, and West Singhbhum districts of Jharkhand. The birds are completely white, hence the name is Charka, which means white in the local language. The skin colour in most of the chickens is white. Plumage is also white. Other dominant attributes include white skin, red earlobe, single comb, and red double wattles. The shank colour is predominantly yellow, followed by white and grey. The flock size in the study area varies from 5 to 15. Most of the chickens have a single comb, followed by rose and pea combs. The mean body weight of adult indigenous Charka male and female chickens was 1.49±0.01 kg and 1.13±0.01 kg, respectively. The estimated population is around 1,48,000.

Charka chicken

Table: Egg production

Egg production characteristics	Average	Range	N
Age at first egg (months)	192.54±0.99	165-219	207
Annual egg production	62.19±1.56	36-96	151
Clutch size (days)	13.40±0.43	6-24	151
Clutch interval/ Pause Period (days)	106.97±0.85	86-128	151
Laying cycle (months)	12.50±0.21	6-18	151
Age at culling (months)	26.15±0.30	20-32	151

Chotanagpuri buffalo: Chotanagpuri buffaloes, also referred to as 'Jharkhandi' or 'Dhanbadi', are distributed in the Chotanagpuri plateau region in Jharkhand state (Ranchi and Khunti in the West to Dhanbad, Dumka, and Pakur in the East). These buffaloes are reared in small herds with a herd size ranging from 1-20. Animals are 'medium' in size. The coat is Black in the majority of animals. However, light brown colour leg extremities and ventral parts of the body are seen in around 13.6% of buffaloes. The animals have a narrow face and a barrel-shaped body. The shape of the horns is loosely curved, oriented laterally backward and inward. The height at withers, body length, and chest girth of the buffaloes are found to be 95.56±0.56 cm, 92.34±0.52 cm, and 112.66±0.48 cm, at 1 year of age, and 128.43±0.28 cm, 133.40±0.27 cm, and 191.83±0.27 cm, in adult female buffaloes. The estimated body weights in adults are 481.29±0.29 kg for males and

Chotanagpuri buffalo

470.22±0.30 kg for females. The buffaloes are poor milkers as the milk production ranges from 2.5 kg to 5.5 kg per day. Apart from milk, these buffaloes are also used for draught purposes and can work for > 6 hours a day.

NWP centre: MAFSU,Nagpur

Umarda cattle: These cattle are distributed mainly in Digras, Darvha, Ner, Arni, and Pusad tahsils of Yavatmal district, Manora, Mangrulpir, and Karanja tahsils of Washim district, and the adjoining part of Amravati district in Maharashtra. The coat colour is white. The animals at birth have a light brownish colour, which vanishes with the advancement of age. The forehead is concave, and the muzzle, horns, and hooves are black. The black eyeliner is a typical characteristic of Umarda cattle. Horns are stumpy. Animals are strong and medium in size. The Umarda bullocks are reared for draught purposes and are well suited for heavy agricultural work on black cotton soil.

Umarda cow

Horn length, ear length, face length, face width, paunch girth, body length, body height, and heart girth are 18.01±0.50, 24.83±0.19, 45.06±0.20, 18.69±0.18, 163.78±0.89, 122.93±0.58, 124.84±0.55, and 151.58±0.89 cms in adult Umarda cattle.

Table: Body measurements (cm) of Umarda cattle

Parameter	Male			Female		
	Average	Range	N	Average	Range	N
Chest girth	163.39±0.58	133-200	437	146.43±0.35	125-190	796
Body length	130.53±0.37	102-160	437	120.17±0.24	105-145	796
Height at withers	133.19±0.36	107-152	437	120.99±0.23	103-145	796

Table: Dairy performance of Umarda cattle

Parameter	First Lactation			Overall		
	Average	Range	N	Average	Range	N
Daily milk yield (kg)	1.10±0.03	1-3	102	1.17±0.02	1-4	705
Peak milk yield (kg)	1.59±0.04	1-3.5	102	1.63±0.02	1-4.5	705
Lactation length (days)	207.94±4.01	120-300	102	204.78±1.68	120-365	705
Lactation milk yield (kg)	226.82±6.77	120-600	102	252.45±4.90	120-960	705
Fat %	4.44±0.21	2.50-7.15	49	4.80±0.08	2.50-8.51	320
SNF %	8.83±0.11	6.31-11.21	49	8.71±0.06	5.15-11.21	320

Melghati buffalo: Mainly distributed in the Melghhat region of Amravati district (Dharni and Chikhaldara tahsils) of Maharashtra. These are medium-sized buffaloes with a black coat colour and long hair. The forehead of animals is broad between horns, and slightly convex. The face is noticeably long and tapering towards the muzzle. Horns are medium in size, black in colour, curved in shape (backward-upward/ backward-inward) with pointed tips. The animals are reared under a pastoral management system. Feed concentrate is offered during milking only.

Melghati buffalo

Table: Body measurements (cm) of Melghati buffalo

Parameter	Male			Female		
Average		Range	N	Average	Range	N
Chest girth	184.55±0.88	164 - 195	71	177.65±0.25	145 - 197	1354
Body length	135.35±0.65	115 - 144	71	131.61±0.16	109 - 147	1354
Height at withers	132.25±0.54	114 - 142	71	127.95±0.15	106 - 145	1354

Table: Dairy performance of Melghati buffalo

Parameter	First Lactation			Overall		
	Average	Range	N	Average	Range	N
Daily milk yield (kg)	3.88±0.04	2.0 - 7.0	355	3.96±0.03	2.0 - 8.0	978
Peak milk yield (kg)	6.40±0.06	3.0 - 9.0	355	6.47±0.04	3.0 - 10.0	978
Lactation length (days)	277.61±1.15	200 - 340	355	275.78±0.76	180 - 365	978
Lactation milk yield (kg)	1071.18±9.85	720 - 1485	355	1087.37±6.00	720 - 1760	978
Fat %	6.91±0.10	4.57-9.64	101	7.00±0.08	4.57-10.52	272
SNF %	9.10±0.04	7.53-10.03	101	9.11±0.04	6.37-11.52	272

Melghati cattle: Animals aredistributed in the Melghhat region of Amravati district, comprising Dharni and Chikhaldara tahsils. A total of 876 adult Melghati cattle from 18 villages of the Melghat region were surveyed to document phenotypic, morphometric, production, and reproduction traits. Small-sized animals are of red, white, and mixed colours. Animals have prominent eyes. The muzzle, eyelid, tail switch, and hooves are black. The forehead is straight with a vertical depression midway. The horns are black, with lateral orientation, while and ears have horizontal orientation. Horn length, ear length, face length, and face width in adult Melghati males were (cms) 25.55±0.33, 24.85±2.61, 45.42±0.15, and20.55±0.10, and in adult Melghati females were 23.42±0.40, 23.75±0.13, 42.27±0.18, and 18.72±0.10. Chest girth, Paunch girth, body length, height at withers, and body weight, in adult Melghati males were 158.20±0.64 cm, 167.79±0.82 cm, 127.11±0.37 cm, 124.91±0.32 cm, and 297.87±2.80 kg, while in adult

Melghati cow

Melghati females were 146.48±1.06 cm, 159.32±1.35 cm, 117.03±0.63 cm, 115.28±0.54 cm, and248.76±4.46 kg. The overall mean age at first oestrus, oestrous cycle duration, oestrus duration, age at first mating, age at first calving, service period, and calving interval were 40.45±0.18 months, 21.22±0.07 days, 17.85±0.28 hrs, 42.00±0.17 months, 51.12±0.20 months, 198.62±2.47 days, and 475.87±2.71 days, respectively.

Table: Dairy performance traits of Melghati cattle

Parameter	Average	Range	Number of Observations
Daily milk yield (kg)	1.39±0.03	0.5-3.5	320
Peak milk yield (kg)	2.01±0.03	1-4	254
Lactation length (days)	205.99±2.94	110-290	254
Lactation milk yield (kg)	286.01±6.84	60-540	253
Fat %	4.66±0.14	2.44-8.31	124
SNF %	8.73±0.03	8.32-9.89	124

Eki dog

NWP centre: DAHVDD, Nirjuli, Arunachal Pradesh

Mon-Bhaah cattle: These aresturdy, compact-bodied animals of short height. The majority of animals have black coat colour, while brown animals or animals with white faces and tail switch are also seen. They have a long and hairy body coat to protect themselves from the cold climate of the region. Mon-Bhaah cattle are well adapted to a severe, harsh cold climate and are found only in snow-capped areas. They can survive on limited fodder and are usually seen grazing along with yaks in deep, snowy areas. The semi-range management system is followed as animals are provided with maize powder and beverage waste occasionally. The milch cows are milked once in the morning. Mon-Bhaah male animals are utilized mainly for the work power (Ploughing) while cows are used for milk and manure purposes. The average daily milk yield and lactation period are1.67±0.03 kg and 164.82±0.39 days, respectively.

Eki dog: Eki dogs are medium to large. The body is compact and hairy.The coat colour varies from black-brown to white or admixture.The animals are well adapted to snow-capped regions of high mountains.The average litter size is 8.The adult average body length, height, and body weight are80 cm, 59 cm, and 20 kg, respectively.

NWP centre: BASU, Patna

Champaran Goat: These goats are distributed in the East and West Champaran districts of Bihar. Animals are of black, brown colour, or a combinationof black and brown colour. Specific visible characteristics of the population includelustrous hair, medium legged animals, a beardin aged animals,and a slightly convex nose line. Animals are mainly used for mutton production.

Monbah cattle

Champaran Goat

Table: Body weight of Champaran Goat (kg)

Weight at	Male			Female		
	Average	Range	N	Average	Range	N
Birth	2.34±0.36	0.4-4.0	08	2.33±0.17	1.8-3.0	6
Weaning / 3 M	4.96±0.49	1.2-11	24	3.78±0.37	2.0-7.0	16
6 M	8.89±0.39	6-17.5	42	7.38±0.31	4-10	24
12 M	18.04±0.53	08-35	154	13.82±0.49	6-29	92
Adult (6 teeth)	31±0.69	13-47	145	22.65±0.35	11-40	255

Banka cattle

Banka Cattle: These aredistributed mainly in hilly regions of Banka, Munger, and some parts of the Jamuidistricts of Bihar. Animals are small in size. Colour is black, brown, white, or a combination of these. The forehead is flat or slightly convex. Few animals have white eyelashes and few others have a pinkish muzzle and hooves. Animals are maintained mainly by poor livestock keepers of Banka and Munger districts residing near hills for milk, draught, and manure purposes. Milk production is 2-3 litres/day. Animals are reared underazero-input system and maintained on grazing. One of the most distinctive features of their management is seasonal migration from hilly areas to the Ganges basin, primarily in the Bhagalpur district, for green fodder. Local farmers allow theanimals to stay in their fields for a few nights for the benefit of natural fertilization. In return, they provide food, shelter, and monetary compensation to the livestock keepers.

NWP centre:OUAT, Bhubaneswar

Mayurbhanj Goat: Mayurbhanj goats are predominantly black,with occasional presence of brown coat colour. These goats are of medium size. Males usually develop beards at a later stage of life. The head is convex, and the ears are short and horizontal. Mayurbhanj goats are early-maturing and highly prolific, mostly kidding twins at second and later kidding, with triplets occurring in a few cases. The goats are horned, having an upward and backward orientation. The average body weight at birth in males and femalesis 1.21±0.09 and 0.99±0.09 kg, respectively. The average body length at birth in males and females is 20.03±0.61 and 18.20±0.63 cm, respectively. The average wither height at birth for males and females is 25.23±0.47 and 22.66±0.49 cm, respectively. The average chest girth at birth in males and females is 25.38±0.62 and 22.91±0.64 cm, respectively. The average body weight at three months of age in males and females is 5.96±0.24 and 5.27±0.23 kg, respectively. The average body length at three months of age in males and females is 30.62±0.65 and 29.69±0.62 cm, respectively.The average body weight at one year in males and females is 12.88±0.51 and 11.87±0.51 kg, respectively. The average age at sexual maturity is 7.69 months, the age at first kidding is 13.47 months, and the kidding interval is 7.47 months.

Mayurbhanj goat

Golla Pig: The Golla community of the undivided Ganjam district rears pigs in groups, and these pigs are known as the Golla pig. Golla pigs are compact and medium-sized with well-developed muscles. Their head is small. The neck is short and muscular, while the legs are strong with well-built muscles at the back and thighs. The tail is medium in length with a tuft of hair. Pigs are medium-sized with a barrel-shaped abdomen. The skin is predominantly solid black, although some pigs may exhibit a light brown coat or black skin with all four legs white. The skin is thick, and males have a row of standing hair running over the neck and thorax. The ears are small and erect in orientation. Females have ten teats. The average body weight at birth is 0.49±0.004 kg in males and 0.48±0.004 kg in females. At birth, the

Gola pig

average body length is 17.01±0.05 cm in males and 16.16±0.05 cm in females, while the average wither height is 10.87±0.041 cm in males and 10.45±0.040 cm in females. The average chest girth at birth is 19.29±0.07 cm in males and 18.41±0.07 cm in females. At six months of age, the average body weight increases to 23.49±0.15 kg in males and 22.83±0.14 kg in females. The body length at this stage is 43.53±0.14 cm in males and 40.32±0.15 cm in females, while the wither height is 32.25±0.07 cm in males and 31.35±0.07 cm in females. At the age of one year, the average body weight reaches 45.70±0.19 kg in males and 44.43±0.21 kg in females. The body length at this stage is 59.62±0.35 cm in males and 56.59±0.35 cm in females, while the wither height measures 47.5±0.29 cm in males and 44.15±0.22 cm in females. Golla pigs exhibit good reproductive performance. The average litter size at birth is 7.29 piglets, with an average litter weight of 3.60±0.04 kg. At weaning, the average litter size reduces to 6.12 piglets, and the litter weight increases to 30.68±0.38 kg. The average age at first estrus is 216.12 days, while the average age at first service is 247.44 days. The average age at first farrowing is 351.10 days, with a farrowing interval of 204.94 days. The gestation period is recorded at 112.29 days.

Mayurbhanj chicken: Mayurbhanj chicken originates from the Mayurbhanj district of Odisha and is primarily reared for both egg and meat production. These birds are small to medium in size, with males exhibiting brown, golden-white, or white plumage with some black and green shades, while females typically have brown and black plumage. The unique coloration provides them with natural camouflage, helping protect them from predators. They have yellow shanks and a single comb, with black tail feathers that display greenish shades. The birds reach their first egg-laying stage at an average age of 5.09 months. They produce approximately 53 eggs annually, with an average egg weight of 40.21 grams. The eggs have a white shell with a thickness of 0.19 mm. The hatchability rate on a fertile egg basis is 86.76%, while on a total egg basis, it is 81.47%. Adult male birds weigh around 2.51 kg, while females weigh approximately 1.64 kg. Mayurbhanj chickens have an exceptional ability to survive on a low plane of nutrition and withstand harsh climatic conditions. They are highly valued due to the superior taste of their meat and are often in high demand for festivals and special occasions.

NWP centre: SKUAST, Jammu

Hill cattle of Jammu: Also known as the desi cow, and distributed in the hilly terrain of the Jammu division. The utility of the population is milk, draught, and manure. The population is very docile, and the average herd size is small (1-4). The body colour is generally Roan (10.70%), Black (31.92%), Brown (25.10%), and White (32.28%). Animals have a small body frame and short legs. The forehead is mainly concave.Eyelid colour is Black (42.32%), brown (23.45%), and white (34.23%), and hooves are mainly Black (54.00%) and brown (46%).The ear is horizontal and drooping, with anaverage value of 13.87 cm.Horn orientation in animals is horizontal-upward and horizontal-inward, and polled animals are also seen.The average daily milk yield is 2.09 kg, with the average peak yield of 2.85 kg. The lactation length is 187.52 days,rangingfrom 140 days to 260 days.

Badarwahi sheep: The population is mainly found in the Bhadarwah, Doda, Kishtawar, Bani, and Ramnagar of Jammu & Kashmir. The population size is around 50-

Chicken of Mayurbhanj

Hill cattle of Jammu

AnGR in Jammu region

60 thousand. Animals are very docile and are reared by the tribal community for dual purpose (wool and meat). The average flock size is (20-40). The flock composition is 85% ewes, 5% rams, and 10% lambs. Body colour is generally white. Rams are mostly horned, and ewes are in general polled (8-10% found to be horned).

Table: Adult body weight (Kg) and body biometry inBadarwahi sheep (cm)

Sex	BL	HW	CG	PG	FL	FW	EL	HL	TL
Male	110.59 ± 1.01	75.94 ± 1.22	70.41 ± 1.58	76.17	27.94 ± 0.42	13.17 ± 0.15	10.88 ± 0.43	22.22 ± 1.85	24.64 ± 0.90
Female	113.44 ± 2.18	76.33 ± 1.80	72.44 ± 2.79	75.33 ± 3.04	28.44 ± 0.34	13.78 ± 0.54	11.11 ± 0.75	13.50 ± 0.25	26.67 ± 1.75

Bakerwal Dog: This is an ancient dog breed mainly reared by the Bakerwal community. The animals are very furious and aggressive, and are mainly used for guarding the goat and sheep flocks from wild animals. The average herd size is 1-4. The body colour is mainly black (50%), brown (16.67%), red (22.22%), and white (11.11%). The decreasing population of the Bakerwal dog is a serious concern.

Bakerwal dog

Table: Morphometric characteristics of Bakerwal Dog

	Chest girth	Body Length	Height	Ear Length	Tail Length
Mean ± SE (cm)	64.56 ± 0.74	52.33 ± 0.60	55.89 ± 0.55	11.50 ± 0.27	27.11 ± 0.59
Range (cm)	56.00-72.00	44.00-60.00	50.00-61.00	10.00-15.00	20.00-31.00

NWP centre:WBUAFS, Kolkata

Gour buffalo: This is an indigenous non-descript buffalo population in the Malda district of West Bengal, also referred to as Desi buffalo. The animals are well-adapted to local climatic conditions. They play a crucial role in the region's agriculture and dairy sectors. The animals are valued for their medium-quality milk, sturdy build, and resilience to water scarcity.

Gour buffalo

Table: Dairy performance of Gour buffalo

Parameter	First Lactation			Overall		
	Average	Range	N	Average	Range	N
Daily MY (kg)	4	2-7	68	5.5	2-8	117
Peak MY (kg)	6.5	4.5-8.7	68	7.5	5.5-9.6	117
Days to reach PY	130	97-156	68	125	105-132	117
Lactation Per. (d)	275	235-305	68	283	210-318	117
Lactation MY(kg)	1120	850-1270	68	1260	900-1456	117
DP (days)	70	67-92	68	82	65-103	117

Tarai Fowl: Birds are distributed in the tarai region of West Bengal, mainlyin Jalpaiguri and Alipurduar districts. They exhibit distinct physical traits that differentiate them from other native poultry breeds. Males have red and black plumage, while females are light brown. Their skin is yellow, and they possess whitish shanks, red earlobes, and red combs. The eyes are black, and the comb type varies between single and pea. The birds exhibit a steady growth pattern across different age stages. At hatching, chicks weigh an average of 35g. By 8 weeks, males reach 285g, while females average 257g. At 12 weeks, males weigh around 425g, and females 397 g. By 24 weeks (adult stage), males attain an average weight of 775g, while females reach 746g. The average adult body weight of hens is 1.17 kg and 1.15 kg, and for adult cocks, it is 1.56 kg and 1.62 kg, in Alipurduar and Jalpaiguri districts, respectively.

Tarai fowl

Egg production: The fowl begin egg-laying at an average age of 205 days. Their annual egg production averages 87 eggs, with a range of 60 to 98 eggs. They lay in clutches of approximately 8.7 days with a clutch interval of 22 days. The laying cycle lasts around 12 months, varying between 9 to 17 months, and birds are generally culled at an average age of 22 months.

Jalangi Fowl: The population is found inMurshidabad district, West Bengal. The fowls, locally known as Jalangi in these areas, are characterized by their small body size, moderate egg production, and limited flight capabilities, coupled with a high population density. These Fowls play a crucial role in the agrarian lifestyle, significantly contributing to household economies and food security by providing both meat and eggs. Plumage coloration of black with white and brown patches, alongside yellow skin and shanks, red earlobes, yellowish eye color, rose comb type, and red comb color are characteristics of the population. The average adult body weight for hens is recorded at 1.210 kg, while for adult Cocks, it stands at 1.520 kg. In this district, the age at first laying is observed to be 167 days, with an average egg production of 138 eggs per annum.The indigenous fowl begin egg-laying at an average age of 205 days. Their annual egg production averages 87 eggs, with a range of 60 to 98 eggs. They lay in clutches of approximately 8.7 days with a clutch interval of 22 days. The laying cycle lasts around 12 months, varying between 9 to 17 months, and birds are generally culled at an average age of 22 months.

Jalangi Fowl

Jhargrami Fowl: The Distribution area is Jhargram district of Southern West Bengal, known for its rich biodiversity and traditional livestock farming practices. Among the various poultry

Jhargrami cock

breeds reared in this region, the indigenous non-descript fowls hold significant importance, particularly in the backyard poultry systems managed by rural and tribal communities. These birds, raised under free-range conditions, serve as a vital source of livelihood, eggs, and meat with minimal input costs. Despite their non-standardized characteristics, they exhibit remarkable adaptability to the local agro-climatic conditions, making them a resilient genetic resource for smallholder poultry farming.The birds in the population depict highly variableplumage color (shades of black, brown, red, and mixed patterns).Adult males weigh between 1.25–1.65 kg, while females range from 1.0 to 1.35 kg. Egg Production varies between 50–80 eggs/ year under scavenging conditions.Egg weight ranges between 35–45 g. The meat is preferred for its superior taste and lower fat content compared to the commercial broilers.

Sundabani Duck: The population has been identified from the South 24 Parganas, North 24 Parganas, and Nadia districts. Their plumage color varies from blackish-brown, white, and grey to spotty patterns, with a predominantly solid plumage pattern. Drakes typically exhibit a greyish hue, while ducks display glossy blackish-brown, white, and grey feathers. They have blackish or yellowish skin, while their shank color ranges from orange and grey to brown. Their eyes are blackish, adding to their unique appearance. The average body weight of the ducks was recorded at 1.265 kg, ranging from 1.110 to 1.450 kg, while the average weight of drakes was 1.335 kg, ranging from 1.125 to 1.500 kg. These ducks exhibit an annual egg laying capacity averaging at 140, with a range of 120 to 175. They are primarily utilized for both meat and egg production. The age at first egg averages 6.82 months, ranging from 6.5 to 7.5 months. Annual egg production is approximately 120 eggs, with a range of 105 to 135 eggs per year. The clutch size averages 14 days, varying between 8 and 20 days, while the clutch interval is around 12 days, ranging from 9 to 18 days. These ducks represent not only the local biodiversity but also the cultural heritage of the region, contributing significantly to the livelihoods and ecosystem services of rural communities.

Sundarbani Duck

NWP centre: ICAR- IVRI, Izzatnagar

Rohilkhandi Cattle: The population is also known as Shyama/ Nandini/ Desi and is distributed in the Rohilkhand region of Uttar Pradesh. The animals have white coat color with an occasional tinge of black color, white eyelids, and black tail switch, muzzle, hooves, and horns. They have relatively thin, curved or straight horns, with males exhibiting larger horn size (24 cm length) than females (16 cm).The face is long (44 cm in females and 46 cm in males) with a width of 16 cm in females and 17 cm in males. A well-developed dewlap is present in both sexes. The height at withers, chest girth, and paunch girth (cm) are 113.5, 148.5, and 155.5 cm in females, while 125.4, 155.7, and 161.3 cm in males. The tail length and tail switch length are95.9 and 33.7 cm, respectively, in females, while corresponding values in males are 101.4cm and 34.5 cm, respectively. The udder is mostly bowl-shaped and small to medium in size, with cylindrical and pointed teats. The reproductive performance of the local Rohilkhandi cattle breed is quite satisfying with inter intercalving interval of 348 days, a service period of 82 days, and an age at first estrous of 32.2 months.

Rohilkhandi cattle

Table: Body measurements of Rohilkhandi cattle (cm)

Parameter	Male			Female		
	Average	Range	N	Average	Range	N
Chest girth	155.70	111.6 – 199.7	250	148.55	119.53 – 177.57	750
Body length	123.81	91.58 – 156.04		115.65	95.01 – 136.29	
Height at withers	125.43	94.63 – 156.23		113.53	93.73 – 133.33	

Table: Dairy performance of Rohilkhandi cattle

Parameter	First Lactation (N=93)		Overall (N= 540)	
	Average	Range	Average	Range
Daily milk yield (kg)	4.5	3.1 – 5.9	5.28	3.58 - 6.98
Peak milk yield (kg)	5.2	3.8 - 6.6	6.16	4.49 – 7.83
Days to reach Peak milk yield	47.5	42 - 51	-	-
Lactation (days)	196.6	155.8-237.4	215.33	169.63 – 261.03
Lactation milk yield (kg)	899.8	540 - 1450	1051.30	701.02 – 1401.58
Fat %	4.5	3.5 -5.3	4.51	3.95 – 5.07
SNF %	8.0	7.5 – 8.3	8.00	7.80 – 8.20
Dry period (days)	75	60 – 93	78	63 – 95

Rohilkhandi sheep: Distributed in the Rohilkhand region of Uttar Pradesh,especially in Bareilly district. A total of 729 animals have been characterized so far, including 495 females and 234 males. The white and black coat colours are predominant, with occasional combinations of white/black and white/brown. They have relatively large, thick, and corrugated horns (36.42±1.48 cm), that are mostly curved backwards, downwards, forward, and upward at the end, in males and rudimentary horns, in females. The face is slightly convex and devoid of wool. The ears are small to medium, tubular, cartilaginous appendages and pendulous, with a length of 8.60±0.86 cm and 7.65±0.13 cm in males and females, respectively, with similar ear width (5.0±0.1 cm) in both sexes. The breed has a face length of 22.38±0.46 cm and 20.24±0.20 cm, and a face width of 13.96±0.39 cm and 11.56±0.16 cm in males and females, respectively. The height at withers, chest girth, and paunch girth (cm) are 77.21±1.36, 54.73±1.03, and 86.67±1.38 cm in males, while 69.15±0.29, 76.01±0.44, and 78.49±0.53 cm in females. The tail length is 44.52±0.84 cm in males and 40.45±0.33 cm in females. The reproductive performance of the local Rohilkhandi sheep breed is quite satisfying, with age at first mating of 9.64±0.05 months in males and 10.70±0.06 months in females. The average birth weight is 2.48±0.29 kg and 2.13±0.16 kg, while the adult weight is 44.54±1.37 kg and 34.29±0.40 kg in males and females, respectively.

NWP centre: DUVASU, Mathura

Battisi goat: Battisi is a dual-type goat population inhabiting the Mathura district of UP and the bordering area of Rajasthan and Haryana. Battisianimals are medium to large. The white coat color with black or brown patches on the face, chest, abdomen, and legs isanimportant characteristic of the Battisi goat. The nose line is typical Roman type. Ears are medium to large. The goats are primarily maintained on grazing (extensive system) with zero input. Goat rearing constituted a vital component of the livelihood security and economy of the farmers maintaining this goat population. Study reveals that the Battisi goat is phenotypically different from other registered goat breeds of the country.

Battisi buck

Table: Body weight (kg) at different ages of Battisi goat

Weight at	Male			Female		
	Average	Range	N	Average	Range	N
Birth	5 kg	3-7 kg	80	4 kg	2-6kg	120
Weaning / 3 month	14 kg	12-20 kg	75	10 kg	8-15 kg	110
6 months	24 kg	20-30 kg	80	18 kg	16-25 kg	150
12 months	35 kg	30-40 kg	100	30 kg	25-35 kg	180
First Kidding	-	-	-	30 kg	25-35 kg	120
Adult (6 teeth)	47 Kg	42-55 Kg	50	40 kg	35- 48 kg	500

Table: Body measurements (cm) of Battisi goat

Measurements	Male			Female		
	Average	Range	N	Average	Range	N
Chest-girth	93.66	80-95	50	75.67	55-84	300
Body length	80	70-85	50	70.038	49-82	300
Height at withers	90	75-95	50	76.01	56-83	300

NWP centre: GBPUAT, Pantnagar

Kow-debar sheep: Distributed in Pauri Garhwal, Almora, and Chamoli districts, which are situated at elevations ranging from approximately 928 to 1690 meters above mean sea level. It's a dual-purpose (meat and wool) population. Animals have a compact body, a small size, black colour, and a coarse fibre coat. Adult Kow-debar body measurement (cm) for chest girth, body length, height at wither, and paunch girth averaged 72.15 ±0.80, 64.79 ±0.87, 59.56 ±0.77, and 73.09 ±0.68 cm, respectively, in males. Corresponding mean values in adult females were 68.61±0.28, 61.77±0.31, 56.51±0.25, and 70.26±0.24 cm, respectively. Additionally, adult male body weight averaged 29.91±0.57 kg, while adult females averaged 26.20±0.20 kg.

Kow-debarEwe

Table:Body Weight (kg) of Kow-debar sheep.

Weight at	Male			Female		
	Average	Range	N	Average	Range	N
Birth	2.57±0.49	1.50- 3.50	20	2.41±0.31	1.50- 3.40	22
Weaning/ 3 months	9.67±0.29	9.00- 12.00	14	9.52±0.27	8.00- 12.00	20
6 months	13.57±0.97	10.00- 18.00	34	12.01±0.39	9.00-15.00	30
1 year	19.39±1.02	15.00-24.00	53	16.93±0.33	11.00-23.00	58
First Lambing	-	-	-	19.92±0.30	15.00-29.50	81
Adult weight	29.91±0.57	24.00- 40.00	198	26.20±0.20	17.00- 37.00	486

Kowbakar Goat (Black goat or Kali bakari): These aredistributed in Pauri Garhwal, Almora, and Chamoli districts of Uttarakhand. Animals are of medium size, with a compact bodyand a black colourhairy coat.The head is slightly convex, and the forehead has black hairs. The average adult body weights in males and females are 29.22±0.41 kg and 27.98±0.13 kg, respectively. The measurements of horn length, face length, face width, ear length, height at withers, body length, chest girth, paunch girth and tail length are 15.52 ± 0.35 cm, 19.07 ± 0.19 cm, 13.06±0.17cm, 13.48 ± 0.14 cm, 61.51± 0.62 cm, 62.01± 0.57 cm, 69.42± 0.51 cm, 73.15±0.51cm and 12.88 ± 0.13 cm, respectively in adult males. The corresponding measurements in females are 14.02 ±

Kowbakar goat

0.12 cm, 18.73.21 ± 0.07 cm, 11.79± 0.06 cm, 12.99 ± 0.04 cm, 59.52 ± 0.22 cm, 61.62 ± 0.20 cm, 67.07 ± 0.18 cm, 71.22±0.19 cm, and 12.27 ± 0.04 cm, respectively.

Name of the Center: KVAFSU, Bidar, Karnataka

Gangavathi Cattle: These cattle are native toKoppal district, and move to adjoining Vijayanagara and Bellary districts during the summer months. The population is estimated to be 20,500 in Koppala taluka. These cattle are draught type, medium in size, and have a moderate temperament. The majority of animals of the Mysore type cattle are of white coat colour. The head is straight and long, tapering towards the muzzle,and hasa clear depression in the middle of the forehead. The muzzle is pinkish and pigmented. Horn size is 1 to 2.5 feet and is white at the base and black at the tip. Horns emerge fairly close together from the poll, move away from the centre in a backward and upward direction, and then turn toward the centre. The herd size varies from 100-500 animals. These are maintained in an extensive system ofrearing only. Gagavathi cattle have been kept predominantly for manure and male calf production for drought purposes. They are maintained in a herd size

Gangavathi Cattle

Sira ewes

ranging from 150 to 500 animals. Average daily milk yield (overall lactation) is 2.97 Kg, with a peak yield of 3.56 Kg per animal.

Sira Sheep: Primarily found in the Sira taluka of Tumkur district and adjacent areas. The animals are known for their robust characteristics and adaptability to diverse environments. These are predominantly raised by the Golla community.The Sira sheep population is an integral part of the agricultural landscape in the region. Animals exhibit a variety of coat colors, including white, black, greyish-black, and brown. Most of them have long, droopy ears, while some possess tubular ears. Typical features of a representative animal include a convex forehead and a Roman nose. Approximately 20 per cent of the animals have wattles. The medium-sizedhorns curve backwards and downwards.

Table: Adult body weight and measurements of Sira sheep

Parameter	Females	Males
Body weight	38-48 kg	45-58 kg
Body length	55-62 cm	65-74 cm
Height at wither	65-72	78-86
Chest girth	87-90	97-103

NWP centre: TNUVAS, Tamil Nadu

Thanjavur Black Goat: Thanjavur Black goats are distributed widely throughout the Cauvery Delta region of Tamil Nadu, located along the Cauvery River basin. The goat is popularly called "*Karuppukuttaiadu*" or "*NattuAdu*" in the local vernacular language (Tamil). The Thanjavur Black goat is a compact, medium-sized black coloured animal. The coat colour is uniformly black, covered with short, straight, and silky black hair.

Table: Body weight of the Thanjavur Black goat

Weight at	Male			Female		
	Average	Range	N	Average	Range	N
Birth	1.90	1.4-2.3	43	1.74	1.4-2.2	36
Weaning	6.27	4.5-7.8	119	5.72	4.5-7.8	103
6 months	9.65	7.5-11	119	8.96	7-11	113
1 year	14.81	13-15.8	67	13.51	11-15.8	98
First Kidding	18.56	16-20	58	16.50	14.5-20	165

Thanjvur Black Goat

Macherela Buck

NWP centre: SVVU- NTR CVSc, Gannavaram

Macherla or Palnadu goat: Synonyms for this population are Chukka Meka and Poda Meka. Animals are distributed in the Palnadu and Guntur districts of Andhra Pradesh.The coat colour pattern is spotted with black and white or brown and white.The body length, height at withers, and chest girth in adult males were89.46±0.25, 96.38±0.44, 91.20±0.53cm, respectively. The corresponding measurements (cm) in females were 81.26±0.15, 84.82±0.43, and 84.14±1.10. The adult body weights were 50.24±0.20 and 40.01(kg) in males and females, respectively.

NWP centre: PVNR-TVU, Hyderabad

Sinagara/Cheluka Godlu Cattle: The animals of this population are distributed in the Mulugu, Mahabubabad, and Bhupalpally districts of Telangana.

Sinagara/Cheluka Godlu Cattle

Animals are of varying coat colours (white/grey/red). The tail switch, hooves, eyelids, and muzzle are black. The forehead is convex. Udder is of bowl shape with cylindrical teats with pointed tips. The body weight (kg), body length (cm), and wither height (cm) ranged from 110-450, 95-410, 91.16 in adult males, respectively. The corresponding values for adult females were 74.45, 74-141, and 70-140, respectively. The age at first mating (month) among males ranged between 28-45, while age at first oestrus, age at first mating, and age at first calving among females ranged between 28-44, 30-46 & 36-58 months, respectively.

NWP centre: KVASU, Pookode, Kerala

Attappady Cattle: This population is distributed in the Attappady hill regions of Palakkad is district of Kerala.The estimated population is 4,000-5,000 only.

Attappady Cattle

Gudadheri cattle

Gangavati cattle

Animals are medium in size with predominantly red, followed by brown and black coat colour. The forehead is straight with erect ears. Horns are curved sideward and inward. The herd size ranges from 12-15 animals, and the body weight ranges between 220 to 250 kg. The cows produce 2-3 litres of milk a day.

NWP centre: NDVSU, Jabalpur

Malvi sheep: Malvi sheep is found in Sarangpur, Khandwa, Dhamnod, Burhanpur, Barwani, Ujjain, Agar Malwa and some areas of Mandsaur, Maheshwar, and Khargone districts of Madhya Pradesh. Coat color pattern is primarily black/white/brown and black/white with a few head patches, confirming the coat color pattern variation in the Malvi sheep breed. Typically, animals have a slightly convex head profile, slightly curved pendulous ears, with few male sheep having medium-curved horns.The estimated population sizeis between 85- 90 thousand. The flocks consist of 60% ewes, 15% rams, and 25% lambs. This population is famous for carpet wool, meat, milk, lamb skins, pelts, and manure.

Malvi ram

Table: Body Weight parameters of Malvi sheep (kg)

Weight at	Male			Female		
	Average	Range	N	Average	Range	N
Birth	3	2-4	100	2	1.5-3	200
Weaning/ 3 months	11	9-12	100	9	8-10	200
6 months	13	12-15	100	11	10-13	200
1 year	27	25-30	100	22	20-25	200
First Lambing	-	-	-	27	25-30	200
Adult weight	38	35-40	100	33	30-35	200

NWP centre: RUVAS, Bikaner

Totapuri goat: The Totapuri goat is a dual-purpose population primarily raised for meat production. The breed derives its name from its distinct parrot-shaped nasal bridge. Its coat exhibits various bicolor patterns, including a white body with brown or black head and neck, a black body with white spots, and a brown body with black neck. The goats possess medium to large pendulous ears and a convex head, while their horns are short, straight, curved, and directed backward. This breed is highly prolific, with a strong tendency for twinning. Adult males and females reach approximately 55 kg and 39 kg body weight, respectively. Despite their adaptability and potential, systematic scientific studies on Totapuri goats remain limited, leading to an underutilization of their genetic potential.

Totapari Male

Table: Body weight parameters of Totapuri goat (kg)

	Birth wt	3 Month	6 Month	9 Month	12 Month	Adult
Overall	2.69±0.02 (265)	15.97±0.14 (588)	23.62±0.28 (366)	31.73±0.32 (274)	36.51±0.42 (228)	47.53±0.32 (1359)
Male	2.76±0.03 (143)	15.81±0.21 (205)	24.38±0.47 (100)	35.53±0.52 (93)	40.71±0.71 (63)	55.473±0.62 (116)
Female	2.62±0.04 (122)	16.12±0.15 (383)	22.86±0.29 (266)	27.93±0.38 (181)	32.32±0.45 (165)	39.59±0.19 (1243)

NWP centre: CKU, Durg

Narayanpuri Goat: The animals of this population are found in the Narayanpur district of Chhattisgarh. Animals are of varying coat colours, pure red-58.3%, black &white-18.7%, pure black-12.6%, Pure white-6.2%, Red and white-4.2%. Body weight (kg) at birth, weaning, six months, 12 months, and adult for males are 1.69±0.71, 1.87±0.09, 3.38±0.16, 7.65±0.21, 13.6±0.41, respectively, while the corresponding values for females are 1.00±0.04, 1.87±0.06, 3.17±0.13, 7.07±0.21, 8.02±0.21, and 11.56±0.41.

Narayanpuri Goat

Abujhmari pig: The indigenous pigpopulation isdistributed in the Abhujhmad area of Narayanpur district of Bastar region. Animals are of black coat color (81%), followed by black with white patches. They have a long and straight snout and dense bristles on their back with a pot belly,which makes these local pigs a unique germplasm. Average litter size is 7 (4-10).

Abujhmarhi Female

Desi Kukri (Chicken): The birds are distributed in the Rajnandgaon and Mohla-Manpur-Ambagarh Chowki districts. The predominant plumage colour is black (30.64%), followed by birds with white (28.4%) and brown (20.80%) patches. Single comb is predominant (96.29%). Shank is long, 6.09±0.13 cm in males and 5.11±0.08 cm in females, and thin (diameter 1.27±0.02 cm in cocks and 1.15±0.01cm in hens), which make the birds efficient runner and hence can escape from their predators. Eggs are cream to light brown in colour having average weight of 38.53g. Egg has a higher albumen weight and a higher albumen percentage than other breeds.

Desi Kukri Chicken

NWP centre: ICAR RC for NEH region Uniam, Meghalaya

Syiar Markasa Poultry

Phenotypic characterization of Syiar Markasa poultry of Meghalaya is going on. It is reared by Khasi Tribe since time immemorial. The highest density of the populations of these poultry are distributed in Markasa, a small village in Eastern West Khasi hills district of Meghalaya. Physical characteristics were recorded on 885 birds. Plumage colour is mainly Golden reddish brown, followed by golden blackish brown, multi-coloured and black. Birds possess solid plumage mainly. Single comb with red colour is predominant. Sahnk colour is yellow in most of the cases.

Tripura Black Poultry

Phenotypic characterization of Tripura Black poultry of Tripura is going on. It is a native poultry in the Tripura with unique characteristics and potential to register as breed. Majority of birds were observed pure black shining coloured plumage but in some cases dull black and black with red on neck were also found. Birds possess single comb with bright red colour.

NWP centre: ICAR RC Goa

Gomanchal buffalo: Distributed in all the talukas of Goa. Data collected from 1240 buffaloes included 74 male calves, 217 female calves, 796 adult female buffaloes and 180 adult male buffaloes. Coat and skin colour: varies from light black and light grey to deep black, with some individuals displayed intermediate shades. The tail switch was mostly black or light black with occasional occurrences of white hairs.

Gomanchal buffalo

Performance traits of Gomanchal buffaloes

Parameters	Male			Female		
	Mean	Range	N	Mean	Range	N
Weight at birth (kg)	21.44±3.18	18-27	29	20±2.78	16-25	45
Weight at 24 months (kg)	184±22.45	140-214	34	175±20.23	137-233	58
Adult weight (kg)	637±35.20	511-762	60	436±33.12	249-611	162
Chest girth (cm)	222±18.20	194-250	60	179.5±16.13	125-210	162
Body length (cm)	139±14.91	132-147	60	144.5±12.39	125-190	162
Height at withers	142±15.12	139-155	60	139.7±11.12	125-160	162
Parameter	First Lactation			Overall		
	Average	Range	N	Average	Range	N
Daily milk yield (kg)	3.0±0.23	2-4	24	4.7±0.43	2-6	162
Peak milk yield (kg)	5.5±0.47	3-6	15	7.08±0.69	4-10	65
Days to reach peak yield	61±7	50-70	24	54.16±8	45-74	162
Lactation length (days)	240±21	230-280	24	230±24	150-300	162
Lactational milk yield (kg)	720±32	550-750	24	1130±41	480-1800	162
Fat %	7±1.2	6-9	24	6.9±1.1	6-10	162
Dry period (days)	70±12	55-70	24	64±14	57-88	162

NWP centre: CVS&AH, Aizawl

Shikhar Chicken: Distributed in Aizawl, Serchhip and Lungleidstricts of Mizoram. Earlier Mizos (people of Mizoram) reared them to catch wild Jungle fowl. The wild jungle fowls followed them when they are release in the jungle and thus the farmers reared them as trap for Jungle fowl and probably the name "Shikhar" came from this act. Estimated population is approximately 23000. Plumage colour is mainlygolden yellowish, reddish orange, whitish grey and golden yellowish in males; and Golden brownish in females. Annual egg production ranges from 30 to 47 with a clutch size of 4-6 days.

Shikhar cock

Meitei Yen Chicken: The meitei/ meetei community of the valley districts of Manipur namely Imphal East, Imphal West, Thoubal, Bishnupur and Kakching districts have been rearing this breed since the time immemorial. As per the information, the name 'meetei' was taken from the community which was rearing this breed and the term 'yen' means

Meitei Yen cock

'chicken' in Manipuri language. Estimated population is approximately 10 Lakh. Plumage colours are red, black, brown, white, grey. Egg production (annual) ranges between 45-50.

Mrui Chicken: Distributed in Peren, Dimapur and Cummukidema districts of Nagaland. Estimated population is approximately 10 Lakh. Rearing by Jeliang Community. Plumage colours are Golden brownish (23%), Gray white and black mixed (20%), and Black (18%), mainly. Annual egg production ranges between 35 to 54. Age at first egg ranges from 4 to 5 months.

Mrui Chicken

NWP centre: NDUAT Kumarganj

Awadhi sheep: Distribution: Ayodhya, Sultanpur, Ambedkar Nagar and adjoining districts of Uttar Pradesh**.** Utility: Meat, wool and manure. Coat Colour: white, white with black & brown patches and some are black**.** Forehead: slightly convex**,** Ears : Small or rudimentary in majority of population. Mean body length, height at weither,chest girth and tail length are 71.07±0.50, 69.07±0.30, 74.41±0.19 and 40.06±0.46 cm; based on data collected from 102 Awadhi sheep. Average body weight was 30.13±0.57 Kg.

NWP centre: BAU Ranchi.

Dumka Sheep: Distributed in Dumka, Deoghar and Jamtara district of Jharkhand. The coat clour is white. Famous for carpet type wool**.** Average birth weight of lamb is 1.0kg and average adult male and female body weight is 16.0 and 14.0 kg respectively.

NWP centre: AAU, Khanapara

Sagoli goat: Distribution in Golaghat, Kamrup, Lakhimpur and Nalbari districts of Assam. Two colour variants: Black (Koli Sagoli), Brown (Muga Sagoli). The mean body weight gain of indigenous goat at birth, 3, 6, 9 and 12 months were 1.24±0.03, 3.92±0.09, 7.28±0.08, 10.33±0.08 and 13.24±0.12 kg, respectively. The daily milk yield (gm) was recorded to be 101.33±1.20 with a range of 65.05-161.18 gm. Small in body size and are mainly reared for meat purpose.

Sagoli goat

NWP centre: CSWRI, NTRS, Garsa (HP)

Shiwalik Hill Goat: The Shiwalik Hill Goat is predominantly found in the Bilaspur, Hamirpur, and Mandi districts of Himachal Pradesh, with some populations also observed in Kangra district. A comprehensive survey was initiated in Hamirpur district, covering more than 800 goats, where physical measurements and performance parameters were recorded. The morphometric measurements of male and female Shiwalik Hill Goats show distinct differences in body structure and size. The adult body weight of males was recorded as 38.12 ± 1.1 kg (n=35), which is higher than that of females, measuring 32.87 ± 0.34 kg (n=249). The body length of males averaged 78.46 ± 1.32 cm (n=35), whereas females had a shorter body length of 71.04 ± 0.34 cm (n=240). Similarly, the height at the withers was greater in males (77.74 ± 1.47 cm, n=35) than in females (74.02 ± 0.45 cm, n=239). The heart girth, an important indicator of body mass, was measured at 77.03 ± 1.49 cm in males, whereas females had a relatively smaller heart girth of 72.19 ± 0.42 cm. The paunch girth, reflecting abdominal capacity, was 86.43 ± 1.73 cm in males and 81.48 ± 0.78 cm in females.

Shiwalik goat

Himachali Yak: A preliminary survey was conducted on the Himachali Yak population, covering more than

Himachali Yak

100 yaks. The morphometric measurements of male and female Himachali yaks reveal distinct sexual dimorphism. The average body length of males was recorded as 129.54 ± 11.96 inches (n=13), whereas females had a comparatively smaller body length of 114.89 ± 8.67 inches (n=28). Similarly, the height at the withers was greater in males (117.46 ± 9.11 inches) than in females (101.61 ± 7.08 inches). The heart girth, an important indicator of body mass, was measured at 167.23 ± 15.89 inches in males, which was significantly larger than the 147.68 ± 10.36 inches recorded in females. Horn length showed considerable variation, with males exhibiting longer horns (45.6 ± 10.13 inches, n=10) compared to females (32.32 ± 5.23 inches, n=19).

NWP centre: ICAR-NDRI-ERS, Kalyani

Sundarbani cattle: Population is available in Sunderban region of 24PGS, West Bengal since long. Utility of the breed: Mostly draught, manure and milk. Average pare day milk yield is 1.05 Kg and peak yield is 2.5 Kg.

Table: Body measurements (cm) of adult Sundarbani cattle.

Parameter	Male			Female		
	Average	Range	N	Average	Range	N
Body length	99.39	88.9 -109.22	16	96.01	68.58 – 119.38	206
Chest girth	118.59	106.68 – 129.54	16	113.94	81.28 – 129.54	206
Height at withers	97.47	86.36 -106.68	16	94.08	73.66 – 119.38	197

NWP centre: SKUAST Kashmir

Kashmir Pony: These ponies are distributed in Baramulla, Bandipora, Ganderbal, Budgam, Anatnag, Resai, Rajouri, Pooch (Pir Panjal Range). This important genetic resource is of prime requirement and important means of transportation during Shri Amarnathji Yatra and tourism industry of J&K. They are the source of livelihood generation of thousands of Pony Wallas (rearers) many of who are registered with JK tourism department.

Kashmir Pony

Table: Body measurements (cm) of Kashmiri pony

Parameter	Male			Female		
	Average	Range	N	Average	Range	N
Height	128.95±0.016	105 -143	340	125.68±0.098	118-135	20
Body length	125.7±0.018	103-141	340	124.84±0.114	118-132	20
Girth	139.6±0.019	101-156	340	137.8±0.13	127-147	20
Face length	45.4±0.030	39-49	340	44.96±0.04	40-48	20
Face width	13.04±0.001	13-14	340	13±0	13	20
Ear length	12.7±0.006	11-15	340	12.37±0.018	11 -14	20
Ear width	7.00±0.010	6-9	340	7.02±0.02	6-9	20

Genomic Analysis of AnGR

Admixture Mapping of Cattle in Eastern and Western India

Two non-descript populations, namely Jharkhandi (Palamau region) (JHC) and Local cattle of Ranchi/ Hazaribag (Local_RH), Jharkhand, one described cattle population Shahabadi (SHB) and 18 registered/exotic breeds (Bachur, Gangatiri, Purnea, Sahiwal, Kankrej, Hariana, Deoni, Gaolao, Gir, Holstein, Jersey, Kangayam, Laddakhi, Ongole, Tharparkar, Vechure, Siri, Hallikar) were analysed as part of our exploration into breed identification and classification. Three sources of genotypes i.e., BovineGGP50K, BovineHD 777K HD and WIDDE database were used for the study. After quality control on autosomal SNPs using SNP call rate (0.1), sample call rate (0.1) all the datasets were merged retaining only 48544 variants with 466 samples. A total of 48,281 common autosomal SNPs shared between GGP_Indicus_50K and BovineHD 777K HD chip genotyping platforms were obtained for analysis with 466 samples after filtration with MAF 0.002. After LD pruning (r2 =0.5), 39,786 autosomal SNPs of 466 individuals were retained for further downstream analysis. Out of 18 registered/exotic cattle breeds, the genotype data on 13 cattle breeds was taken from publicly accessible BovineHD chip data and on remaining 5 registered breeds (Bachaur, Gangatiri, Purnea, Deoni, Gaolao) the data was generated using GGP indicus 50K SNP chip along with three populations (SHB, JHC and Local_RH). All cattle breeds/populations (21) were analyzed for admixture analysis at K=2 to 21. The minimum cross validation error (0.55652) was obtained at K=12. Further, to refine the reference panel and ensure the inclusion of less admixed individuals, cattle with less than 65-70% uniformity to their respective groups were excluded along with six Jersey samples creating another group. Admixture was re-run with curated reference panel (n=351) to infer ancestry proportion within target cattle populations viz. Shahbadi, Jharkhandi and Local cattle of Ranchi /Hazaribag at K = 11. (Fig 1)

It was revealed that all the registered breeds/population of Bihar viz. Bachur, Gangatiri, Purnea, Shahabadi along with Sahiwal clustered with the Hariana breed of cattle while rest of the registered breeds viz. Ongle, Deoni, Kangyam, Gir, Ongole, Tharparkar and two exotic breeds viz. Jersey and Holstein clustered separately. Nondescript population of Jharkhandi was divided into two groups, while samples collected from Palamu region formed a separate group, but other samples clustered with Local cattle of Ranchi /Hazaribag along with Bihar cattle group. These three cattle are much of Hariana type due to their genetic uniformity (68-72%) to this breed. However, JHC population of Palamu region (JHC2) exhibited 70% unique genome. Jharkhandi (JHC1) showed 68% uniformity to Hariana and rest to various other breeds in the panel (9% with Tharparkar, 7% Ongole, 5% Gir, 3.7% Deoni, 2.9% JHC2, 1% with Kangayam, Jersey and HF). Similarly, local cattle of Ranchi /Hazaribag was having 68% uniformity with Hariana and 9% with Tharparkar, and rest with other breeds (8.4% Ongole, 6.4% JHC2, 2-3% with Gir, Deoni, and Kangayam, <1% with Jersey and HF). Shahabadi cattle population of Bihar had 72% uniformity with Hariana and rest to various other breeds in the panel (9% with Tharparkar, 7.9% Ongole, 2-3% with Deoni, JHC2, Gir and Kangayam, <1% with Jersey and HF).

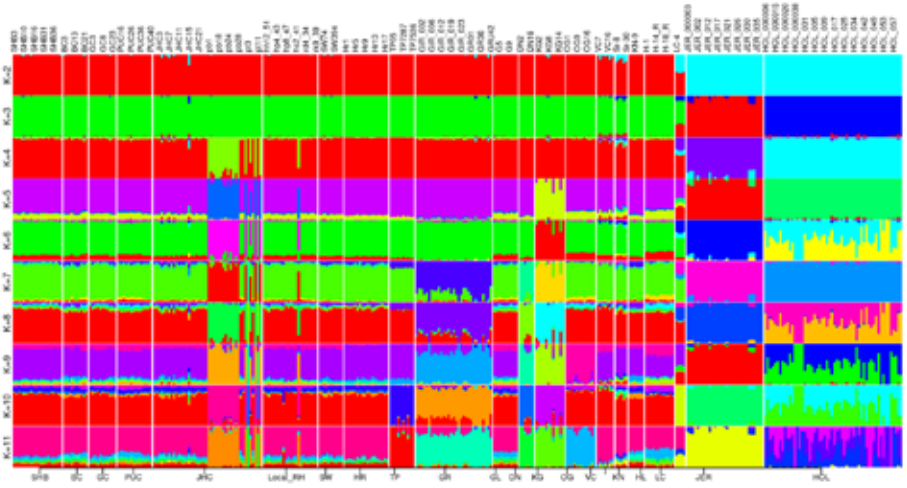


Fig 1. Admixture analysis of 21 Cattle breeds

Mitogenomic diversity and phylogenetic analysis of Indian riverine and swamp buffaloes

The genetic diversity and evolutionary history of riverine and swamp buffaloes in India, utilizing complete mitochondrial genome sequences was explored. Through comprehensive sampling across varied agro-climatic zones, including 91

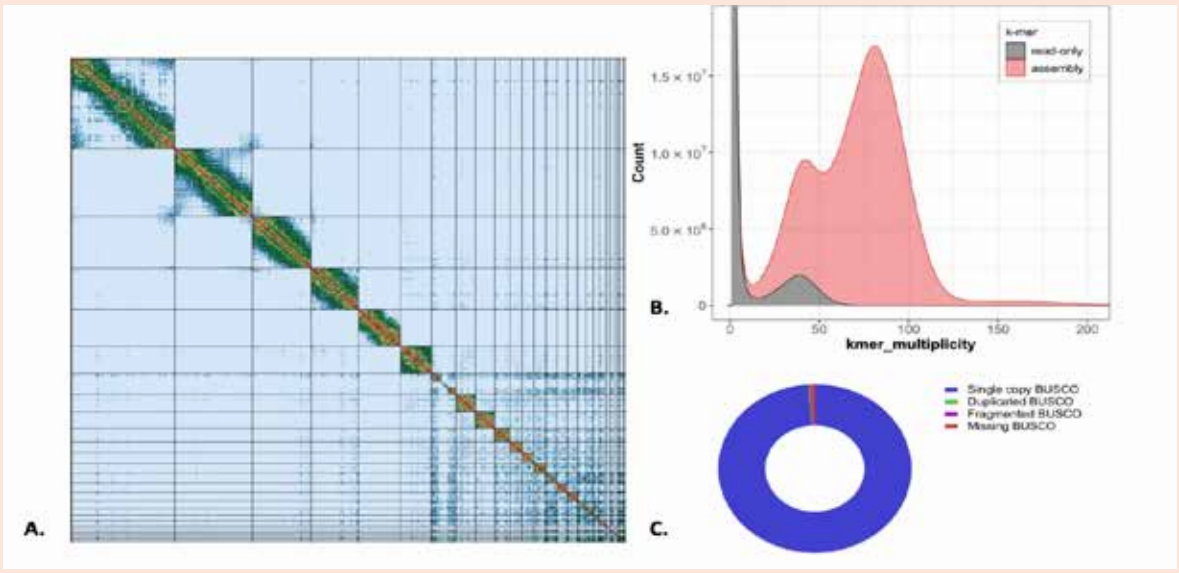
riverine buffaloes from 12 breeds and 6 non-descript populations, along with 16 swamp buffaloes of the Luit breed, this study employed next-generation sequencing techniques to map the mitogenomic landscape of these subspecies. Sequence alignments were performed with the buffalo mitochondrial reference genome to identify mitochondrial DNA (mtDNA) variations and distinct maternal haplogroups among Indian buffaloes. The results uncovered the existence of 212 variable sites in riverine buffaloes, yielding 67 haplotypes with high haplotype diversity (0.991), and in swamp buffaloes, 194 variable sites resulting in 12 haplotypes, displaying haplotype diversity of 0.950. Phylogenetic analyses elucidated the genetic relationships between Indian buffaloes and the recognized global haplogroups, categorizing Indian swamp buffaloes predominantly into the SA haplogroup. Intriguingly, the haplogroup SB2b was observed for the first time in swamp buffaloes. Conversely, riverine buffaloes conformed to established sub-haplogroups RB1, RB2, and RB3, underscoring the notion of Northwestern India as a pivotal domestication site for riverine buffaloes. *The study supports the hypothesis of independent domestication events for riverine and swamp buffaloes, highlighting the critical role of genetic analysis in unraveling the complex evolutionary pathways of domestic animals.*

Genomic diversity of indigenous chicken using whole genome sequencing

Since genetic improvement and widespread use of artificial selection may have impacted the genetic make-up of Indian chicken breeds, the genetic architecture of the contemporary chicken population of India was assessed for future improvement and conservation programs. Whole genome sequences of 180 chicken samples from 16 indigenous breeds, along with the Red Jungle Fowl and the commercial White Leghorn strain were utilized. A panel of 70K genome wide SNPs was selected for comparative genome analysis after stringent screening. Breeds originating from the eastern regions of India exhibited higher genomic diversity, indicative of a rich repository of distinct germplasm. Conversely, the Uttara breed from the northern hilly areas displayed considerable genetic differentiation with diminished diversity compared to others, underscoring conservation concerns. The average inbreeding coefficient (F_{IS}) of 0.084 cautions on the need to mitigate risks associated with inbreeding. The contribution of Red Jungle Fowl to the gene pool of all native breeds was supported by our study. The genetic structuring indicated a relationship among breeds based on geographical proximity, underscored by varying levels of admixture. *The comprehensive insights revealed from the analysis of genome-wide SNPs will serve as a cornerstone in refining conservation strategies, to design interventions with greater precision.*

Pangenome analysis and identification of selection signatures for conservation of Red Junglefowl

Modern chickens trace their ancestry to the Red Junglefowl (Gallus gallus), whose genome was the first



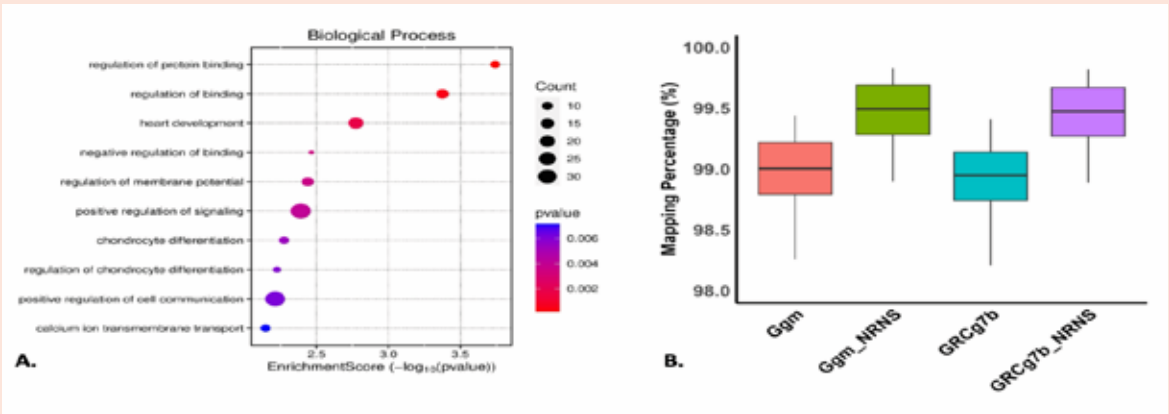
Features of Gallus gallusmurghi assembly: A. Hi-C contact map of final chromosome level assembly B. k-mer completeness profile C. BUCSO completeness

to be sequenced and serves as a model for more than 9000 birds. Yet it remains incomplete, with missing chromosomes, gaps, and misassemblies. In this study, high-resolution chromosome-level genome assembly (Ggm) of Indian RJF was generated using state-of-the-art sequencing technologies, including PacBio HiFi, Hi-C, and Illumina-based whole-genome sequencing. Building on this foundation, we constructed both graph-based and linear pangenomes. The pangenome graph reference was built using 10 complete chicken assemblies including our Ggm assembly. Additionally, an Indian chicken-specific linear pangenome was developed using the iterative mapping and assembly approach with 150 whole-genome sequencing datasets. Ggm assembly achieved superior quality metrics, including a contig N50 of 44.69 Mb, a scaffold N50 of 91.4 Mb, and 99.1% BUSCO completeness. Notably, micro and dot chromosomes were significantly improved compared to the existing RJF (GRCg6a) and broiler chicken (GRCg7b) assemblies. The Red Jungle fowl genome has been assembled and is found to be better the existing assemblies of Ref seq assembly

The pangenome graph reference included 158,786 nodes, 222,739 edges, and 41 connected components. This graph aided in identifying structural variants in Ggm. Indian chicken pangenome identified and functionally annotated the non reference novel sequences (NRNS) in Indian chicken breeds. The pangenome demonstrated significantly improved mapping accuracy compared to traditional linear references such as GRCg7b, underscoring its utility.

Table. Comparing the Assembly metrics

Parameter	GRCg6a	GRCg7b	Ggm (This study)	Ggswu	Daweshian	Hu	Plao	Wuding
Contig N50 (Mb)	17.7	18.8	36.55	91.4	23	16.2	25.1	21.5
Chromosome N50 (Mb)	91.3	90.9	90.9	9104	90.5	90.7	90.5	90.9
Total length	1.056	1.050	1.071	1.1	1.037	1.027	1.036	1.026
BUSCO (%)	99	99	99.1	99.1	96.7	96.6	96.6	96.5
Chromosomes	34	40	40	40	40	40	40	40
Unplaced scaffolds		110	10	0	92	577	300	82
k-mer completeness	-	-	94.5	-	92.9	93.9	92.9	93.1
QV	-	-	54.34	-	41.6	38.4	41.6	43.3



A. Functional annotation of Structural variation in Indian RJF genome identified through pangenome graph B. Mapping rates of WGS datasets against pangenomes constructed with GRCg7b or Ggm as references

National Bovine genomic Centre –Indigenous Breeds

During the period reported upon, a total of 2,750 blood samples, comprising 1,637 from cattle and 1,113 from buffalo were received in the laboratory. These samples belonging to different cattle and buffalo breeds. The cattle breeds include Haryana (189), Sahiwal (185), Himachali Pahadi (23), and Jersey (1240). Further, the buffalo breeds include Murrah (827) and Nili Ravi (286). Out of the total samples received in lab, 2014 were processed and DNA was isolated. Further, the quality and quantity of isolated DNA was assessed using spectrophotometer. The remaining blood samples are being processed for DNA isolation. Genotyping work is in progress.

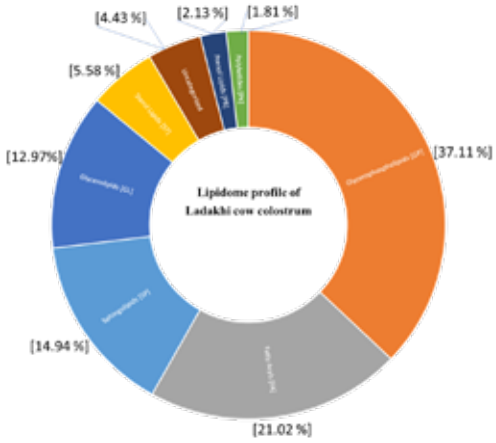
Hon'ble Prime Minister released Gau & Mahish chips

The NDDB developed the unified SNP chips for cattle and buffalo, after pooling the genomic data from the NBAGR, NDDB, BAIF and NIAB. Unified LD chip for cattle (Gau chip) with about 66342 markers; which carried 12871 SNPs exclusively from the LD chip of the cattle from NBAGR and rest from NDDB, BAIF, and few from public domain. Similarly, for the buffalo (**Mahish Chip**), with about 61353 SNPs, 14088 SNPs from NBAGR were included. These contributing markers from participating agencies added the robustness of the unified SNP chip, with their wider genomic distribution and increased polymorphism for indigenous cattle and buffalo populations. Both Gua chip and Mahish chip were released and dedicated to the Nation by the Hon'ble Prime Minister, Govt. of India on 5th August 2024 at Washim (Maharashtra).

Evaluation and Trait Characterization of Native AnGR

Unravelling lipidome signature of colostrum of Ladakhi cows and their pharmacokinetics properties

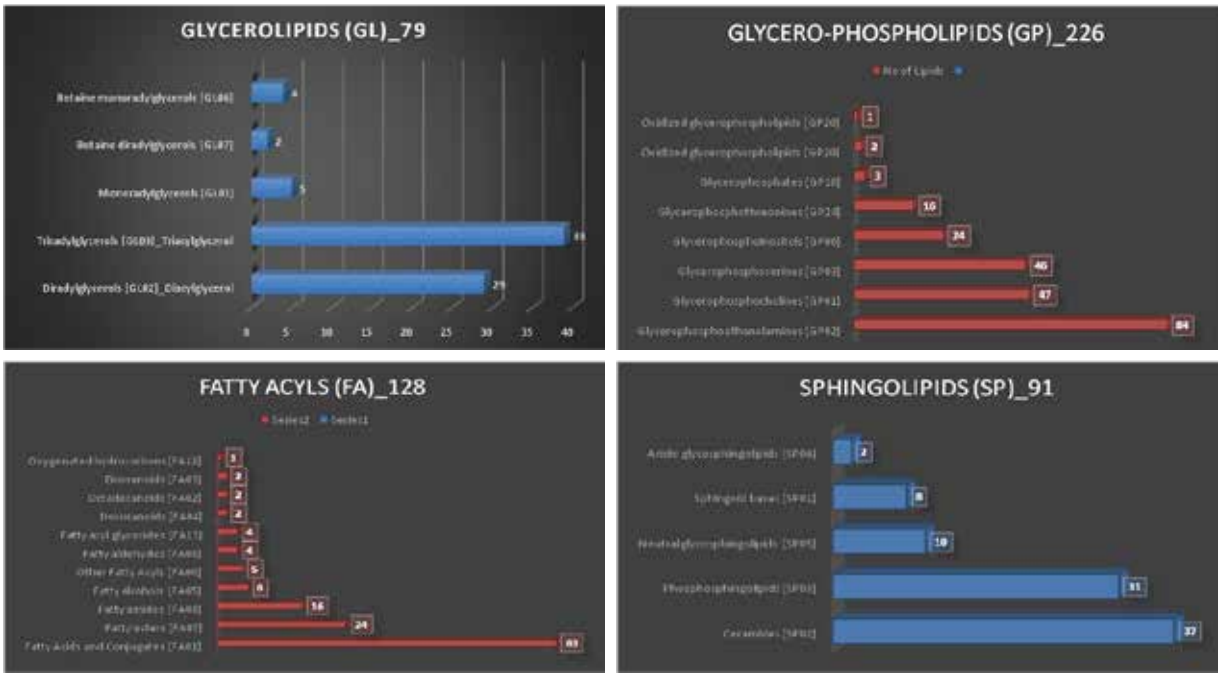
Leh-Ladakh is a high land plateau having atmosphere quite distinct from low land areas. In the high land areas, several species of livestock such as cattle, yak, dzomo, dzo, donkey, double hump camel, sheep, goat exist with unique anatomical, genomic and physiological traits. Amongst these, the native cattle of Ladakh which is now termed as "Ladakhi cattle" is a quite unique population and very well adapted to difficult terrains as well as to extreme climates. These are the main source of milk and protein for local communities especially nomads and pastoralists during the extreme winter period. These cows give 2-5 kg of milk per day and have long lactation length of 305 days or even more. They are mostly reared on local grasses, barley, sattu, and locally made thuchu. Our group has generated transcriptomic, proteomic and metabolomic data of colostrum and milk of this unique cows. In the present study, we are reporting our initial results on lipidome signature of Ladakhi cows' colostrum collected on first day of calving. The lipidome data was acquired using UHPLC-QTOF-MS spectroscopy with positive and negative ion electrospray ionization (+ve ESI, −ve ESI). In lipidome data, a total of 541 lipid molecules were identified using various tools such as Lipid Sig, Lipid Suite and LIPIDMAPS. Additionally, Chemspider, Lipidpedia, and HMDB databases were also utilized to classify various molecules into separate categories. The lipidome was divided into eight main lipid categories: sphingolipids, glycerophospholipids, fatty acyls, glycerolipids, sterol lipids, prenol lipids, polyketides, and saccharolipids. The highest number of lipids grouped into category of glycerophospholipids (226), followed by fatty acyls (128), sphingolipids (91), glycerolipiods (79), sterol-lipids (34), uncategorized (27), phenol lipids (13), polyketides (11). Additionally, these classified lipids molecules were evaluated for their pharmacokinetics properties through ADMETlab 2.0 tool. Majority of the lipid molecules detected in colostrum of Ladakhi cows showed pharmacokinetic properties in oral bioavailability, human intestinal absorption, and in crossing the blood brain barrier. In future, comparing the lipidome signatures of Ladakhi cows with exotic cows like Jersey and Holstein Frisian would provide critical insights into distinct lipid composition of colostrum/milk of native and non-native cows in high altitude environments.



Lipidome profile of Ladakhi cow colostrum

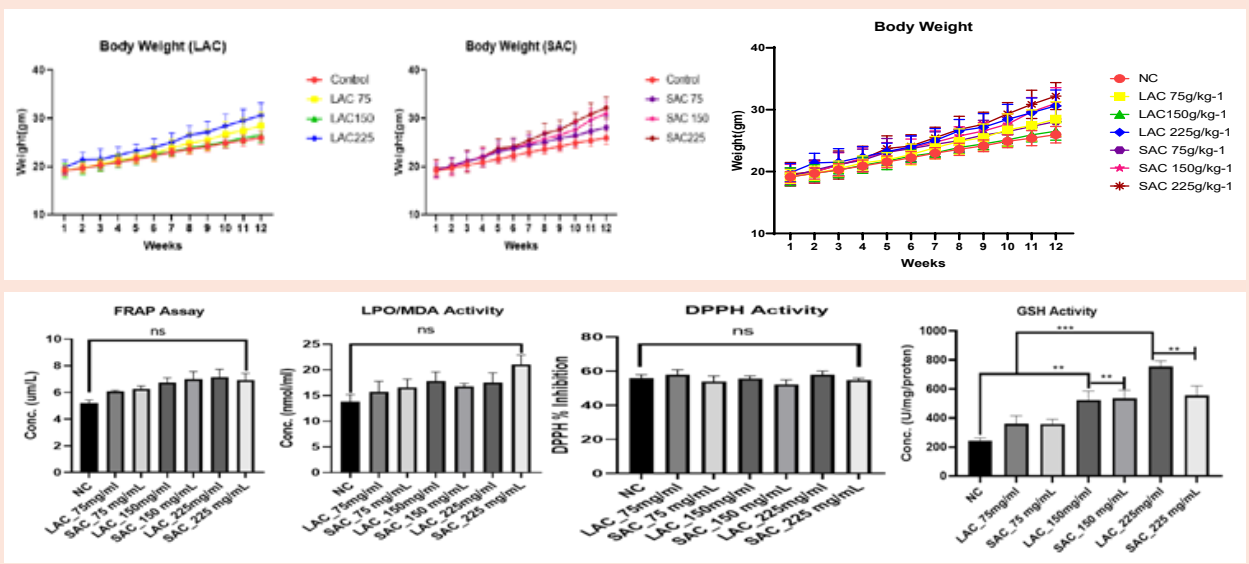
Evaluating effect of Sahiwal and Ladakhi cows' colostrum in C57 BL/6 mice

In the present study, an effort was made to assess immune modulatory parameters of colostrum milk from two native cow breeds adapted to distinct altitudes by undertaking C57 BL/6 mice feeding trials. The trial was conducted to evaluate any toxic/adverse effect of feeding colostrum powder of Ladakhi and Sahiwal cows in different dosages (low dosage group: 75 g/kg-1 body weight; medium dosage group: 150 g/kg-1 body weight; and high dosage group: 225 g/kg-1 body weight) to mice for 12 weeks. The results showed notable correlation between the amount of colostrum feeding and body weight. Specifically, the group administered with 225 g/kg-1 body weight of colostrum powder of Ladakhi and Sahiwal cows exhibited significantly higher body weight gain (24.98 gm ± 1.01 and 25.23 gm ± 1.22, respectively) compared to the groups receiving moderate or low amounts of colostrum powder. Additionally, the splenic index

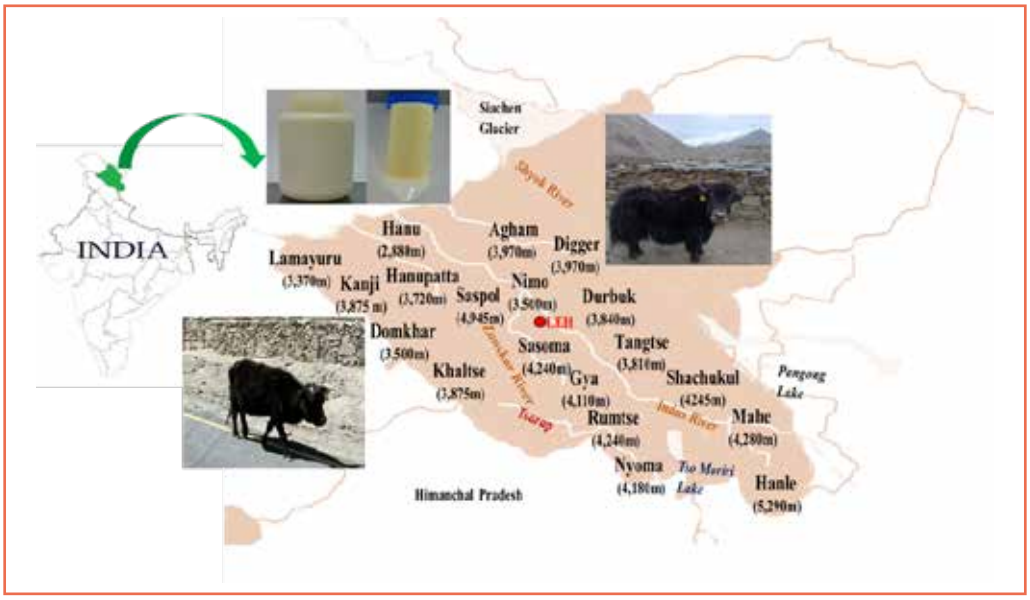


Distribution of metabolites across different lipid classes present in colostrum of Ladakhi cows

was highest in high dosage group for both Ladakhi and Sahiwal cows' colostrum (0.0068 ± 0.00 and 0.0066 ± 0.00) compared to the groups fed with medium and low amount of colostrum feeding. Various parameters related to complete blood count (CBC) was also evaluated after completion of the feeding trials with colostrum powder of Sahiwal and Ladakhi cows. The results suggested no major changes in the CBC parameters in any of the groups irrespective of colostrum dosage. The histological examination of spleen, small intestine, and liver tissues of C57BL/6 mice did not reveal any adverse effect of supplementing of Ladakhi and Sahiwal colostrum in high, medium and low dosages and were almost similar to that of control group. Based on body weight, splenic index, antioxidants, CBC and tissue histology parameters



Evaluation of feeding colostrum from Ladakhi and Sahiwal cows on body weight, antioxidant and tissue histology parameters

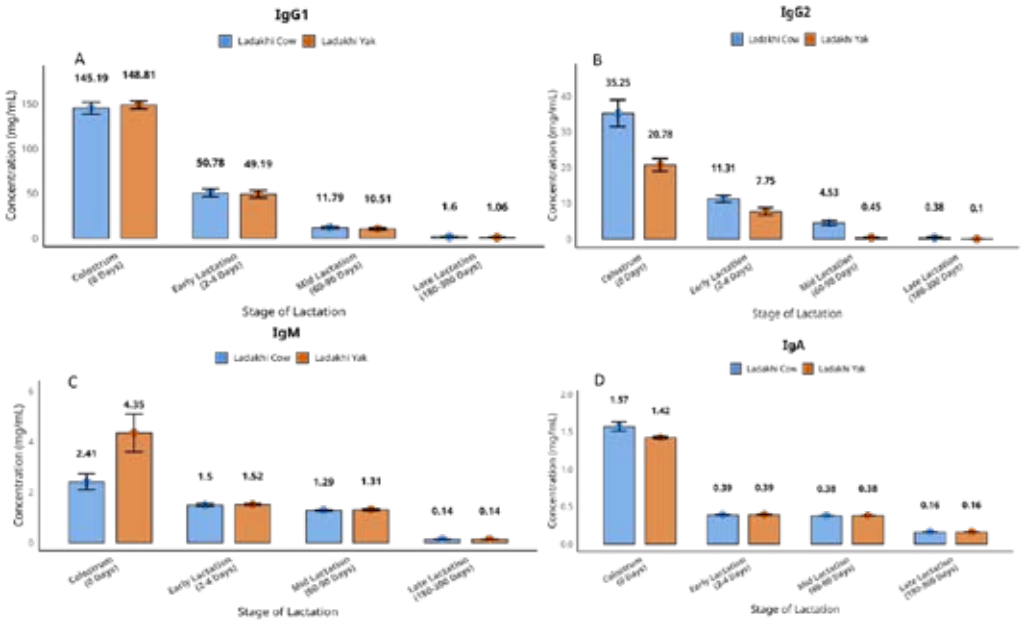


Various locations covered in Leh-Ladakh during milk and colostrum sampling of Ladakhi cows and Ladakhi yak

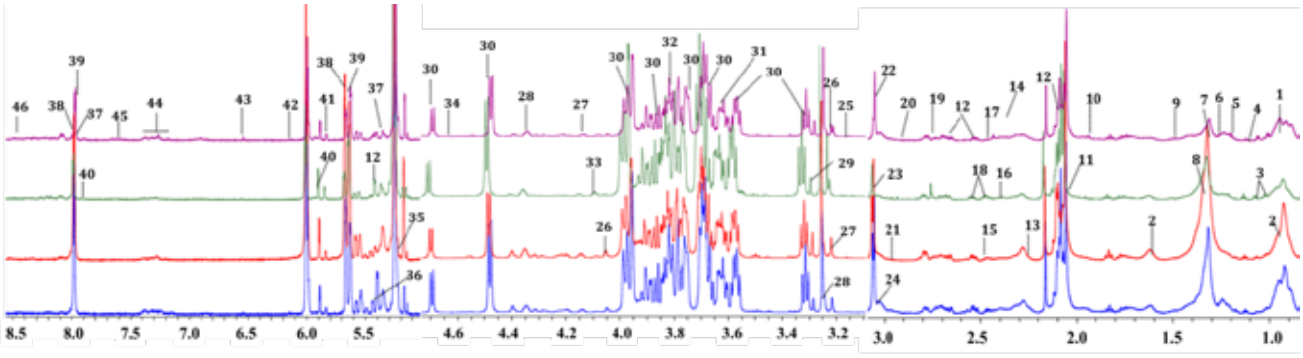
evaluated after completion of 12-week trial, it could be assumed that colostrum feeding even at high dosage are safe and does not lead to any adverse effects.

Antioxidant and biomolecules in Ladakhi cows and Ladakhi yak milk

A total of 48 milk samples of Ladakhi cow, 54 milk samples of Ladakhi yak and 10 milk samples of Jersey cows (from an organized fatm at Leh) were collected in the month of April, 2024 by visiting Durbook, Tangste, Tsoltak, Kheerapullu etc. The freshly collected milk and colostrum samples along with previously collected samples were analysed for basic constituents using a milk analyser. A total of 124 milk and colostrum samples of Ladakhi cows and yak were analyzed. Additionally, the level of immunoglobulins, lactoferrin, lactoperxidase etc. were also measure using ELISA. Various antioxidant parameters were also evaluated in these samples. Briefly, the baseline, antioxidant, immunoglobulins and antimicrobial activity of milk samples of Ladakhi cows and yak were accomplished across colostrum (0 day), early (2-4 days), mid (60-90 days) and late (180-300 day) lactation stages. In Ladakhi cows, fat percentage was highest in colostrum (5.23±0.76) and lowest in mid-lactation (4.69±0.03). Protein content declined from colostrum (4.27±0.12) to late lactation (3.38±0.07), while lactose increased from colostrum (2.71±0.09) to late lactation (4.16±0.46). A



Abundance of immunoglobulins (A) IgG1 (B) IgG2 (C) IgM (D) IgA in colostrum, early, mid and late lactation milk of Ladakhi cow and Ladakhi yak



1: Isoleucine; 2: Leucine; 3: Valine; 4: Isobutyrate; 5: 3-Hydroxybutyrate; 6: Fucose; 7: Threonine; 8: Lactate; 9: Alanine; 10: Acetate; 11: N-Acetylglucosamine (NAG); 12: O-Acetylcarnitine; 13: Acetone; 14: Glutamate ; 15: Pyruvate; 16: Succinate; 17: Carnitine; 18: Citrate; 19: Dimethylamine; 20: Trimethylamine; 21: 2-Oxoglutarate; 22: Creatine; 23: Creatine phosphate; 24: Creatinine; 25: Malonate; 26: Choline; 27: O-Phosphocholine; 28: sn-Glycerophosphocholine; 29: Betaine; 30: Lactose; 31: Glycine; 32: Guanidoacetate; 33: myo-Inositol; 34: Lactulose; 35: Maltose; 36: Glucose-1-Phosphate; 37: UDP-NAG; 38: UDP-Galactose; 39: UDP-Glucose; 40: Uridine; 41: cis-Aconitate; 42: dCTP; 43: Fumarate; 44: Phenylalanine; 45: Hippurate ; 46: Formate

Metabolomic spectra of colstrum and milk of Ladakhi yak using 1H NMR spectroscopy

similar trend was seen in yaks, with fat (6.3±0.56) and protein (5.40±0.11) highest in colostrum. Additionally, the antioxidant activity in term of FRAP, DPPH, and GSH, was highest in colostrum and declined through lactation, while lipid peroxidation (LPO) increased. For instance, FRAP in cows dropped from 581.4±78.51 (colostrum) to 228.8±8.32 (late lactation). Immunoglobulins (IgG1, IgG2, IgM, IgA) were highest in colostrum, with IgG1 in cows decreasing from 145.19 mg/mL (colostrum) to 1.6 mg/mL (late lactation). Antimicrobial peptides such as lactoferrin (0.6 µg/mL), lysozyme (1.1 µg/mL), and lactoperoxidase (2.2 µg/mL) were highest in colostrum and declined with lactation, except LPO, which increased. Colostrum in Ladakhi cows and yaks has the highest fat, protein, immunoglobulins, and antioxidants, crucial for neonatal immunity.

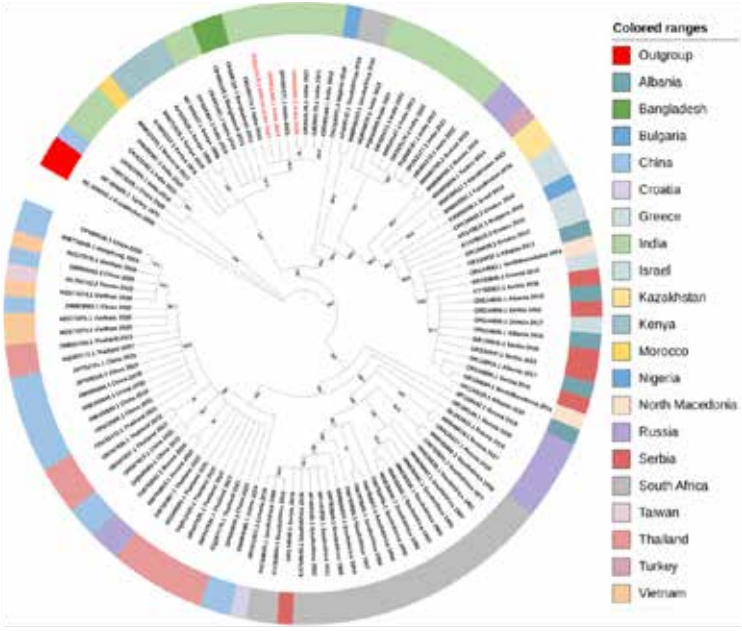
Characterizing milk metabolome of Ladakhi yak of Ladakh

In the present study, metabolome signature of colostrum, transition and mature milk samples of Ladakhi yak (n=40) was generated using NMR spectroscopy. The analysis of spectrum has resulted in identification of 46 metabolites comprising of monosaccharides, disaccharides, organic acids, nitrogenous organic acids, amino acids, nucleotides and other compounds. The most abundant metabolites detected in Ladakhi Yak colostrum were; UDP-glucose (2951.04±1330.90), UDP-galactose (2669.88 ±1588.40), OPCh (1414.62 ±345.72), betaine (204.65± 106.23), myo-inositol (686.94±177.02), N-acetylglucosamine (1530.01±407.08), N-Acetylglucosamine (NAG) (991.04± 249.30), O-Acetylcarnitine (402.67 ±157.70), lactate (284.65±102.94), Lactulose (301.43± 73.96), glutamate (184.35± 80.47), creatine (446.50 ±217.03), and threonine (361.36 ±152.57). The most abundant metabolites detected in Sahiwal colostrum were; UDP-glucose (1796.21±798.10), UDP-galactose (1686.93±643.46), OPCh (1047.54±462.63), Choline (1086.58±651.63), Betaine (820.48±383.21), Myo-inositol (622.07±177.02), N- Acetylglu-cosamine (1530.01±407.08), O-Acetylcarnitine (443.86±88.87), Lactate (284.65±102.94), Lactulose (361.56±112.24), Glutamate (228.68±115.59), Creatine (406.83±246.03). The colostrum metabolome appears to provide a number of nutrients beneficial for growth and development of the new-born mammal, such as branched chain amino acids, other essential amino acids, pyruvate, succinate and choline. In the days post-parturition, the levels of these beneficial nutrients are reduced as it evolves to a regular milk composition with significant increases in lactose content. The PCA results showed separate groupings of 0-day (colostrum), 2-day, 4-day (transition milk), <30-days and >30-days (mature milk). The partial least squares discriminant analysis (PLS-DA), also discriminated samples belonging to 0 day (colostrum), 2- day and 4- day as well as <30-days and >30-days and clustered separately. The hierarchical clustering of colostrum, transition and mature milk samples based on individual metabolite concentration showed that 0-day colostrum was distinctly different while, 2-day and 4-day samples clustered together. Similarly, <30-days and >30-days samples of mature milk grouped together indicating similarity in their metabolic profile. Overall analysis indicated that colostrum metabolome of Ladakhi yak

is quite dynamic in nature where in large number of metabolites concentrations dropped from 0-day to transition (2-day and 4-day) and mature milk (<30-days and >30-days).

Unravelling breed signatures behind variable susceptibility Lumpy skin disease

Whole genome of LSD virus was sequenced from LSDV-infected Mithun from Arunachal Pradesh, and cattle from Bangalore. The genome was assembled and submitted to NCBI under accession no OR863382 and PQ510117. A phylogenetic analysis of the assembled viruses with global strains was carried out to study the clustering of the viral strains. The assembled strains were clustered together with the Indian strains, showing the slow evolutionary changes, and genetic stability of the virus.



Phylogeny of LSDV whole genomes

Comparative transcriptome profiling of heart tissue of Changthangi and Jamunapari goats

The Changthangi is an important goat breed found in the cold arid region of Ladakh which is famous for producing the finest natural fibre -'pashmina'. The breed forms the main source of livelihood for the Changpa nomads and is well adapted to the oxygen-poor environment of the region. However, the molecular drivers that are associated with the adaptation to hypoxia are largely unknown. Since exposure to hypoxia affect the cardiovascular functions, the transcriptome profile of heart tissue from Changthangi goat was compared with that of Jamunapari goat from the tropical and humid Gangetic plains. Four biological replicates of heart tissue from each breed were subjected to RNA sequencing using Illumina platform. More than 122 million reads were generated for both goat breeds. The filtered reads were aligned with the reference goat genome (ARS1.2). Comparison between the two breeds led to the discovery of 372 unique transcripts in Changthangi and 282 in Jamunapari, while 13944 transcripts were common to both breeds. The highest expressed genes common to both breeds were mainly related to mitochondrial electron transport, ATP synthesis coupled electron transport and cardiac muscle contraction. Gene ontology analysis identified functions such as regulation of dopamine secretion, aggrephagy, ATP-dependent microtubule motor activity and heme transporter activity enriched in Changthangi while immune response, lipid metabolic process and positive regulation of MAP kinase activity were found to be significant in Jamunapari goat. Differential gene expression analysis revealed a higher level of genes involved in Cytokine-cytokine receptor interaction, NF-kappa B signaling and Chemokine signaling pathways in Jamunapari breed. The most significant pathway in Changthangi breed was the Apelin signaling pathway which is involved in control of blood flow and blood pressure, dilation and vasoconstriction as well as strengthening of the cardiac contractility and angiogenesis. The enrichment of the Apelin signaling pathway in Changthangi breed reflects its capability of survival in the harsh hypoxic conditions of Ladakh. *This study offers an insight into the differentially expressed genes and pathways in heart tissue of two goat breeds adapted to diverse climatic conditions.*

Identification of selection signature contributing to high altitude adaptation in Changthangi goat

To further investigate the genomic basis of high-altitude adaptation a comparative whole-genome resequencing analysis was conducted using data from 15 animals of Changthangi breed and 15

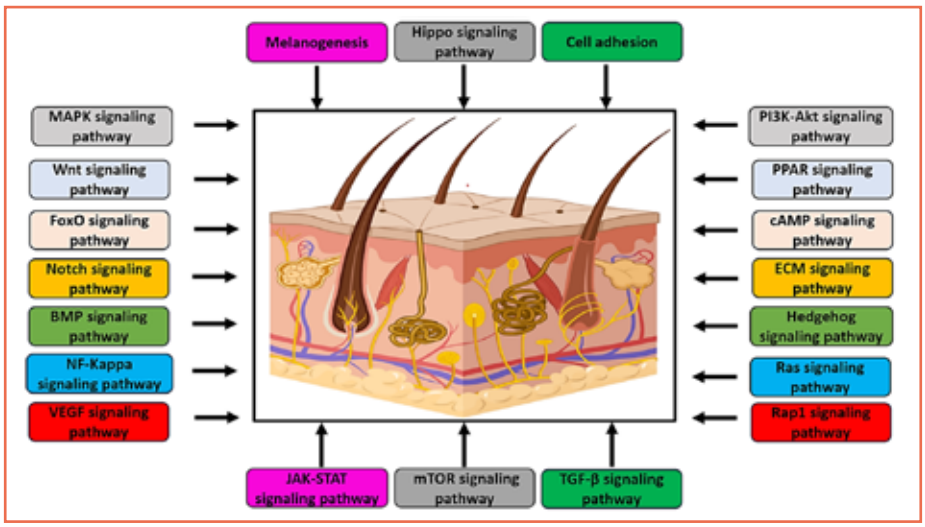
Jamnapari goats, a milch breed adapted to tropical climates. Selection sweep analyses using inter-population approaches (Cross-Population Extended Haplotype Homozygosity (XP-EHH) and FST) were performed. Several genomic regions exhibiting strong selection signatures were detected, suggesting a potential role in high-altitude adaptation. Functional enrichment analysis of the candidate genes revealed significant involvement in processes such as positive regulation of angiogenesis, cardiac muscle cell development, regulation of vasoconstriction, keratinocyte proliferation. Further pathway analysis indicated enrichment in biological processes related to heart development, blood vessel development, inflammatory response regulation, calcium ion homeostasis, and calcium ion transport via high-voltage-gated calcium channels. In addition, genes encoding keratins (KRTs) and keratin-associated proteins (KRTAPs) were identified, highlighting their crucial role in cashmere fiber production and contributing to the high-altitude adaptation of the Changthangi goat. The genes identified, including *BCL2, CACNG6, MAP3K9, SHISA9, ANGPTL3, NOS2, MAPKI 0, BCL7C, PIK3CA, ACVR2B, ADGRB3, ADGRG6*, are likely integral to the adaptation of the Changthangi goat to high-altitude environments. *These findings suggest that genetic adaptations in Changthangi goats are primarily associated with mechanisms that alleviate hypoxic stress and environmental challenges at high altitudes, providing key insights into the biological pathways critical for survival in extreme climates.*

Comparative transcriptomics of indigenous sheep breeds for pulmonary adaptation to diverse climates.

The Changthangi sheep thrive at high altitudes in the cold desert regions of Ladakh, India and Muzaffarnagri sheep are well-suited to the low-altitude plains of northern India. Four biological replicates of lung tissue from each breed were utilized to generate the transcriptomic data to explore the mechanisms underlying molecular adaptation of lungs to the diverse environments. Differences in gene expression analysis revealed discrete expression profiles in lungs of each breed. In Changthangi sheep, genes related to immune responses, particularly cytokine signaling, were significantly enriched. Pathway analysis highlighted the activation of NF-kB signaling, a key mediator of inflammation and immune response. Additionally, the gene network analysis indicated a strong association between cytokine signaling, hypoxia-inducible factor (HIF), and NF-kB activation, suggesting a coordinated response to hypoxic stress in lungs of Changthangi sheep. In Muzaffarnagri sheep, the gene expression profiles were enriched for pathways related to energy metabolism, homeostasis and lung physiology. Key pathways identified include collagen formation and carbohydrate metabolism, both of which are crucial for maintaining lung function and structural integrity. Gene network analysis further reinforced this by revealing a strong connection between genes associated with lung structure and function. *Our findings shed light on the valuable insights into gene expression mechanisms that enable these sheep breeds to adapt to their respective environments and contribute to a better understanding of high-altitude adaptation in livestock.*

Molecular insights into Pashmina fiber production: Comparative transcriptomic analysis of Changthangi goats and sheep

Situated in one of the most inhospitable environments on Earth, Ladakh is home to the distinctive Changthangi goat, famed for its production of Pashmina, the most luxurious natural fiber known. In contrast, the wool from the region's Changthangi sheep ranks below Pashmina in terms of quality. The skin transcriptomic patterns of both Changthangi goats and sheep were compared to uncover the genetic determinants that contribute to recognition of Changthangi goats as premier Pashmina producers. Drawing upon previously conducted studies, a collective of 225 genes correlated with fiber characteristics were extracted from the differentially expressed genes observed between the two species (adjusted p-value of ≤ 0.05 and a Log2 fold change of ≥ 1.5). These genes underwent further analysis through DAVID software for biological function interpretation and pathway enrichment in KEGG and Reactome databases. The comparative transcriptomic analysis showed a marked upregulation of genes in pathways including Wnt, MAPK, PI3K-Akt, and Hedgehog in Changthangi goats, all critical

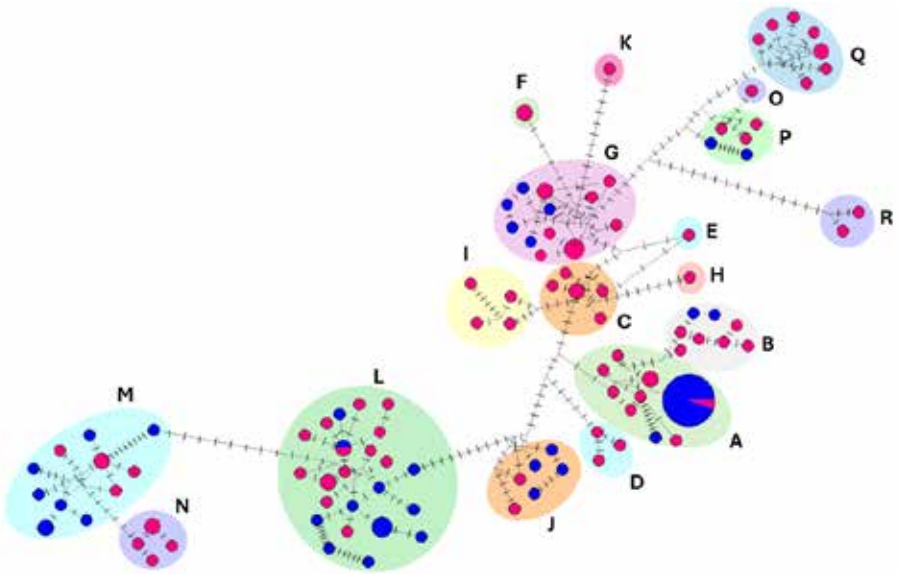


Signaling pathways involved in pashmina fiber production

to fiber formation and its quality attributes. Such pathways are integral to hair follicle development, the preservation of epidermal stem cells, and defining fiber properties. Additional insights were gained into cell adhesion molecules and ECM-receptor interactions, which are crucial for hair follicle structure, growth, and signaling. This investigation offers an in-depth understanding of the molecular intricacies governing Pashmina production in Changthangi goats, providing valuable insights into their unique genetic makeup and underlying mechanisms influencing the exceptional quality of Pashmina fibers.

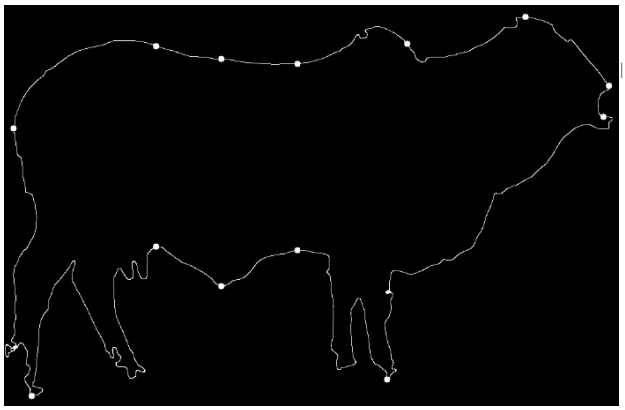
Mitochondrial genome analysis revealed complex origins of indigenous Indian horse and pony breeds

The maternal genetic diversity of six indigenous Indian horse and pony breeds: Bhutia, Kathiawari, Manipuri, Marwari, Spiti, and Zanskari was investigated through a detailed mitochondrial genome analysis. DNA samples from 53 horses across various Indian agro-climatic regions were examined, revealing 36 unique haplotypes, with a haplotype diversity of 0.889 and nucleotide diversity of 0.00347, indicating substantial maternal genetic diversity in these equine breeds. The maximum values of genetic diversity indices were observed in Zanskar ponies and minimum in the Bhutia breed. A median-joining (MJ) network, constructed from the hypervariable D-loop region alongside Indian equine sequences from NCBI, identified 55 haplotypes, with some shared across 2–5 breeds. Hierarchical AMOVA analysis showed that 95.20% of genetic variation existed within populations, while only 4.80% was distributed among groups, pointing to minimal genetic structuring by geographic region. Phylogenetic analysis incorporating global sequences



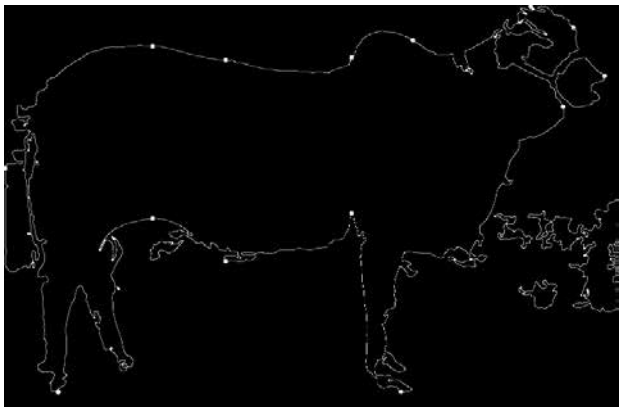
Median-Joining network based on complete mitochondrial D-loop sequences of Indian horses and ponies alongside global haplotypes. Blue circles indicate Indian horses/ponies, while pink circles represent global haplotypes

Sahiwal Cattle



Sahiwal Cattle -Outline

Hariana Cattle



Hariana Cattle - Outline

highlighted notable genetic variability without distinct geographic clustering, suggesting considerable gene flow and interbreeding across regions. The median-joining network based on D-loop sequences positioned Indian horses within seven of the 18 globally recognized haplogroups (A, B, G, J, L, M, and P), with haplogroup A being most prevalent. These findings enhance understanding of equine genetic diversity, reflecting global patterns of high maternal haplotype diversity, and shed light on the complex genetic backgrounds shaped by historical breeding practices.

Assessment of Livestock Population Uniformity using Photographs

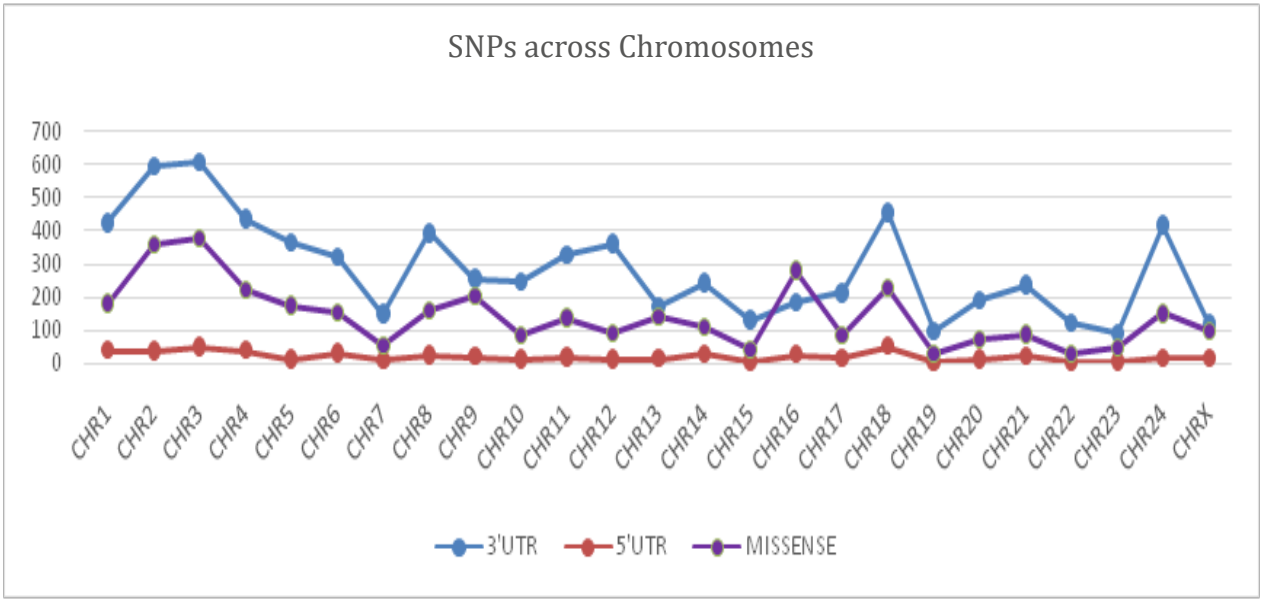
Photographs and measurements of 13 quantitative traits of 51 animals of Sahiwal cattle were collected from a private farm at Taroari (8 animals) and livestock farm at NDRI, Karnal (43 animals). Photographs and measurements of 50 animals of Hariana cattle were also recorded at Gaushalas at Jundla and Uplana in Karnal.

The computational pipeline of Nye et al, Frontier in Genetics, 11:513 (2020) was used that included Mask R-CNN deep learning model to identify animal of a species in photograph. It utilized other procedures such as unsupervised image segmentation and k-mean clustering to obtain outline of animal image. Extreme points on the image outline were marked by applying geometry parameters. Distances in pixels were measured between the extreme points to extract 13 conformation traits. The photographs display outline and extreme points of one animal each of Sahiwal and Hariana cattle.

In total, 24 animals of Sahiwal cattle and 11 animals of Hariana cattle were properly segmented. The phenotypic data on actual measurements as well as measurements obtained from photographs for 35 animals were clustered using K-mean clustering in R-software. Measurements using photographs provided better clustering compared with the field measurements. Actual data misclassified 5 animals while photo-data assigned 3 animals incorrectly. The ratio - between cluster SS / total SS was 60% using photo data and 29.9% using actual data.

In the study, confirmation traits measured from photographs showed better clustering than actual traits measurement. Therefore phenotyping from photographs was possible under field conditions for determining uniformity of an animal population and recognising it as a breed.

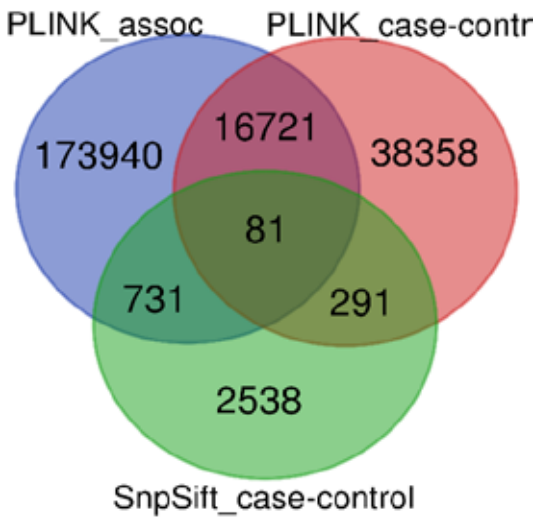
Mask R-CNN model and unsupervised image segmentation was used to segment 101 animals from photographs of Sahiwal and Hariana cattle breeds. In total 35 animals were properly segmented.Confirmation traits measured from photographs showed better clustering comapred with actual measurements. Therefore phenotyping from photographs was possible under field conditions for determining uniformity of an animal population.



Distribution of functionally annotated SNPs (in millions) identified across buffalo chromosomes

Investigating molecular basis of seasonal variation on seminal attributes for identification of probable biomarkers of semen quality in buffaloes

Whole genome sequencing data on nine bulls of each group, seasonally affected and not-affected generated. Using two different methods- PLINK and SNP sift, first time genome wide SNPs identified in the Murrah buffalo bulls, categorized based on heat stress affected (SA) and not-affected (SNA) semen quality. Genes with significant allele frequency variation documented and catalytic, binding, cellular structure, biological regulation, cellular process were the GO terms, most enriched. Possible impact of mis-sense SNPs on protein structure and function analysed and the genes related to apoptosis, inflammation, chromatin remodelling, immune response and sperm structure and motility (GPX6, CLEC12a, BOLA-I, PCNT, PKHD1, AKAP4, HECTD4, UBIQUITIN, KMT2C etc.) were identified. Mis-sense SNP A>G, identified in theGPx6 gene could be correlated with semen quality during summer stress based on the discard ratios. Genotype analysis of selected mis-sense SNPs in specific genes linked with semen quality,GPx6 (p0.004), PCNT (p0.01), PKHD1 (p0.03) and two SNPs in CLEC12A (p0.004; p0.0025), in 85 bulls showed significant differences, suggesting these SNPS in the target genes as potential markers for semen quality differentiation during hot summer.

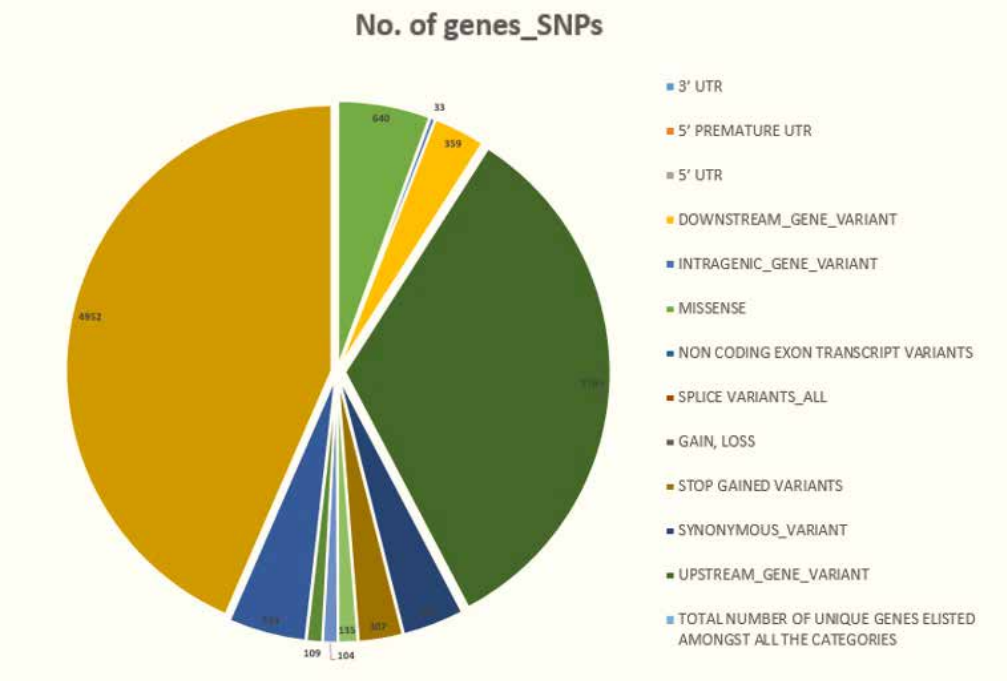


Number of post filtration, significant SNPs identified to be associated with semen quality in seasonally affected (case) and not-affected (control) buffalo bulls, using different analysis tools (PLINK and SnpSift)

Whole genome sequencing of buffalo bulls with altered semen quality during hot-summer could identify potential SNPs in the GPx6, PCNT, PKHD1 and CLEC12A genes, associated with semen quality.

Gene expression profiling of liver tissue highlights metabolic differences in Kadaknath and Broiler chicken

Kadaknath and Broiler chickens exhibit distinct differences in growth rates, metabolic processes, and



Number of genes with different classes of SNPs after genotyping and p-value filtration of SA_SNA vcf files at the end of case control and CC_TREND test

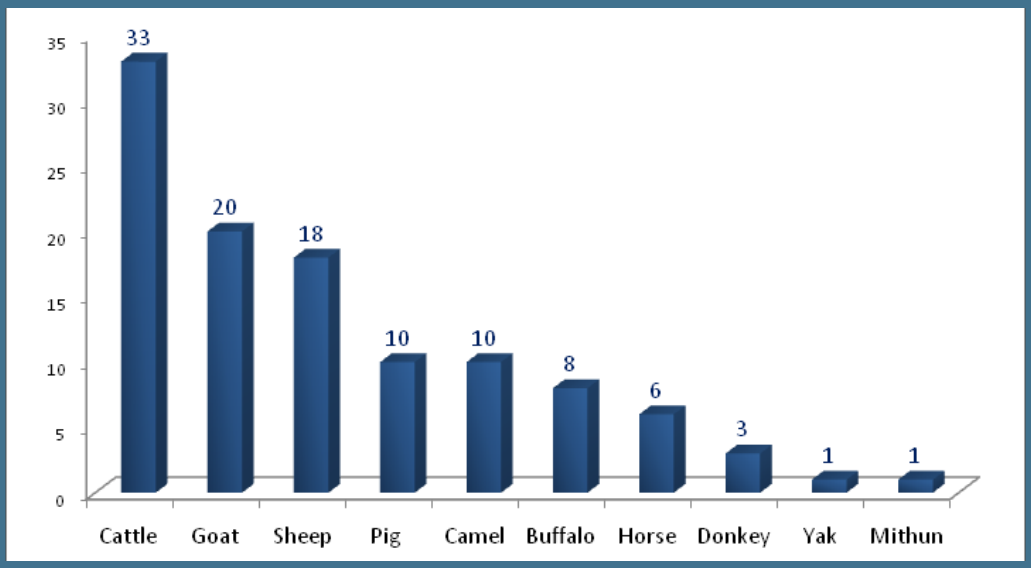
meat quality. Broilers are known for their rapid growth and high muscle yield, while Kadaknath is renowned for its unique black meat, exceptional meat quality, and adaptability to free-range conditions. As a central organ in metabolism, the liver is responsible for synthesis and metabolism of nutrients, energy homeostasis and protein synthesis, essential for the overall health and development of both breeds. To investigate the metabolic differences, a comparative transcriptomic analysis of liver tissues from four healthy Kadaknath and Broiler chickens was performed. High-quality reads (Phred score ≥ 30) were mapped to the *Gallus gallus* genome reference assembly(GCF_016699485.2). Differential expression analysis identified 237 significantly differentially expressed genes with a fold change greater than 2 (padj<0.05), with 80 genes upregulated in Kadaknath and 157 upregulated in Broiler. Kadaknath chicken, reared under free-range conditions, exhibited efficient fat metabolism and energy utilization, reflected by the upregulation of genes involved in glycerol catabolic processes. These genes help in mobilizing stored fats for energy during activities like foraging and responding swiftly to predators, highlighting the role of liver in balancing energy reserves with immediate demands. In contrast, Broilers, raised in controlled environments with limited physical activity, exhibited gene expression patterns linked to fat synthesis and protein production. The upregulation of genes related to ribosomal function and protein translation underscores the function of liver in supporting rapid growth and high muscle yield in Broilers. *These findings highlight the distinct metabolic adaptations between Kadaknath and Broiler chickens, emphasizing the significance of liver in regulating energy utilization and fat metabolism to support breed-specific metabolic processes.*

Conservation of Native AnGR

Somatic cell conservation

The somatic cell lines of different breeds across livestock species were generated and cryo-preserved under the Consortium Research Platform on Agrobiodiversity (ICAR). Ear tissue samples of true-to-the-breed type male and female animals were used to generate somatic cells following primary (tissue explant) and secondary cultures (Cell passaging) in Dulbecco's Modified Eagle Medium (DMEM) supplemented with Fetal Bovine Serum (FBS). Contamination-free, viable cells which were following the normal sigmoid growth curve were cryopreserved ($1x10^6$cells/ml) at -196°C in the LN_2. The inventory is maintained at the National Gene Bank of ICAR- NBAGR, Karnal, India.

This year, 45 indigenous breeds belonging to five livestock species (Cattle, buffalo, sheep, goat, and horse) were conserved as somatic cells (Table 1). Nine of these fall under the critical, endangered, or vulnerable categories as per the Breed Watch List 2022, ICAR- NBAGR, Karnal. So far, 110 livestock breeds of 10 species have been cryopreserved in the ICAR-NBAGR National gene bank (Fig 1). It includes 27 of 38 critical/endangered/ vulnerable populations (Table 2). The effort contributes towards fulfilling the national obligation embedded in the United Nations Sustainable Development Goal 2.5.1.



Breeds (110) represented in the Somatic cell Bank (as of 31.12.2024) of ICAR-NBAGR

Table: Somatic cell conservation of indigenous livestock populations during 2024

Species	No. of breeds	Name of Breeds/ populations
Cattle	15	Poda Thurpu, Binjharpuri, Malnad Gidda, Deoni, Bachaur, Punganur, Ongole, Red Sindhi, Hallikar, Kenkatha, Krishna Valley, Khillar, Vechur, Kosali, Pulikulum
Goat	12	Gujari, Karauli, Sojat *Barbari, Jamunapari, Osmanabadi, Bundelkhandi, Jakhrana, Beetal, Berari, Malabari, Attapady Black
Sheep	9	Poonchi, Nellore, Seemanchali, Macherla, Rampur Bushair, Jalauni *Patanwadi, Malpura, Katchaikatty Black
Buffalo	8	Gojri, Chilika *Murrah, Bhadawari, Nili Ravi, Surti, Mehsana, Banni
Horse	1	Spiti (Endangered)

**Contributed by the cooperating centers of Consortium Research Platform on Agro-biodiversity.*

Table: 'At Risk' breeds (Breed Watchlist-2022) conserved as Somatic cells

Species	Critical (4/5)	Endangered (13/19)	Vulnerable (10/14)
Cattle		Belahi, Krishna Valley, Pulikulam	Mewati, Siri, Punganur, Vechur
Sheep		Karnah, Katchaikatty Black	Gurez, Poonchi, Jalauni, Rampur Bushair
Buffalo			Chilika
Goat	Teressa		Konkan Kanyal
Pig		Agonda Goan	
Horse		Kachchhi-Sindhi, Manipuri , Zanskari, Spiti	
Camel	Mewati, Mewari, Malvi	Jalori, Kharai, Marwari	

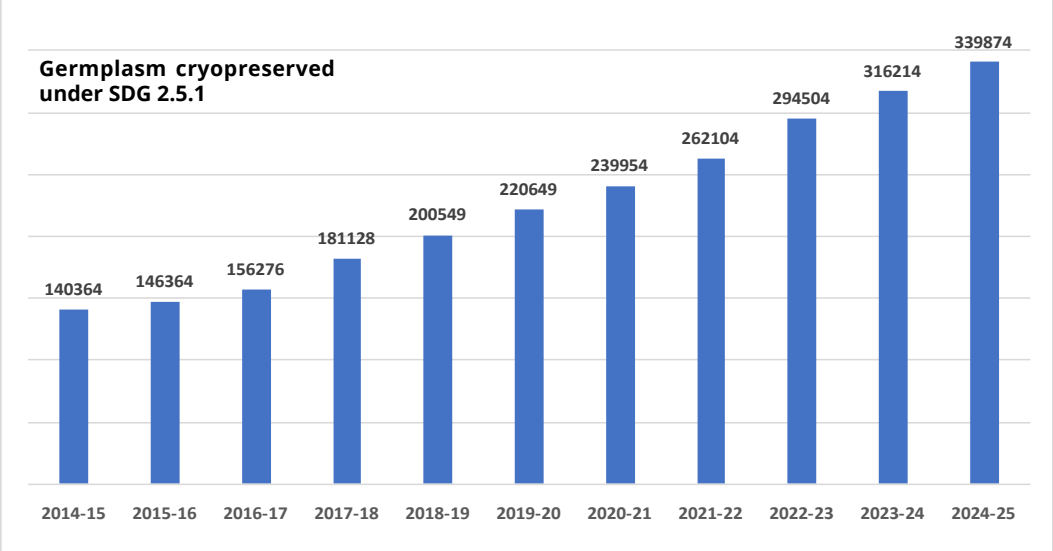
Sustainable Development Goal (SDG) indicators

SDG 2.5.1: Number of animal genetic resources for food and agriculture secured in either medium- or long-term conservation facilities

Category	2022-23	2023-24	2024-25
Semen doses	287974	306024	327524
Somatic cells	6530	10190	12350

SDG 2.5.2: Proportion of local breeds classified as being at risk of extinction

Year	Local Breeds		
	"Number of local breeds at risk (nR)"	"Number of local breeds not at risk (nNR)"	"Indicator value (nR/nR+nNR)"
2022-23	38	174	17.92
2023-24	38	182	17.27
2024-25	38	192	16.52



In situ conservation under Network Programme on AnGR

Conservation of Tibetan sheep (AHD Sikkim)

Tibetan sheep population has increased from 204 Nos. (2023-24) to 337 Nos. (2024-25) and the number is expected to further increase by the end of the project period. The number of Tibetan sheep rearing households has also increased considerably from 5 Nos. (2023-24) to 12 Nos. (2024-25). Seven sheep farmers identified for rearing of Tibetan Sheep conservation programme. The awareness camp was conducted, Morphometric traits were recorded.

Conservation of Tibetan sheep was also started at At "State of Art Building" at Govt RSBF, Sangti, West Kameng district Arunachal Pradesh. Where 11 numbers of Sheep (1M +10F) were procured from Pangma village.

Conservation of Zanskari horse (AHD Leh)

For conservation of Germplasm of Zanskari Equine Breeding farm Chouchod and Zanskar has been set up. Awareness camps cum veterinary health camp were organized and consumable items like Horse bridle, Horse feed, dosing medicine etc.were distributed. Ahorse polo Tournaments like LG cup and CEC polo cup were organized. Pure breed Zanskari Stallion on community basis for breeding purpose were distributed. Pasture lands were protected by means of chainlink fencing.

Conservation of Halari donkey (Sahjeevan, Bhuj)

At Starting of project, there were a total of 469 Halari donkey, now by March 2025, the population ahs reached to 502 in Saurashtra region of Gujarat. Under Halari Donkey Breeders Association, a total of 154 Halari donkey herders across the Saurashtra region collaborated and democratically evolved the organisation inclined towards Halari donkey conservation. The Association was formed in 2023 with 100 members.

Total 200 Halari Donkeys tagged with Radio Frequency Identification (RFID) microchips for precise tracking, population monitoring and better breed management. As a community Engagement and strengthening the Halari Donkey Breeder Network, Karobari Meetings were held with the Halari Donkey Pashu Ucherek Trust, engaging Karobari (local community leaders).Training program was conducted at the ICAR- NRCE, Bikaner for better Management of Halari Donkey.

Conservation of Halari donkey (Farm based unit at ICAR-NRCE, Bikaner centre)

The Institute herd of Halari donkey has been strengthened. The current strength is 43 with 5 Jacks, 16 Jennies, 22 colts, foals and fillies. The machine milking of Halari donkey has been set up and they are being milked using this machine. The Govt. Horse and Donkey Farm, Chanasma, Patan, Gujarat has been visited and various aspects of donkey farming, skill development, exchange of technology and germplasm has been discussed. A proposal has been moved in eoffice for execution. The impact of the project is that the price of Halari donkey has increased significantly. Several calls for opening of donkey farm are being received. There is a significant increase in the demand for Training in donkey farming.

Conservation of Mewari camel (ICAR- NRC Camel, Bikaner)

The survey was conducted in seven districts of Rajasthan (Jhalawar, Baran, Bundi, Dungarpur, Salambur, Kota and Udaipur) to know the status of the Mewari population. 26 farmers in 14 villages spread over 10 tehsils were surveyed. On April 2024, the camel farm at NRCC, Bikaner has 34 Males and 54 Females of the Mewari breed. Under the project purchase of 4 adult females, 1 adult male and 2 male calves were done to strengthen the nucleus herd.

RESEARCH PROJECTS

भाकृअनुप
ICAR

NBAGR
रा.प.आ.सं.ब्यूरो

Division & Group Wise Research Project

S.No.	Project Type	Project title	Workers	Duration
Animal Genetic Resources Division				
1	*Institute*	Characterization and documentation of Indigenous dog breeds of India.	**Raja KN**, AK Mishra and RK Pundir	August, 2021 to March, 2025
2	*Institute*	Characterization of milk and curd of Chilika buffaloes adapted to saline conditions of Odisha state	**MS Dige**, M Mukesh, M Sodhi, KV Singh, RS Kataria (ICAR-NBAGR), Sudarshan Kumar (ICAR-NDRI), SK Das (OUAT) and NK Navani & SK Ambatipudi (IIT, Roorkee)	August, 2021 to March, 2024
3	*Institute*	Computational judgement of livestock population uniformity on the basis of photographs.	**Avnish Kumar** and Dinesh Kumar Yadav	April, 2022 to March, 2025
4	*External (ICAR-AGRI-CRP)*	CRP on Agro-biodiversity Conservation of Animal Genetic Resources.	**Rekha Sharma** (PI from July, 2023), RAK Aggarwal, Reena Arora and Sonika Ahlawat (from Oct., 2023) MS Tantia, (PI up to 31.07.2023)	June, 2015 to March, 2026
5.	*External (DAHD GoI)*	National Bovine Genomic Centre-Indigenous Breeds (NBGC-IB)	**Dr. R.K. Pundir** and Dr. Amod Kumar	Sept. 2018 to March 2026
6.	*Institute*	Network Project on Animal Genetic Resources	**BP Mishra**, Director from 04.05.2021 (Co-ordinator), AK Mishra (I/c w.e.f. 01.08.2023), MS Tantia (I/c up to 31.07.2023)	January 1996..... Cont.....
7.	*ARCC*	Advanced Research Project on Canine (ARPC)	**Raja K N,** A K Mishra, Reena Arora and Indrajit Ganguly (Lead Centrel ICAR-IVRI, Bareilly)	November 2024 to March 2026
Animal Genetics Division				
8.	*Institute (Service project)*	Karyotyping and DNA Testing for Screening Genetic Defects in Indian Bovines.	**SK Niranjan,** Amod Kumar and Monika Sodhi	April, 2016 to March, 2026
9.	*Institute (Service project)*	Evaluation of genetic diversity in conserved cattle and buffalo bulls.	**Amod Kumar**	April, 2020 continued
10.	*Institute*	Genome analysis for adaptability to salinity in Chilika buffalo.	**Amod Kumar**, SK Niranjan, Sanjeev Singh and Indrajit Ganguly	August, 2021 to Jan., 2024
11.	*Institute*	Admixture mapping of cattle in eastern and western India	**SP Dixit**, Indrajit Ganguly, Sanjeev Singh, Avnish Kumar Bhatia, SK Niranjan, Rahul Behl, Amod Kumar **(**MS Tantia up to 31.07.2023)	August, 2021 to March, 2026
12.	*Institute*	Development of a panel of genome-wide ancestry informative markers in indian horse and pony breeds	**Indrajit Ganguly**, Sanjeev Singh, SK Niranjan, Amod Kumar, Rahul Behl, Sonika Ahlawat, RK Pundir and SP Dixit (NBAGR), K K Kanka (IIAB-Ranchi), S C Mehta, Anuradha Bhardwaj and T.K. Bhattacharya (NRCE)	Oct., 2023 to Sept., 2025

S.No.	Project Type	Project title	Workers	Duration
13.	*Institute funded (7.90)*	Characterization of genes/loci associated with endurance ability in Indian horses.	**Rahul Behl,** Indrajit Ganguly, S. K. Niranjan and Amod Kumar	July, 2024 to March, 2026
14.	*Institute funded (7.91)*	Development of reference panel and admixture analysis of buffalo genetic resources of India	**Amod Kumar,** R K Pundir, SP Dixit, Sanjeev Singh, Indrajit Ganguly, Rahul Behl	April, 2024 to March, 2027
Animal Biotechnology Division				
15.	*Institute*	Exploring the mitochondrial DNA diversity of Indian pigs, horses and donkeys	**Sonika Ahlawat**, Reena Arora, Rekha Sharma and KV Singh	April, 2022 to March, 2024
16.	*External (ICAR-AGRI-CRP)*	CRP on Genomics: - Identification of markers for economic traits and transcriptomics study in Buffalo and goats.	**Reena Arora** (PI from April, 2019)**,** RK Vijh (PI up to April, 2019), Sonika Ahlawat	June, 2015 to Sept., 2026
17.	*External (ICAR-CABin)*	Comparative genome analysis of Indian chicken breeds.	**Reena Arora** (PI from 28.11.2020), Sonika Ahlawat and Rekha Sharma from June, 2022 (NBAGR) SB Lal (CCPI), DC Mishra, Md. Samir Farooqi & Sudhir Srivastava (IASRI)	April, 2020 to March, 2026.
18.	*External*	Exploring molecular basis of seasonal variation of seminal attributes and identification of potential biomarkers for selection of Buffalo bulls with quality semen.	**RS Kataria**, Manishi Mukesh, RAK Aggarwal and MS Dige (from April, 2021) NBAGR, **Pawan Singh**-PI-NDRI, Pardeep Kumar-PI-CIRB and Dharmender Kumar-CIRB and AK Tyagi-NDRI.	Sept., 2020 to Sept., 2024
19.	*External (DST-ASACODER)*	Characterizing milk colostrum of Ladakhi cows and yak for identification of biomolecules with therapeutic potential	**Manishi Mukesh**, Monika Sodhi, RS Kataria and S K Niranjan (NBAGR), A Mohanty (NDRI), M Sharma, (DRDO-DIPAS), Mh Zahid Ashraf (JMI), Sathees Rd (IISc) and V Bharti (DRDO-DIHAR).	January, 2021 to Dec., 2024.
20.	*International (IAEA-CRP, Contract No. 24756)*	Delineating genomic diversity, population structure and demographic dynamics in diverse native buffalo breeds of India.	**Monika Sodhi**, RS Kataria Manishi Mukesh and BP Mishra	Nov., 2022 to Oct., 2027
21.	*Institute*	Unravelling breed signatures behind variability susceptibility to Lumpy skin disease.	**Ravi Kumar Gandham ,** M Mukesh, B Mishra, Amod Kumar and BP Mishra NBAGR and Vikas Vohra (NDRI, Karnal)	July, 2023 to June, 2025.
22.	*External* (UCB, Govt. of Uttarakhand)	Biotechnological package for reducing new born mortality and optimizing age at puberty in Badri cattle and Pantja goat of Uttarakhand	**Monika Sodhi** and Manishi Mukesh	2023-2026
23.	*Externally funded-ILRI (9.40)*	Pangenome analysis and identification of Selection signatures for conservation of Red Jungle Fowl	Simmi Tomar, AK Tiwari, Jaydep Rokade (ICAR-CARI), **Ravi Kumar Gandham (ICAR-NBAGR),** Akhilesh Mishra (Pench Tiger Reserve)	April, 2023 – March, 2026
24.	*Externally funded-NASF (9.35)*	Deciphering the genetic basis of lower susceptibility of indigenous cattle to bovine anaplasmosis	**Sonika Ahlawat**, Reena Arora, Rekha Sharma, SKUAST-Anish Yadav, Rajesh Godhara	August, 2024 to March, 2027
25.	*Externally funded-NLM (9.36)*	Comparison of milk compositional and transcriptomic landscape of major and minor dairy species of India.	**Sonika Ahlawat**, Reena Arora, Rekha Sharma, Raja K.N. (ICAR-NBAGR), Vivek Sharma (ICAR-NDRI)	April, 2024 to March, 2027

S.No.	Project Type	Project title	Workers	Duration
NEH Projects				
26.	*Institute*	Survey and documentation of native animal genetic resources of NEH region- Mizoram.	**Monika Sodhi,** RS Kataria, SP Dixit, and N Shyamsana Singh (CVS &AH, Aizawl)	Oct., 2019 to Mar., 2024
27.	*Institute*	Survey and documentation of native animal genetic resources of NEH region- Arunachal Pradesh.	**SK Niranjan,** AK Mishra, Amod Kumar, Bina Mishra (from Jan., 2023) and Jaideep Kumar Singh (KVK, Tawang)	Oct., 2019 to Mar., 2024
28.	*Institute*	Survey and documentation of native animal genetic resources of NEH region- Nagaland	**DK Yadav** (PI from 31.10.2020), Anand Jain PI up to 31.10.2020), NK Verma (up to 31.8.20), MS Dige, Hiabe Zeliang and Mahak Singh (ICAR-RC for NEHR, Nagaland) from Oct.,2021	Oct, 2019 to Mar., 2024
Functional Group projects				
Functional Group-I				
29.	*Institute*	Identification and characterization of indigenous AnGR of Uttar Pradesh	**AK Mishra**, RS Gandhi (upto 30.04.2022) Reena Arora, HK Narula (from July, 2022), Avnish Kumar, Amod Kumar, PS Dangi and Avneesh Kumar (DUVASU Mathura)	August, 2021 to March, 2025
30.	*Institute*	Identification and characterization of indigenous Animal Genetic Resources of Uttarakhand.	**Amod Kumar**, AK Mishra, Reena Arora, Avnish Kumar,	July 2023 to March 2027
Functional Group-II				
31.	*Institute*	Survey and documentation of indigenous AnGR of Tamil Nadu & Kerala	**Raja KN**, RK Pundir and Sonika Ahlawat	August, 2021 to March, 2025
32.	*Institute*	Survey and documentation of indigenous AnGR of Andhra Pradesh and Telangana	**Sonika Ahlawat**, RK Pundir, Raja KN (NBAGR), R Vinoo and D. Sakaram	July, 2023 to March, 2026
Functional Group-III				
33.	*Institute*	Identification of indigenous Animal Genetic Resources of Maharashtra, Gujarat, Goa and Himachal Pradesh	**Sanjeev Singh**, Indrajit Ganguly, SP Dixit and SV Kuralkar (PGIVAS)	August, 2021 to July, 2025
Functional Group-V				
34.	*Institute*	Survey and documentation of native AnGR of Madhya Pradesh state	**SK Niranjan,** DK Yadav, Monika Sodhi, RS Kataria, Bina Mishra (from Jan., 2023)	August, 2021 to March, 2025.
35.	*Institute*	Identification, characterization, documentation and registration of non-descript animal and poultry genetic resources of Rajasthan.	**DK Yadav** and SK Niranjan	August, 2021 to March, 2026

S.No.	Project Type	Project title	Workers	Duration
36.	*Institute*	Characterization and documentation of farm Animal Genetic Resources of Chhattisgarh state.	**Monika Sodhi**, RS Kataria, SK Niranjan and DK Yadav, Bina Mishra (from Jan., 2023) (NBAGR), Asit Jain Kishore Mukharjee (CGKV, Durg), Rohini Pathak (DVS, Chhattisgarh)	August, 2021 to March, 2026
Functional Group-VI				
37.	*Institute*	Cataloguing and characterization of native non-descript Animal Genetic Resources of	**Dige MS**, M Mukesh, KV Singh, R Behl and SK Dash, C Mishra (OUAT) MK Padhi (DPR, Bhubaneshwar)	August, 2021 to March, 2024
38.	*Institute*	Cataloguing and characterization of native non-descript Animal Genetic Resources of Ladakh (UT).	**Karan Veer Singh**, M Mukesh, R Behl and MS Dige, Feroz Din Sheik (KVK, SKUAST-Leh	August, 2021 to March, 2025.
Functional Group-VII				
39.	*Institute*	Survey and documentation of indigenous Animal Genetic Resources of Andaman & Nicobar Islands.	**Bina Mishra**, RK Gandhan, Monika Sodhi, SK Niranjan (ICAR-NBAGR), Jai Sundar and T. Sujatha (ICAR-CIARI, Port Blair), PN Ananth, Abdul Gafoor (KVK, Lakshdweep)	July 2023 to March 2026

PUBLICATIONS

भाकृअनुप
ICAR

रा.प.आ.सं.ब्यूरो

Publication: Research papers

International

S. No.	Authors	Title	Journal	Volume/Issue	NAAS IF
1	Ahlawat S, Vasu M, Mir M, Singh MK, Arora R, Sharma R, Chhabra P, Sharma P	Molecular insights into Pashmina fiber production: comparative skin transcriptomic analysis of Changthangi goats and sheep	Mammalian Genome	35(2):1-10 https://doi.org/10.1007/s00335-024-10040-9	8.7
2	Ahlawat S, Sharma U, Chhabra P, Arora R, Sharma R, Singh KV, Vijh RK	Maternal genetic diversity and phylogenetic analysis of Indian riverine and swamp buffaloes: insights from complete mitochondrial genomes	Mammalian Genome	35(3):390-398 doi: 10.1007/s00335-024-10048-1	8.7
3	Ahlawat S, Sharma U, Niranjan SK, Chhabra P, Arora R, Sharma R, Singh KV, Vijh RK, Mehta SC	Unraveling the Maternal Heritage: Identifying the Complex Origins of Indigenous Indian Horse and Pony Breeds Through Mitochondrial Genome Analysis	Mammalian Genome	36(1):118-128 https://doi.org/10.1007/s00335-024-10089-6	8.7
4	Ahlawat S, Vasu M, Choudhary V, Arora R, Sharma R, Ayoub Mir M, Singh MK	Comprehensive evaluation and validation of optimal reference genes for normalization of qPCR data in different caprine tissues	Molecular Biology Reports	51(1):268 doi: 10.1007/s11033-024-09268-0. PMID: 38302649	8.80
5	Ahlawat S, Niranjan SK, Arora R, Vijh RK, Kumar A, Sharma U, Raheja M, Popli K, Yadav S & Mehta SC.	Advancing equine genomics: the development of a high density Axiom_Ashwa SNP chip for Indian horses and ponies	Functional & Integrative Genomics	24(6):195 doi: 10.1007/s10142-024-01482-0. PMID: 39441226	8.90
6	Arora R, Kumar H, Sharma U, Ahlawat S, Sharma R, Chhabra P, Sankhyan V, Vijh R K	Mapping genome-wide diversity and population dynamics in Indian chicken breeds for targeted conservation and breeding	British Poultry Science	65(6), 665–676 https://doi.org/10.1080/00071668.2024.2379968	8.0
7	Arora R, Kaur M, Kumar A, Chhabra P, Mir M, Ahlawat S, Singh MK, Sharma R, Gera R	Skeletal muscle transcriptomics of sheep acclimated to cold desert and tropical regions identifies genes and pathways accentuating their diversity	International Journal of Biometeorology	68(1) https://doi.org/10.1007/s00484-024-02708-3	9.20
8	Arora R, Ahlawat S, Sharma R, Chhabra P, Kaur M, Lal SB, Mishra DC, Farooqi Md. S, Srivastava S	Transcriptomics of pectoralis major muscles uncovers a footprint of enriched pathways in five diverse backyard chicken breeds of India	Gene Reports	36(5):101949 https://doi.org/10.1016/j.genrep.2024.101949	7.0

S. No.	Authors	Title	Journal	Volume/Issue	NAAS IF
9	Arora R, Malla WA, Tyagi A, Saxena S, Mahajan S, Sajjanar B, Gandham R, Tiwari AK	Transcriptome profiling of Canine Parvovirus 2 Nonstructural gene 1(CPV2. NS1) transfected 4T1 mice mammary tumor cells to elucidate its oncolytic effects	International Journal of Biological Macromolecules	281(Pt 4):136620 doi:10.1016/j. ijbiomac.2024.136620. Epub 2024 Oct 16. PMID: 39419151	14.20
10	Azam S, Sahu A, Pandey NK, Neupane M, Van Tassell CP, Rosen BD, Gandham RK, Rath SN, Majumdar SS	Constructing a draft Indian cattle pangenome using short-read sequencing	Communications Biology	8(1):605 doi: 10.1038/s42003-025-07978-0. PMID: 40223124; PMCID: PMC11994783	11.90
11	Bagiyal M, Parsad R, Ahlawat S, Gera R, Chhabra P, Sharma U, Arora R, Sharma R	Review on camel genetic diversity: ecological and economic perspectives	Mammalian Genome	35(4):621-632 https://doi.org/10.1007/s00335-024-10054-3	8.7
12	Dige MS, Gurao A, Singh LP, Chitkara M , Singh MK, Dass G, Verma AK, Pundir RK and Kataria RS	Transcriptomic analysis reveals molecular insights into lactation dynamics in Jakhrana goat mammary gland	BMC Genomics	25:874 https://doi.org/10.1186/s12864-024-10744-x	10.40
13	Gangwar M., Ahmad S. F., Ali A. B., Kumar A., Gaur G. K., & Dutt T.	Identifying low-density, ancestry-informative SNP markers through whole genome resequencing in Indian, Chinese, and wild yak	BMC Genomics	25(1), 1-16 https://doi.org/10.1186/s12864-024-10924-9	10.40
14	Gera R, Arora R, Chhabra P, Sharma U, Parsad R, Ahlawat S, Mir MY, Singh MK, Sharma R, Kumar R	Comparative transcriptome analyses of cardiac tissue reveals differential gene expression profiles in sheep in response to altitudinal adaptation	Small Ruminant Research	238(6):107330 https://doi.org/10.1016/j.smallrumres.2024.107330	7.80
15	Gera R, Arora R, Chhabra P, Sharma U, Parsad R, Ahlawat S, Mir MA, Singh MK and Kumar R.	Exploring transcriptomic mechanisms underlying pulmonary adaptation to diverse environments in Indian rams	Molecular Biology Reports	51(1):1111 doi: 10.1007/s11033-024-10067-w. PMID: 39485559	8.80
16	Goli Rangasai C, Kiyevi G Chishi, Ganguly I, Singh S, Dixit S P, Rathi P., Diwakar V, Limbalkar O M, Sukhija N, and Kanaka K K	Global and local ancestry and its importance: a review	Current Genomics	25, no. 4, 237-260. doi:10.2174/0113892029298909240426094055	7.8
17	Gurao A, Vasisth R, Kumari N, Chitkara M, Singh R, Mukesh M, Vohra V, Kumar S, Dige MS, Kataria RS	Identification of KIT gene transcript variants in white spotted river buffalo (Bubalus bubalis)	Animal Genetics	918-920 https://doi.org/10.1111/age.13484	8.40
18	Kaur H, Chitkara M, Mathai E, Gurao A, Vasisth R, Dige MS, Mukesh M, Sriranga KR, Singh P & Kataria RS	Polymorphism detection and characterization of sperm cells chromatin remodeling associated genes in Murrah buffalo	Tropical Animal Health and Production	56(8):318 https://doi.org/10.1007/s11250-024-04158-w	7.70

S. No.	Authors	Title	Journal	Volume/Issue	NAAS IF
19	Kar, D., Ganguly, I., Singh, S., Bhatia, A.K. and Dixit, S.P.	Genome-wide runs of homozygosity signatures in diverse Indian goat breeds	3 Biotech	14(3), p.81 https://doi.org/10.1007/s13205-024-03921-y	8.60
20	Karan M, Gurao A, Kumar A, Chitkara M, Gowane GR, Ahlawat S, Niranjan SK, Pundir RK, Arora R, Kataria RS and Dige MS	Genomic insights into high-altitude adaptation and evolutionary dynamics of Indian yaks in the Trans-Himalayan region	Conservation Genetics	26:49–62 https://doi.org/10.1007/s10592-024-01650-6	8.20
21	Karan M., Goli R C, Kiyevi G Chishi, Ganguly I, Dixit S P, Singh S, Choudhary S	Runs of Homozygosity decipher genetic diversity in cattle breed dwelling in the colder regions of the world	Cytogenetic and Genome Research	164, no. 3-4, 154-164. https://doi.org/10.1159/000541723	7.70
22	Kumar G, Gurao A, Vasisth R, Chitkara M, Singh R, Sriranga K R, Dige MS, Mukesh M, Singh P and Kataria RS	Genome-wide 5'-C-phosphate-G-3' methylation patterns reveal the effect of heat stress on the altered semen quality in Bubalus bubalis	Gene	906 (2024) 148233 https://doi.org/10.1016/j.gene.2024.148233	9.50
23	Kumar A., Aggarwal R. A. K., & Tantia M. S.	Deciphering genetic diversity in conserved cattle bulls to achieve sustainable development goals	Scientific Reports	14(1), 1-15. https://doi.org/10.1038/s41598-024-61542-0	10.60
24	Mahar K, Gurao A, Kumar A, Chitkara M, Gowane GR, Ahlawat S, Niranjan SK, Pundir RK, Arora R, Kataria RS & Dige MS.	Genomic Insights into High-Altitude Adaptation and Evolutionary Dynamics of Indian Yak Populations	Conservation Genetics	26(1):49-62 https://doi.org/10.1007/s10592-024-01650-6.	8.20
25	Mahar K, Gurao A, Kumar A , Singh LP, Chitkara M, Gowane GR, Ahlawat S, Niranjan SK, Pundir RK, Kataria RS and Dige MS	Genomic inbreeding analysis reveals resilience and genetic diversity in Indian yak populations	Gene	928 (2024) 148787 (https://doi.org/10.1016/j.gene.2024.148787	9.50
26	Panchariya DC, Dutta P, Ananya, Mishra A, Chawade A, Nayee N, Azam S, Gandham RK, Majumdar S, Kushwaha SK	Genetic marker: a genome mapping tool to decode genetic diversity of livestock animals	Frontiers in Genetics	15:1463474 doi:10.3389/fgene.2024.1463474. PMID: 39483851; PMCID: PMC11524813.	9.70
27	Parsad R, Bagiyal M, Ahlawat S, Arora R, Gera R, Chhabra P and Sharma U	Unraveling the genetic and physiological potential of donkeys: insights from genomics, proteomics, and metabolomics approaches	Mammalian Genome	36(1):10-24 https://doi.org/10.1007/s00335-024-10083-y	8.7
28	Purohit H, Pannu U, Sharma R, Kumar V, Vyas J and Harsh A	Dairy performance of Sanchori cattle	International Journal of Advanced Biochemistry Research	8(1S):973-976. DOI: 10.33545/26174693.2024.v8.i1Sm.488	5.29
29	Purohit H, Pannu U, Sharma R, Kumar V, Prasad S, Vyas J and Harsh A	Draught and reproductive performance of Sanchori male cattle	International Journal of Veterinary Sciences and Animal Husbandry	9(1):854-856. https://doi.org/10.22271/veterinary.2024.v9.i1l.102377-85	4.61

S. No.	Authors	Title	Journal	Volume/Issue	NAAS IF
30	Raja KN, Arora R ,Vijh RK, Sharma U, Raheja M, Sharma M, Maggon M & Ahlawat S.	Empowering canine genomics: Design and validation of a High-Density SNP array for Indian dogs.	Genome	68,1–12 https://doi.org/10.1139/gen-2024-0094.	9.10
31	Parsad R, Ahlawat S, Bagiyal M, Gera R, Chhabra P and Sharma U, Arora R and Sharma R	Cathelicidins in farm animals: Structural diversity, mechanisms of action, and therapeutic potential in the face of antimicrobial resistance	Veterinary Immunology and Immunopathology	279: 110866 DOI: 10.1016/j.vetimm.2024.110866	7.80
32	Parsad R, Ahlawat S, Bagiyal M, Arora R, Gera R, Chhabra P and Sharma U and Singh A	Climate resilience in goats: a comprehensive review of the genetic basis for adaptation to varied climatic conditions	Mammalian Genome	36(1):151-161 https://doi.org/10.1007/s00335-024-10101-z.	8.7
33	Surati U, Niranjan SK, Pundir RK, Koul Y, Vohra V, Gandham RK and Kumar A.	Genome-wide comparative analyses highlight selection signatures underlying saline adaptation in Chilika buffalo	Physiological Genomics	56: 609–620 https://doi.org/10.1152/physiolgenomics.00028	10.60
34	Vasisth R, Gurao A, Chitkara M, Kumar G, Sriranga KR, Mukesh M, Dige MS, Singh P, Aggarwal RAK and Kataria RS	Selection of reference genes for normalizing gene expression data across seasons in spermatozoa of water buffalo (*Bubalus bubalis*)	International Journal of Biometeorology	1397-1409 https://doi.org/10.1007/s00484-024-02675-9	9.20
35	Vasu V, Ahlawat S, Arora R and Sharma R	Deciphering the molecular drivers for cashmere/pashmina fiber production in goats: a comprehensive review	Mammalian Genome	36(1):162-182 https://doi.org/10.1007/s00335-025-10109-z	8.7
36	Vasu V, Ahlawat S, Chhabra P, Sharma U, Arora R, Sharma R, Mir MA and Singh MK	Genetic insights into fiber quality, coat color and adaptation in Changthangi and Muzzafarnagri sheep: A comparative skin transcriptome analysis	Gene	891: 147826 doi:10.1016/j.gene.2023.147826. Epub 2023 Sep 24	9.50
37	Vasu M, Ahlawat S, Choudhary V, Sharma R, Arora R, Sharma U, Chhabra P.	Selection of reliable reference genes for gene expression studies involving peripheral blood mononuclear cells in small ruminants.	Small Ruminant Research	234(1):107256 https://doi.org/10.1016/j.smallrumres.2024.107256	7.80
38	Vijh RK, Sharma U, Arora R, Kapoor P, Raheja M, Sharma R, Ahlawat S, Dureja V	Development and validation of the Axiom-MaruPri SNP chip for genetic analyses of domesticated old world camelids	Gene	921:148541 doi:10.1016/j.gene.2024.148541	9.50

National

S. No.	Authors	Title	Journal	Volume/Issue	NAAS IF
1	Ahmad S F, Kumar A , Tamilarasan K, Gangwar M aand Gaur G K	Transforming Indian cattle industry for building sustainable future	Indian Journal of Animal Genetics and Breeding	61-74. doi: https://doi.org/10.59317/hdx1x429	-
2	Kamal R, Chandran PC, Amitava Dey, Mishra AK, Sharma R, Kumari R and Das A	Comprehensive characterization of Indian native chicken breeds in Jharkhand: Exploring phenotypic, reproductive and behavioural traits	Journal of Livestock Biodiversity	13(1): 36-43.	-

3	Kumar S L, Singh R, Gurao A, Saini S, Vohra V, Niranjan S K, Sodhi M, Dash S K and Kataria R S	Genetic cryptic demographic mode shift analysis in buffaloes of Odisha using STR markers shows an absence of recent bottleneck	Journal of Livestock Biodiversity	12(1): 30-36.	
4	Mishra A.K., Kumar A, Arora R, Bhatia A K and Kumar A	Battisi goat: a lesser known goat population of northern India	Journal of Livestock Biodiversity	12(1). https://epubs.icar.org.in/index.php/JLB/article/view/157994	-
5	Nagarajan G, Kumar R, Yadav GS, Sharma R and Kumar A	From endangered to preserved: Biobanking of the Katchaikatti Black sheep through dermal fibroblast cryopreservation	Journal of Livestock Biodiversity	12 (1): 59-64.	-
6	Prakash V, Jyotsana B, Gautam P, Ahlawat S and Sahoo A	Climate resilience in livestock species of hot arid climatic regions of India	Journal of Livestock Biodiversity	13(1): 1-11.	-
7	Prasad S, Yadav S, Sharma R, Ahlawat S, Arora R, Raj M P and Venu R	Somatic cell conservation of the Punganur cattle: An Indian heritage breed	Journal of Livestock Biodiversity	12(1). https://epubs.icar.org.in/index.php/JLB/article/view/157987	-
8	Purohit P B, Raja K N, Nayee N G, Yadav A, Kachave M R and Kalairaj K	Investigating non-genetic factors impacting first lactation milk yield in Mehsana buffaloes	Indian Journal of Animal Genetics and Breeding	43(1, 2), 113-117. doi: https://doi.org/10.59317/342dq591	-
9	Singh R, Gurao A, Sriranga K R, Chitkara M, Sodhi M, Rajesh C and Kataria R S	Identification of transcription factor binding sites of HSP60 and HSP90B1 Genes' promoter in Bubalus bubalis	Indian Journal of Animal Genetics and Breeding	Vol 41-42. https://doi.org/10.59317/rg9cne27	-
10	Raja K. N, A. K. Mishra, S. K. Niranjan, B. P. Mishra.	Characterization, registration and gazette notification- new initiatives for recognizing native dog breeds	The Indian Journal of Animal Genetics and Breeding	Vol. 41-42 doi: https://doi.org/10.59317/5 pesb06	-
11	Sivalingam J, Niranjan S.K., Yadav D K, Singh S P, Singh P K and Singh A P	Physical characteristics of a new buffalo population "Dang" in Chambal region of Madhya Pradesh	Journal of Livestock Biodiversity	12(1): 25-26.	-
12	Vasu M, Ahlawat S, Chhabra P, Sharma U, Sharma R, Arora R, Mir M A and Singh M K	Identification of potential miRNA-mRNA regulatory networks contributing to Changthangi sheep hair follicle development	Journal of Livestock Biodiversity	12(1). https://epubs.icar.org.in/index.php/JLB/article/view/157990	-
13	Yadav D.K., Singh M., Dige M S and Zeliang H	Characteristics, management and production performance of 'Nagal' pig in tribal production system of North Eastern Hill region of India.	Journal of Livestock Biodiversity	13(1): 57-59.	-

Publication: Research Abstracts

S. No.	Authors	Title	Title of Event	Place/ Date
1	Amod Kumar, MS Dige, Reena Arora, SK Niranjan, Sonika Ahlawat, Rekha Sharma, KV Singh, Raja KN, Aneet Kour, Upasana Sharma, Vandana Dureja, Meenal Raheja, RK Vijh	Development and validation of high-density SNP array for Indian Yak populations	National Symposium on "Animal production systems and its role in sustainable use of AnGR" and XXI Annual Convention of SOCDAB-2024	NTR College of Veterinary Sciences, Gannavaram (SVVU), Andhra Pradesh on 15-16 February, 2024
2	Chitkara M., Gurao A., Poonia S., Dige M. S., Mukesh M., Kumar P., Singh P., Gandham R. K. & Kataria R. S.	Comparative analysis of Whole Genome Sequence data of Buffalo Bulls using different genetic variant calling tools	National Symposium on Technological Advancement and Their Application for Management of Native Animal Genetic Resources (AnGR)	Veterinary College, KVAFSU, Bengaluru on 21-22 January, 2025
3	Gandham R K	Genomic Analysis of Riverine Buffalo Breeds Using ddRAD-Seq	National Symposium of Indian Society for Buffalo Development on Innovative Approaches for Boosting Buffalo Productivity (ISBD-2024)	Department of Animal Genetics & Breeding College of Veterinary Science & Animal Husbandry, Kamdhenu. University, Anand 388001, during 16-18; December, 2024
4	Gandham R K	Cattle genome: Insights in Indian zebu	National Conference of Indian Society of Animal Genetics and Breeding (ISAGBCON) on "New Vistas in Harnessing Genetic Resources for Sustainable Animal Production" and XVIII Annual Convention of the Indian Society of Animal Genetics & Breeding (ISAGB)	Department of Animal Genetics & Breeding, Bihar Animal Sciences University, Patna on 21-22 November, 2024
5	Gandham R K	Pangenome of Buffalo: Scope and Utility	National Symposium of Indian Society for Buffalo Development on Innovative Approaches for Boosting Buffalo Productivity (ISBD-2024)	Department of Animal Genetics & Breeding College of Veterinary Science & Animal Husbandry, Kamdhenu. University, Anand 388001, during 16-18; December, 2024
6	Gandham R K	Molecular Genetics Research in Goat Breeding	International Conference on "Small Holders' Goat Production In Tropical Countries - Opportunities and Constraints" (ICGPT2024)	Post Graduate Research Institute of Animal Sciences (PGRIAS), Kattupakkam, TANUVAS, Chennai, Tamil Nadu on 8-9 August, 2024
7	Gandham R K	Heat Stress: The Interactome and Systems Biology	National Conference on "Advanced Physiological Strategies for Sustainable Livestock Production and Reproduction" by Animal Physiologists Association (APA)	ICAR-CSWRI, Avikanagar on 1-2 March, 2024
8	Amod Kumar, Mishra AK, Arora R, Kumar A, Dangi PS, Kumar B and Chauhan A.	A preliminary survey conducted in Bareilly and Lakhimpur districts uncovered a lesser – known equine population	National Symposium on Animal production systems and its role in sustainable use of AnGR	College of Veterinary and Animal Sciences, Gannavaram, Andhra Pradesh on 15- 16 February, 2024
9	Mahanthi Vasu, Sonika Ahlawat, Pooja Chhabra, Upasana Sharma, Reena Arora, Rekha Sharma, Ma Mir, MK Singh	Comparative skin transcriptome analysis of Changthangi and Muzzafarnagari sheep to understand adaptive genetic variations	National Symposium on "Animal production systems and its role in sustainable use of AnGR" and XXI Annual Convention of SOCDAB-2024	NTR College of Veterinary Sciences, Gannavaram (SVVU), Andhra Pradesh on 15-16 February, 2024

S. No.	Authors	Title	Title of Event	Place/ Date
10	Mahanthi Vasu, Sonika Ahlawat, Reena Arora, Rekha Sharma, MA Mir, MK Singh	Identification and validation of stable reference genes for quantitative PCR in small ruminant populations under high altitude hypoxic and arid condition"	International Conference of Indian Society for Sheep and Goat Production and Utilization (ISSGPUCON 2024) on "Recent trends and future perspectives to improve the performance, health and welfare of small ruminants under changing climate scenario"	Rajiv Gandhi Institute of Veterinary Education and Research (RIVER), Puducherry on 24 - 26 April, 2024
11	Mahanthi Vasu, Sonika Ahlawat, Vikas Choudhary, Rekha Sharma, Reena Arora	Assessment of reference gene stability for accurate qPCR normalization in sheep and goat peripheral blood mononuclear cells	National Symposium on "Animal production systems and its role in sustainable use of AnGR" and XXI Annual Convention of SOCDAB-2024	NTR College of Veterinary Sciences, Gannavaram (SVVU), Andhra Pradesh on 15-16 February, 2024
12	Mahar K., Gurao A., Kumar A., Chitkara M., Gowane G. R., Ahlawat S., Niranjan S. K., Pundir R. K., Arora R., Kataria R. S. & Dige M. S.	Genomic insights into high-altitude adaptation and evolutionary dynamics of Indian yaks in the Trans-Himalayan region	National Conference ISAGBCON 2024: New Vistas in Harnessing Genetic Resources for Sustainable Animal Production	Department of Animal Genetics & Breeding, Bihar Animal Sciences University, Patna on 21-22 November, 2024
13	Meenakshi Chitkara, Harsimran Kaur, Rashi Vasisth, Karpenahalli Ranganatha Sriranga, Ankita Gurao, Karan Mahar, Mahesh Shivanand Dige, Rajiv Anand Kumar Aggarwal, Manishi Mukesh, Pradeep Kumar, Pawan Singh and Ranjit Singh Kataria	Heat stress induced mitochondrial copy number and gene expression changes in the spermatozoa of buffalo bulls	Poster presented during XVIII ISAGB National Conference on "New Vistas in Harnessing Genetic Resources for Sustainable Animal Production"	Department of Animal Genetics & Breeding, Bihar Veterinary College, Bihar Animal Sciences University, Patna-800014 on 21-22 November, 2024
14	Mishra AK, Arora R, Kumar A, Kumar A, Dangi PS, Kumar B and Chauhan AK	"Rampur Black: A lesser-known sheep population of Uttar Pradesh	National Symposium on Animal production systems and its role in sustainable use of AnGR	College of Veterinary and Animal Sciences, Gannavaram, Andhra Pradesh on 15- 16 February, 2024
15	Nagarajan G, Kumar Rajiv, Yadav GS, Sharma R, Misra SS, Kumar A	Generation and genetic characterization of fibroblast cells derived from the skin of Katchaikatti black sheep	International conference on "Recent trends and future perspectives to improve the performance, health and welfare of small ruminants under changing climate scenario" & ISSGPUCON 2024	Rajiv Gandhi Institute of Veterinary Education and Research (RIVER), Puducherry on 24 - 26 April, 2024
16	Nidhishree N. S., Pundir R. K., Choudhary A., Pandey B., Dige M. S., Vohra V. & Kumar A.	Deciphering signatures of selection for draughtability in Hallikar cattle	National Conference ISAGBCON 2024: New Vistas in Harnessing Genetic Resources for Sustainable Animal Production	Department of Animal Genetics & Breeding, Bihar Animal Sciences University, Patna on 21-22 November, 2024
17	Poonia S., Gurao A., Chitkara M., Mahar K., Kumar A., Gowane G. R., Kataria R. S. & Dige, M. S.	Optimizing bin size for enhanced detection of Copy Number Variations in the Yak genome using Cnvpytor	National Symposium on Technological Advancement and Their Application for Management of Native Animal Genetic Resources (AnGR)	Veterinary College, KVAFSU, Bengaluru on 21-22 January, 2025
18	Prashanthini S R, Ganguly I, Singh S, Bhatia A. K., Vijh R.K., Arora R., Ahlawat S. and Dixit S.P.	Deciphering distinct adaptation and production signatures through whole-genome re-sequencing in Indian goat breeds of tropical and temperate ecosystems	International Conference of Indian Society for Sheep and Goat Production and Utilization (ISSGPUCON 2024)	Rajiv Gandhi Institute of Veterinary Education and Research (RIVER), Puducherry on 24 - 26 April, 2024

S. No.	Authors	Title	Title of Event	Place/ Date
19	Raja K N, Sonika Ahlawat and R K Pundir	Characterization of Molai Aadu Goat of Tamil Nadu	National Symposium on "Animal production systems and its role in sustainable use of AnGR" and XXI Annual Convention of SOCDAB-2024	NTR College of Veterinary Sciences, Gannavaram (SVVU), Andhra Pradesh on 15-16 February, 2024
20	Raja K N, Sonika Ahlawat and R K Pundir	Socio-economic utility a Molai Aadu Goat of Tamil Nadu	International Conference on "Recent Trends and Future Perspectives to improve the Performance, Health and Welfare of Small Ruminants under Climate change Scenario"	Rajiv Gandhi Institute of Veterinary Education and Research (RIVER), Puducherry on 24-26 April, 2024
21	Raja KN, Mishra AK, Pundir RK and Mishra BP	Characterization and documentation of indigenous dog population	National Symposium on Animal production systems and its role in sustainable use of AnGR	College of Veterinary and Animal Sciences, Gannavaram, Andhra Pradesh on 15- 16 February, 2024
22	Raja KN, Sonika Ahlawat and RK Pundir	Characterization of Molai Aadu Goat of Tamilnadu	XXI SOCDAB Annual Convention and National Symposium: Animal Production Systems and its Role in Sustainable use of AnGR	NTR College of Veterinary Science, Gannavaram, Andhra Pradesh on 15-16 February, 2024
23	Rashi Vasisth, Ankita Gurao, Meenakshi Chitkara, Gautam Kumar, Karpenahalli Ranganatha Sriranga, Mahesh Shivanand Dige, Manishi Mukesh, Pradeep Kumar, Pawan Singh, Ravi Kumar Gandham and Ranjit Singh Kataria	Spermatozoal transcriptome analysis indicates mitochondrial gene expression key to heat stress induced semen quality changes in buffalo bulls	International conference on Intra- and Inter-Cellular Regulatory Systems (IICRS-2024)	School of Life Sciences, University of Hyderabad on 18 – 21 November, 2024
24	Reena Arora, Sonika Ahlawat, Rekha Sharma, Pooja Chhabra, Mandeep Kaur	Exploring the transcriptomic underpinning of the phenotypic diversity of indigenous chicken breeds	National Symposium on "Animal production systems and its role in sustainable use of AnGR" and XXI Annual Convention of SOCDAB-2024	NTR College of Veterinary Sciences, Gannavaram (SVVU), Andhra Pradesh on 15-16 February, 2024
25	Reena Kamal, PC Chandran, Amitava Dey, Rekha Sharma, AK Mishra, Rajni Kumari, Shanker Dayal, PK Ray, Manoj Tripathi, Kamal Sarma, Anup Das	Phenotypic characterization and behavioural traits of native chicken of Chota nagpur plateau, Jharkhand	National Conference of Indian Society of Animal Genetics and Breeding (ISAGBCON-2024) on "New Vistas in Harnessing Genetic Resources for Sustainable Animal Production" and XVIII Annual Convention of ISAGB	Department of Animal Genetics & Breeding, Bihar Veterinary College, Bihar Animal Sciences University Patna, Bihar on 21-22 November, 2024
26	Rekha Sharma, Shalini Yadav, Sushma Prasad, Sonika Ahlawat, Reena Arora, Reena Kamal, PC Chandran	Initiative on cryo-conserving somatic cells of indigenous livestock germplasm of Bihar	National Conference of Indian Society of Animal Genetics and Breeding (ISAGBCON-2024) on "New Vistas in Harnessing Genetic Resources for Sustainable Animal Production" and XVIII Annual Convention of ISAGB	Department of Animal Genetics & Breeding, Bihar Veterinary College, Bihar Animal Sciences University Patna, Bihar on 21-22 November, 2024
27	Rekha Sharma, Sonika Ahlawat, Reena Arora	Livestock sector: key to achieving effective sustainable development goals (SDGs)	National Conference of Indian Society of Animal Genetics and Breeding (ISAGBCON-2024) on "New Vistas in Harnessing Genetic Resources for Sustainable Animal Production" and XVIII Annual Convention of ISAGB	Department of Animal Genetics & Breeding, Bihar Veterinary College, Bihar Animal Sciences University Patna, Bihar on 21-22 November, 2024

S. No.	Authors	Title	Title of Event	Place/ Date
28	Rekha Sharma, Sushma Prasad, Shalini Yadav, Sonika Ahlawat, Reena Arora, RAK Aggarwal	Creating in vitro repository of native livestock of Indian challenged agro-ecosystems - a step towards achieving Sustainable Development Goals	National Conference on Achieving Sustainable Development Goals in Challenged Agro-Ecosystems (ASDGCAE-24)	ICAR-Central Arid Zone Research Institute, Jodhpur on 3-5 March, 2024
29	Ritika Gera, Pooja Chhabra, Reena Arora, Rajesh Kumar, Mandeep Kaur, Ram Parsad, Mohsin Ayoub Mir, Manoj Kumar Singh, Sonika Ahlawat, Rekha Sharma	Comparative transcriptomics of heart tissue reveals insights into adaptation of Changthangi sheep to high altitudes of Ladakh	International Conference on Research and Innovation for Sustainable Development ICRISD-2024	University Institute of Engineering & Technology, M.D.U, Rohtak on 04-05 May, 2024
30	Shahi BN, Kumar S, Kumar D, Mishra AK and Kumar A	Kow debar: A lesser known sheep breed of Uttarakhand	National Symposium on Animal production systems and its role in sustainable use of AnGR	College of Veterinary and Animal Sciences, Gannavaram, Andhra Pradesh on 15- 16 February, 2024
31	Shalini Yadav, Rekha Sharma, Sushma Prasad, Sonika Ahlawat, Reena Arora	Somatic cell conservation: symphony of SDG target and indigenous livestock conservation	International Conference on Research and Innovation for Sustainable Development ICRISD-2024	University Institute of Engineering & Technology, Maharshi Dayanand University, Rohtak on 04-05 May, 2024
32	Singh K. V., Dige M. S., Mukesh M., Dorjay T., Sheikh F. & Mishra B. P.	Malra Goat and Malluk Sheep: Ladakh's Native Livestock	National Symposium on Technological Advancement and Their Application for Management of Native Animal Genetic Resources (AnGR)	Veterinary College, KVAFSU, Bengaluru on 21-22 January, 2025
33	Sushma Prasad, Rekha Sharma, Shalini Yadav, Sonika Ahlawat, Reena Arora	Imperative role of the livestock sector in accomplishing Sustainable Development Goals	International Conference on Research and Innovation for Sustainable Development ICRISD-2024	University Institute of Engineering & Technology, Maharshi Dayanand University, Rohtak on 04-05 May, 2024
34	Sushma Prasad, Rekha Sharma, Shalini Yadav, Sonika Ahlawat, Reena Arora, Reena Kamal, PC Chandran	Growth and proliferation of livestock dermal fibroblasts pre and post-long-term cryopreservation	National Conference of Indian Society of Animal Genetics and Breeding (ISAGBCON-2024) on "New Vistas in Harnessing Genetic Resources for Sustainable Animal Production" and XVIII Annual Convention of ISAGB	Department of Animal Genetics & Breeding, Bihar Veterinary College, Bihar Animal Sciences University Patna, Bihar on 21-22 November, 2024
35	Utsav Surati, Saket K Niranjan, RK Pundir, Ymberzal Koul, Ranjit Singh Kataria, Vikas Vohra, Ajay Kumar Dang, Sushant Kumar Dash, and Amod Kumar	Kidney Transcriptome Profiling Revealed Genes and Molecular Pathways Related to Saline Adaptation in Chilika Buffalo	National Symposium of Indian Society for Buffalo Development on Innovative Approaches for Boosting Buffalo Productivity (ISBD-2024)	Department of Animal Genetics & Breeding College of Veterinary Science & Animal Husbandry, Kamdhenu. University, Anand 388001, during 16-18; December, 2024
36	Utsav Surati, Saket K Niranjan, RK Pundir, Ymberzal Koul, Vikas Vohra, and Amod Kumar	Comprehensive whole genome analysis unravels QTLs under selection in Indian native riverine buffalo	National Symposium of Indian Society for Buffalo Development on Innovative Approaches for Boosting Buffalo Productivity (ISBD-2024)	Department of Animal Genetics & Breeding College of Veterinary Science & Animal Husbandry, Kamdhenu. University, Anand 388001, during 16-18; December, 2024

Other Scientific Publications

Review Articles

S. No.	Title	Authors	Details
1	Omics approaches to understand impact of heat stress on semen quality and fertility in bovines	Meenakshi Chitkara, Ankita Gurao, Harsimran Kaur, Mahesh Shivanand Dige, Monika Sodhi, Manishi Mukesh, Ranjit Singh Kataria (2025)	Animal Reproduction Science :274, 107786, https://doi.org/10.1016/j.anireprosci.2025.107786
2	Review on camel genetic diversity: ecological and economic perspectives	Bagiyal M, Parsad R, Ahlawat S, Gera R, Chhabra P, Sharma U, Arora R & Sharma R	Mamm Genome doi: 10.1007/s00335-024-10054-3
3	Unraveling the genetic and physiological potential of donkeys: insights from genomics, proteomics, and metabolomics approaches	Parsad R, Bagiyal M, Ahlawat S, Arora R, Gera R, Chhabra P & Sharma U	Mamm Genome doi: 10.1007/s00335-024-10083-y
4	Cathelicidins in farm animals: Structural diversity, mechanisms of action, and therapeutic potential in the face of antimicrobial resistance	Parsad R, Ahlawat S, Bagiyal M, Gera R, Chhabra P, Sharma U, Arora R & Sharma R.	Vet ImmunolImmunopathol. 279:110866. doi: 10.1016/j.vetimm.2024.110866
5	Climate resilience in goats: a comprehensive review of the genetic basis for adaptation to varied climatic conditions	Parsad R, Ahlawat S, Bagiyal M, Arora R, Gera R, Chhabra P, Sharma U & Singh A.	Mamm Genome doi: 10.1007/s00335-024-10101-z
6	Genetic Marvels: Exploring the Genetics Behind Heterochromia in Companion animals	Barkathullah N, Alimudeen S, and Bina Mishra	"The Science world", Nov., 2024 Vol4(11)5162-5165
7	Ancient DNA and the Genetic History of Livestock: Unlocking the Past	Ravi Kumar Gandham, Manoj Kumar Goud Pyatla, Narasimha Tanuj Gunturu	Trends in Agriculture Science (Vol. 3, Number 11, pp. 2282–2284), https://doi.org/10.5281/zenodo.14206168
8	The Genetics of Taste: Why We Crave Certain Foods	Ravi Kumar Gandham, Manoj Kumar Goud Pyatla, Narasimha Tanuj Gunturu	The Science world a Monthly e magazine (Vol. 4, Number 11, pp. 5044–5046). https://doi.org/10.5281/zenodo.14098447
9	Machine Learning for Animal Breeding	Ravi Kumar Gandham, Narasimha Tanuj Gunturu and Manoj Kumar Goud Pyatla	The Science world a Monthly e magazine (Vol. 4, Number 8, pp. 2765–2768). https://doi.org/10.5281/zenodo.13624576
10	Telomere-To-Telomere (T2t) Genome Assemblies for Livestock and Poultry	Ravi Kumar Gandham, Narasimha Tanuj Gunturu and Manoj Kumar Goud Pyatla	The Science world a Monthly e magazine (Vol. 4, Number 8, pp. 2758–2760). https://doi.org/10.5281/zenodo.13624220
11	Ancestry informative markers: a foundation for unravelling genetic ancestry and population structures.	Akanksha Chaudhary, Nidhishree N.S., Rakesh Kumar Pundir and Amod Kumar	Journal of Livestock Biodiversity, 12(1), 1-7.

Technical Articles and Lead Papers

S. No.	Title	Authors	Details
1	Genetic characterization and diversity analysis of native AnGR using candidate gene approach	Kataria R. S., Dige M. S., Gurao A., Sodhi M., & Mukesh M.	In training manual on Characterization, Registration, and Conservation of Native AnGR. ICAR-NBAGR, Karnal & Veterinary Officers Training Institute, Bhubaneswar. Sponsored by Fisheries & Animal Resources Development Department (FARD), Government of Odisha.
2	Somatic cell banking: An effective ex-situ conservation tool	Sharma R, Ahlawat S and Arora R	In training manual on "Characterization, registration, and conservation of native animal genetic resources" published by ICAR-NBAGR, Karnal. Pp 59-64. ISBN:978-93-83537-52-5, pp.59-64
3	Genetic characterization and diversity analysis of native AnGR using microsatellite and mitochondrial markers	Arora R, Ahlawat S and Sharma R	In training manual on "Characterization, registration, and conservation of native animal genetic resources" published by ICAR-NBAGR, Karnal. Pp 73-83

S. No.	Title	Authors	Details
4	Practical demonstration of marker data analysis in genetic characterization and diversity assessment	Ahlawat S, Arora R and Sharma R	In training manual on "Characterization, registration, and conservation of native animal genetic resources" published by ICAR-NBAGR, Karnal. Pp 84-88
5	Genetic characterization and diversity analysis of livestock using molecular markers	Ahlawat S, Sharma R and Arora R	In Training book/ manual on "Characterization, Documentation and Sustainable Utilization of Indigenous Livestock and Poultry Genetic Resources" to be published by ICAR-NBAGR, Karnal in collaboration with MANAGE, Hyderabad
6	Ecosystem Services for Sustainable Utilization of Native Animal Genetic Resources (AnGR)	Bina Mishra	MANAGE sponsored online Training Programme on Characterization, Documentation and Sustainable Utilization of Indigenous Livestock and Poultry Genetic Resources, 27-29 November 2024.
7	Ecosystem Services for Sustainable Utilization of Native Animal Genetic Resources (AnGR)	Bina Mishra	Capacity building training course for field veterinary officers of Odisha state. 05-09 August 2024 and 19-23 August 2024.
8	Protection and Recognition of Indigenous Animal Genetic Resources –Registration of New Breeds	Pundir RK	XXI SOCDAB Annual Convention and National Symposium: Animal Production Systems and its Role in Sustainable use of AnGR held on February 15-16, 2024 at NTR College of Veterinary Science, Gannavaram, Andhra Pradesh
9	Genomic selection in dairy animals: its status and future prospects	Pundir RK and Kumar A	XVIII Annual Convention of ISAGB and National Conference on New Vistas in Harnessing Genetic Resources for Sustainable Animal Production held on November 21-22, 2024 at BASU, Patna
10	Genomic approaches for the Conservation of Animal Genetic Resources	Pundir RK and Kumar A	XXII Annual Convention of the Society of Conservation and Development of Animal Breeding (SOCDAB) on National Symposium on Technological Advancement and their Application for Management of Native Animal Genetic Resources (AnGR) held on January 21-22, 2025 at the Veterinary College, KVAFSU, Hebbal, Bengaluru, Karnataka on January 21-22, 2025
11	Genetic characterization and diversity analysis of native AnGR using candidate gene approach.	Kataria R. S., Dige M. S., Gurao A., Sodhi M. & Mukesh M.	In Characterization, Registration, and Conservation of Native Animal Genetic Resources
12	Animal Genetic Resources in India: Way forward for its sustainable management.	Mishra BP and Niranjan SK (2024)	In Compendium: New Vistas in Harnessing Genetic Resources for Sustainable Animal Production, ISAGB National Conference, BASU Patna, November 21-22, 2024), 1
13	Animal Genetic Resources Management in India: With special reference to NEH region.	Mishra BP and Niranjan SK	In Compendium: Managing Agro-Biodiversity in North Eastern India. National Conference (NCMAN-2024), ICAR-Research Complex for NEH Region, Umiam. 23-25 October, 2024; 94-106
14	Achieving Sustainable Development Goals in Challenged Agro-Ecosystems	Dr. Rekha Sharma	In ASDGCAE-24 Conference; ICAR-Central Arid Zone Research Institute, Jodhpur; March 3-6, 2024
15	The trajectory of small ruminants' genomics in India	Dr. Sonika Ahlawat Dr. Reena Arora Dr. Rekha Sharma	In International Conference of the Indian Society for Sheep and Goat Production and Utilization (ISSGPU) on "Recent trends and future perspectives to improve the performance, health and welfare of small ruminants under changing climate scenario. Rajiv Institute of Veterinary Education and Research (RIVER), Puducherry April 24-26, 2024
16	Unlocking genomic potential of Indian goats: towards enhanced production,	Dr. Reena Arora Dr. Sonika Ahlawat Dr. Rekha Sharma	In National Seminar on Policy and Strategies for Indian Goat Sector in 'Amrit Kaal' ICAR-Central Institute for Research on Goats (CIRG), Mathura, in collaboration with Department of Animal Husbandry and Dairying, New Delhi19th November 2024
17	Genomic insights into Indian buffaloes using contemporary approaches"	Dr. Sonika Ahlawat	Indian Society for Buffalo Development (ISBD) Innovative Approaches for Boosting Buffalo Productivity (16th to 18th December 2024).

S. No.	Title	Authors	Details
18	Unraveling Maternal Lineages and Genetic Diversity in Indian Livestock: Insights from Mitochondrial DNA Analyses	Dr. Sonika Ahlawat	National Symposium on Unlocking the Potential of Veterinary Biochemistry and Biotechnology for Food and Nutrition Security (SVBBICON-2024) College of Veterinary Science and Animal Husbandry, Mathura December 20-21, 2024

Popular article

S. No.	Title	Authors	Details
1	देसी भारवाही गोवंशी नस्लों के संरक्षण का महत्व	निधिश्री एन एस, आकांक्षा चौधरी, अमोद कुमार एवं राकेश कुमार पुंडीर	पशुधन प्रकाश, 15(4), 12-14
2	पशु आनुवंशिक संसाधनों के संरक्षण और प्रबंधन में नस्ल सोसाइटी की भूमिका	एम् एस डिगे, गोवाने जी आर एवं मिश्र ए के	पशुधन प्रकाश, पेज : 175 – 176
3	एंसेस्ट्री इंफॉर्मेटिव मार्कर्स का पशुधन में महत्व	आकांक्षा चौधरी, निधिश्री एन एस, अमोद कुमार, एवं राकेश कुमार पुंडीर	पशुधन प्रकाश, 15(17), 63-64
4	आत्मनिर्भर गौशाला - एक सार्थक पहल I	हितेश पुरोहित, रेखा शर्मा, उर्मिला पानु, सोनिका अहलावत, रीना अरोड़ा	खेती (ICAR), जुलाई 77(3): 35-36
5	विज्ञान और अनुसंधान में श्वान का अनमोल योगदान I	विजय कुमार, अजय सिंह, मोनिका शर्मा, रितिका गेरा, उपासना शर्मा, पूजा छाबड़ा, रेखा शर्मा एवं सोनिका अहलावत	पशुधन प्रकाश 15: 8-11
6	याकदूध : स्वस्थ्य ,पौषण और हिमालीय संस्कृति का अनमोल स्त्रोत	विजय कुमार, राम प्रसाद, अजय सिंह, मीना बगियाल, मोनिका शर्मा, रीना अरोड़ा एवं सोनिका अहलावत	पशुधन प्रकाश 15
7	सतत् विकास लक्ष्यों की प्राप्ति में पशुधन का योगदान: एक समग्र दृष्टिकोण I	शालिनी यादव, सुषमा प्रसाद, रेखा शर्मा, सोनिका अहलावत एवं रीना अरोड़ा	पशुधन प्रकाश 15: 26-34

Book Chapters

S. No.	Title	Author	Publication
1	Selection signatures in small ruminant genome: Concepts and potential for improving performance.	Indrajit Ganguly, Nidhi Sukhija, Kanaka KK, Subrata Koloi, Sanjeev Singh and S P Dixit	Genetic Tools for Improving Livestock Performance ISBN: 9788119103041
2	Selection Signatures Underlying Meat Production in Livestock Species	Amod Kumar, Nidhishree N S and Utsav Surati	Biotechnological interventions in Meat Science. Pages 1-330, Elite Publishing House, New Delhi
3	Science and technology innovations in animal biochemistry	Kaith S, Nikhil KC, Priyadarsini S, Loat S, Maheswarappa N, Kumar A and Ahlawat S	in the book "Research and technology advancements in Agriculture. ICAR-NAARM, Hyderabad

Book/Compendium/ Monograph/Technical Bulletin/Training Manual

S. No.	Type of Publication	Title	Author	Publication Details
1	Training Manual	Characterization, Registration, and Conservation of Native Animal Genetic Resources	Mukesh M., Dige M.S., Sodhi M., Mishra B.P	Training manual conducted by ICAR-NBAGR, Karnal and Veterinary officers training institute, Bhubaneswar sponsored by Fisheries & amp; Animal Resources Development Department (FARD), Government of Odisha. ISBN: 978-93-83537-52-5 pages 183
2	Monograph	Ladakhi Cattle: A Unique Animal Genetic Resource Adapted to High Altitude of Leh-Ladakh	M Mukesh, M Sodhi, RS Kataria, SK Niranjan, RK Pundir, Amarjeet, Parvesh Kumari, Preeti Verma, Ankita Sharma, Arjava Sharma, BP Mishra; VK Bharti, Arup Giri, Prabhat Kumar, Bhuvnesh Kumar, OP Chourasia; M. Iqbal, S Rabgais, S Thakchos, T Dorjey	Published by ICAR-NBAGR, Karnal

S. No.	Type of Publication	Title	Author	Publication Details
3	Book	A Ready Reckoner: 21st Livestock Census Animal Breeds	Niranjan SK, Raja KN, Singh Sanjeev, Ganguly I, Mishra A K, Dixit S P, Pundir RK and Mishra BP	Published by Govt. of India, AH Department, pp- 336. ISBN: 978-93-83537616, Document No 139, October 2024.
4	Report	Project Coordinators report on Network Project on AnGR	Mishra B P and Mishra AK	Published by ICAR- NBAGR Karnal. Pp: 44
5	E-Book	REAL-TIME PCR A Practical Approach	Edited by Ravi Kumar Gandham, Bishnu Prasad Mishra, Bina Mishra and Tanuj Gunturu	ISBN: 978-93-83537- 85-3
6	E-Book	RNA-SEQ DATA ANALYSIS A Ready Reference	edited by Ravi Kumar Gandham, Bishnu Prasad Mishra, Bina Mishra	E-Book. ISBN: 978-93-83537-84-
7	E-Book	VARIANT CALLING - A Complete Guide to GATK pipeline	edited by Ravi Kumar Gandham, Bishnu Prasad Mishra, Bina Mishra and Manoj Kumar Goud Pyatla	E-Book. ISBN: 978-93-83537-83-9
8	Technical Bulletin	Ladakhi Cow Milk – Unique Attributes and Benefits	M. Mukesh, M. Sodhi, R.S. Kataria, Amarjeet, S.K. Niranjan, M.S. Dige, D. Sheokand, A. Kumar, V. Garg, K.V. Singh, B.P. Mishra, S. Kumar, J.K. Kaushik, M. Sharma, S. Gupta, N. Sethy, M.Z. Ashraf, A. Sultan, S.C. Raghavan, V.K. Bharti, O.P. Chourasia, M. Iqbal, S. Rabgais, T. Dorjay, and M. Ismail	Published by the Director, ICAR-NBAGR. (ISBN No.: 978-93-83537-87-7)
9	Technical Bulletin	Animal Genetic Resources (AnGR) of Ladakh (UT)	M. Mukesh, S.K. Niranjan, M.S. Dige, K.V. Singh, M. Sodhi, R.S. Kataria, K.N. Raja, R. Behl, B.P. Mishra, V.K. Bharti, B. Kumar, O.P. Chourasia, M. Iqbal, T. Dorjay, S. Rabgais, S. Thakchos, M. Ismail, T. Morup, T. Namgyal, T. Lamchung, I. Hussain, and F.D. Sheikh	Published by the Director, ICAR-NBAGR. (ISBN No.: 978-93-83537-86-0)
10	Technical Bulletin	Double-Humped (Bactrian) Camel of Ladakh, India	Manishi Mukesh, Saket K Niranjan, Karan Veer Singh, Mahesh S Dige, Monika Sodhi, Ranjit S Kataria, BP Mishra, Vijay K Bharti, OP Chourasia, M Iqbal, Stanzin Rabgais, Tsewang Dorjey, Mohd Ismail	Published by the Director, ICAR-NBAGR. (ISBN No.:978-93-83537-53-2)
11		Yak Genetic Resources of India: Ladakhi Yak	Niranjan SK, Behl R, Mukesh M, Kataria RS, Jayakumar S, Bharti VK, Iqbal M, Mishra BP	Published by ICAR-National Bureau of Animal Genetic Resources. Pp 44. ISBN: 978-93-83537-44-0
12		Donkey Genetic Resources of India: Ladakhi Donkey.	Niranjan SK, Behl R, Mukesh M, Bharti VK, Iqbal M, Mishra BP (2024)	Published by ICAR-National Bureau of Animal Genetic Resources. Pp36. ISBN: 978-93-83537-45-7

Accessions Obtained

1. Dryad Submission "Spermatozoa RRBS data: Post-Bismark aligned files extracted for the methylation call for every single C in the CpG context of sperm cells of Murrah buffalo bulls under heat stress." 2024. Assigned a unique DOI (doi:10.5061/dryad.ns1rn8q1j)

2. Milk somatic cell transcriptome of Jakhrana and Jamunapari goat submitted and published in NCBI (Accession Bioproject: PRJNA1094184). SRA Accession: SRX24107564 (Transcriptome Jamunapari), SRA Accession: SRX24107563 (Transcriptome Jamunapari), SRA Accession: SRX24107562 (Transcriptome Jamunapari), SRA Accession: SRX24107561 (Transcriptome Jakhrana), SRA Accession: SRX24107560 (Transcriptome Jakhrana), SRA Accession: SRX24107559 (Transcriptome Jakhrana), SRA Accession: SRX24107558 (Transcriptome Jakhrana), SRA Accession: SRX24107557 (Transcriptome Jakhrana), SRA Accession: SRX24107556 (Transcriptome Jakhrana)

3. GCF_029378745.1 - NCBI RefSeq Assembly for Tharparkarcattle

Breed Calendars

Species
Cattle Breeds of India, Buffalo Breeds of India, Sheep Breeds of India, Goat Breeds of India, Poultry Breeds of India, Pig Breeds of India, Registered Breeds of other Livestock Species

Intellactual Property & Technology

- Copyright certificate received from Copyright Office, Govt of India on Design and development of web-based software “Kadak Express” for gene expression atlas of Kadaknath chicken. Registration no. SW-19784/2024 dated 04.12.2024 (Authors: Dr. Rekha Sharma, Dr. Reena Arora & Dr. Sonika Ahlawat, from ICAR-NBAGR).
- Technology PCR Based DNA Test for the Differentiation of Cattle and Buffalo Meat and Milk. was approved by ICAR- Dated 29-05-2024), Code and Name: 201541224307469 (Dr. RS Kataria).
- Youtube: https://www.youtube.com/@Gandhams_Classes & Github: https://github.com/GandhamShree online class modules were developed (Dr. Ravi Gandham).

NABL Accreditation for Genetic Testing Laboratory at ICAR-NBAGR

ICAR-NBAGR marked a major milestone with the NABL assessment and subsequent ISO 17025:2017 accreditation of its Genetic Testing Laboratory (GTL), achieved on May 17, 2024. The accreditation covers six genetic tests for cattle and buffalo, following an intensive assessment conducted from March 23-24, 2024. Recognized by the National Accreditation Board for Testing and Calibration Laboratories (NABL), this accreditation endorses the GTL’s competency in testing genetic diseases such as Bovine Leukocyte Adhesion Deficiency (BLAD), Citrullinemia, Factor XI Deficiency, and Deficiency of Uridine Monophosphate Synthase (DUMPS) in cattle, as well as A1A2 allele genotyping.

These accredited genetic tests are vital for the early identification of genetic disease carriers, especially in breeding males, enhancing the health and productivity of dairy animals. The newly accredited A1A2 allele genotyping, significant for milk value assessment and selective breeding for the A2 allele, exemplifies NBAGR’s dedication to advancing livestock genetics.

National Accreditation Board for Testing and Calibration Laboratories

NABL

CERTIFICATE OF ACCREDITATION

GENETIC TESTING LABORATORY

has been assessed and accredited in accordance with the standard

ISO/IEC 17025:2017

"General Requirements for the Competence of Testing & Calibration Laboratories"

for its facilities at

ICAR-NATIONAL BUREAU OF ANIMAL GENETIC RESOURCES, MAKRAMPUR, G.T. ROAD BY-PASS, KARNAL, HARYANA, INDIA

in the field of

TESTING

Certificate Number: TC-13682

Issue Date: 17/05/2024 Valid Until: 16/05/2026

This certificate remains valid for the Scope of Accreditation as specified in the annexure subject to continued satisfactory compliance to the above standard & the relevant requirements of NABL.
(To see the scope of accreditation of this laboratory, you may also visit NABL website www.nabl-india.org)

Name of Legal Entity: INDIAN COUNCIL OF AGRICULTURAL RESEARCH (ICAR)

Signed for and on behalf of NABL

N. Venkateswaran
Chief Executive Officer

Awards & Recognition

1. D.S. Balian Memorial Award (2024), was conferred to Dr. R.K. Pundir during 21st Annual Convention of SOCDAB and National Symposium held on February 15-16, 2024 at NTR College of veterinary Sciences, Gannavaram, Vijaywada, AP
2. Dr. A.K. Mishra was bestowed with Fellow of ISSGPU on 24 April, 2024.

Awards by the Society (Poster/Oral Presentation)

1. शालिनी यादव, सुषमा प्रसाद, रेखा शर्मा, सोनिका अहलावत एवं रीना अरोड़ा- "घुमंतू जातियाँ – पशु चारण क्षेत्र और पशुधन संपदा" लेख को हिंदी पत्रिका पशुधन प्रकाश के चौदहवें अंक में द्वितीय पुरस्कार प्राप्त हुआ |
2. Best Poster Award: Rashi Vasisth, Ankita Gurao, Meenakshi Chitkara, Gautam Kumar, Karpenahalli Ranganatha Sriranga, Mahesh Shivanand Dige, Manishi Mukesh, Pradeep Kumar, Pawan Singh, Ravi Kumar Gandham and Ranjit Singh Kataria (2024). On 'Spermatozoal transcriptome analysis indicates mitochondrial gene expression key to heat stress induced semen quality changes in buffalo bulls' in IICRS held at University of Hyderabad from 18 – 21 November 2024.
3. Best Poster Award (Second): Prasahanthini R, Ganguly I, Singh S, Bhatia AK, Vijh RK, Arora R, Ahlawat S and Dixit SP for Deciphering distinct adaptation and selection signatures through whole-genome resequencing in Indian goat breeds of temperate and tropical ecosystems. In ISSGPU International Conference during 24-26 April, 2024 at RIVER, Puducherry.
4. Best Paper Award: Bagiyal M, Ahlawat S, Arora R, Chhabra P, Sharma U, Gera R, Parsad R, Sharma R, Khatak S for Comparative Hepatic Transcriptomics of Aseel and Kadaknath Chickens Reveals Genetic and Metabolic Diversity. In the National Symposium (SVBBICON-2024)" on December 20-21, 2024 at DUVASU, Mathura.
5. Best Paper Award: Gera R, Arora R, Chhabra P, Sharma U, Parsad R, Ahlawat S, Bagiyal M, Mir MA, Singh MK, Kumar R for Transcriptomic Insights into Pulmonary Adaptation of Indian Sheep Breeds in Diverse Environments. In the National Symposium (SVBBICON-2024)" on December 20-21, 2024 at DUVASU, Mathura.
6. Best Poster Award: Parsad R, Ahlawat S, Arora R, Gera R, Bagiyal M, Chhabra P, Sharma U for Identification of selection signature contributing to high altitude adaptation in Changthangi goats. In the National Symposium (SVBBICON-2024)" on December 20-21, 2024 at DUVASU, Mathura.
7. Best Oral Presentation Award: Raja KN, AK Mishra, PK Pundir and BP Mishra. Characterization and Documentation of Indigenous Dog Populations. First in XXI SOCDAB Annual Convention and National Symposium held on February 15-16, 2024 at NTR College of Veterinary Science, Gannavaram, Andhra Pradesh, pp 58.
8. Best Oral Presentation Award (Third): Nidhishree NS, R K Pundir, Akanksha Choudhary, Bharati Pandey, MS Dige, Vikas Vohra, Amod Kumar*. Deciphering Signatures of Selection for Draughtability in Hallikar Cattle. In National Conference ISAGBCON 2024 at BASU Patna, during November 21-22, 2024.
9. Best Oral Presentation Award: Raja KN, A K Mishra, R K Pundir and BP Mishra for "Characterization and Documentation of Indigenous Dog Populations". In National Symposium SOCDAB-2024 at NTR College of Veterinary Sciences, Gannavaram (SVVU), Andhra Pradesh during 15-16 February, 2024.
10. Best Oral Presentation Award: Vasu V, Ahlawat S, Arora R, Sharma R, Mir MA and Singh MK for the presentation titled "Identification and validation of stable reference genes for quantitative PCR in small ruminant populations under high-altitude hypoxic and arid conditions" during International Conference of the Indian Society for Sheep and Goat Production and Utilization (ISSGPU) on "Recent trends and future perspectives to improve the performance, health and welfare of small ruminants under changing climate scenario" from 24th-26th April, 2024 at RIVER, Puducherry.

CAPACITY BUILDING

भाकृअनुप
ICAR

NBAGR
रा.प.आ.सं.ब्यूरो

Trainings in Livestock Census - 2024

21st Livestock Census (2024)

Government of India is presently conducting 21st Livestock Census. started in September 2024. The practice of Head-wise enumeration of all livestock and poultry being conducted every five years interval in our country is a unique framework in the world. The Livestock Census in India has more than 100 years of history. First Livestock Census was conducted in year 1919, by the Britishers, and so far, 20 livestock censuses have been conducted. The 19th Livestock Census (2013) had a special mark, as it initiated breed-wise animal data collection, for the first time in the country.

The Livestock Census data provide all kinds of information not only about the livestock species but also their keepers. A complete count of the livestock and poultry at a pre-defined reference point of time is carried out during the Census, periodically. Therefore, it is important for proper planning, formulation, implementation, and monitoring of programs to improve the livestock sector. Many of the development programs require real livestock numbers in any area for their further improvement. These may be allocation of funds, supply of germplasm for the breeding, conducting disease control and eradication, nutritional support, farmers support etc. Rationalized fund allocation is feasible only after the availability of real population data, in a region. It also provides information about the present demography of various livestock species as well its trends and patterns. Breed-wise Census, therefore, become important for monitoring of the indigenous breed diversity in the country and work as a primary source for identifying the breeds at risk. The data are important for fulfilling the United Nation's Sustainable Developmental Goal 2 (Zero Hunger), specifically Indicator 2.5, related to Animal Genetic Diversity preservation in the country.

The 21st Livestock Census is the largest enumeration in terms of total livestock population and number of breeds in the country. The Census is being conducted on 15 livestock species and three major poultry species, including 220 breeds registered by the Bureau along with other exotic breeds and their crosses with head-wise enumeration, under various categories. The 21st Livestock Census is to be conducted pan India during Sept-Dec, 2024 in all 36 states and UTs. This is first time, when the Census is conducted using Web based MobileApp. The Census would cover each household in rural and urban areas in all districts/ states in the country. First time, during this Census, animals under the pastoral system and their pastoralist communities, would also be enumerated.

Bureau's contribution in Census

Bureau is actively contributing to the upcoming 21st Livestock Census 2024, a significant national exercise that informs policy development and the strategic implementation of programs in the Animal Husbandry sector. For conducting the breed-wise Census; DAHD and NBAGR has conducted 11 Regional Trainings of the State and District Nodal Officers of all the states and UTs. Although, the enumeration of about six billion livestock and nine billion poultry is a herculean task and only one of its kind in the world; higher accuracy of the overall data in general and breed data in special of the Census is now much expected this time. In support of the census, NBAGR also provided critical

breed-related information to the Animal Husbandry Statistics Division, DAHD.

The Bureau's scientists attended the DAHD's Technical Committee-Livestock Census 2024 meetings held at New Delhi, on 9th January and May 15, 2024, ensuring that the breed-specific data aligns with the census requirements. The Director of the Bureau attended the Sensitization Meeting on 21st Livestock Census 2024 at Vigyan Bhawan, New Delhi chaired by Secretary, DAHD. The Director, ICAR-NBAGR has also made the presentation on the breeds to be covered in the Livestock Census and also briefed about Mission activities of the institute. The meeting was attended by the Animal Husbandry Commissioner, DAHD; Advisor (AHS), DAHD, Chief Secretaries/Secretaries/ Commissioners/ Directors of Animal Husbandry Departments of various states. A comprehensive workshop to strategize and empower the states and Union Territories for the preparation of 21st Livestock Census was conducted on 25th June, 2024 at Vigyan Bhawan, New Delhi by the DAHD. Sh. Rajiv Ranjan Singh Hon'ble Union Minister of Fisheries, Animal Husbandry and Dairying, GoI and Senior Vice-President of the ICAR inaugurated the Workshop. He emphasized over the importance of the Census for formulation of various policies and implementation of programs for livestock improvement. Prof. S P Singh Baghel and Sh. George Kurian; Hon'ble Ministers of State, Ministry of FAHD were also present on this occasion. Dr. B P Mishra, Director NBAGR presented the breed details of species covered in 21st Livestock Census in the workshop.

Bureau has attended a workshop on 'Pilot Survey for 21st Livestock Census 2024' held on 12th June, 2024 at Ziro, Arunachal Pradesh. Dr. B P Mishra, Director NBAGR and Dr SK Niranjan, Nodal Officer made the presentations for conducting Breed-wise census along with identifiable features of the registered breeds of the states under the survey.

Regional Trainings on Livestock Census 2024

Bureau participated in six 'Regional Trainings for "21st Livestock Census on software (mobile app/dash board) and Breeds' held for the training of the State and District Nodal officers involved in Livestock Census in various states. Bureau provided the trainings on the breeds included in the Livestock Census to all the Nodal Officers. The trainings were inaugurated by the Honorable Ministers of the Central & State Governments, Secretaries, Animal Husbandry Directors, Advisor AHS, Govt. of India and other officials of the DAHD.

List of Regional Trainings

S.N.	States	Date	Place	Scientist Award
1	Assam, Arunachal Pradesh, Sikkim and Meghalaya	10 July, 2024	Guwahati (Assam)	Dr. BP Mishra, Dr. Raja KN
2	Nagaland, Mizoram, Manipur and Tripura	12 July, 2024	Dimapur (Nagaland)	Dr. BP Mishra, Dr. Raja KN
3	Uttar Pradesh, Madhya Pradesh & Uttarakhand	16 July, 2024	Lucknow (UP).	Dr. AK Mishra, Dr. SK Niranjan
4	Odisha, West Bengal, Chhattisgarh, Jharkhand and Bihar	20 July, 2024	Puri (Odisha).	Dr. BP Mishra, Dr. SK Niranjan
5	Rajasthan and Gujarat	23 July, 2024	Ahmedabad (Gujarat).	Dr. BP Mishra, Dr. SK Niranjan
6	Maharashtra, Daman Div, Dadra Nagar Haveli	25 July, 2024	Pune (Maharashtra)	Dr. BP Mishra, Dr. Sanjeev Singh
7	Andhra Pradesh, Telangana and Karnataka	31 July, 2024	Vishakhapatnam (Andhra Pradesh)	Dr. RK Pundir, Dr. Raja KN
8	Tamil Nadu, Puducherry, Andaman & Nicobar and Lakshadweep	02 Aug., 2024	Chennai (Tamil Nadu)	Dr. RK Pundir, Dr. Raja KN
9	Punjab, Haryana, Himachal Pradesh, Delhi and Chandigarh	06 Aug., 2024	Amritsar (Punjab)	Dr. BP Mishra, Dr. SP Dixit
10	Jammu & Kashmir and Ladakh	09 Aug., 2024	Srinagar (J&K)	Dr. BP Mishra, Dr. SK Niranjan
11	Kerala and Goa	13 Aug., 2024	Panji (Goa)	Dr. BP Mishra, Dr. Indrajit Ganguly

Release of Breed Reckoner

21st Livestock Census Livestock & Poultry Breeds: A Ready Reckoner was released by the Union Minister of Fisheries, Animal Husbandry & Dairying, Govt. of India on 25th October 2024 at New Delhi on the occasion of Lauch of the 21st Livestock Census Operation. The Reckoner prepared by the Bureau for Livestock Census would be useful for identifying the animal breeds during conducting the Census by the enumerators and nodal officers in the country.

HRD Programme

Training Organized

Type of Program	Title	Organizing Agency	Duration	Organizer/Co-ordinator
Training Programme	Somatic Cell Conservation: Techniques and Precautions"	ICAR-NBAGR, Karnal	2-3 June, 2024	Dr Rekha Sharma, Dr. Reena Arora, Dr Sonika Ahlawat
Training Programme	characterization, registration and conservation of native animal genetic resources (AnGR)	ICAR-NBAGR, Karnal	5-9 Aug. , 2024	Dr Manishi Mukesh & Dr M S Dige
Training Programme	characterization, registration and conservation of native animal genetic resources (AnGR)	ICAR-NBAGR, Karnal	19-23 Aug., 2024	Dr Manishi Mukesh & Dr M S Dige
Training Programme	"Characterization, Documentation and Sustainable Utilization of Indigenous Livestock and Poultry Genetic Resources	MANAGE, Hyderabad & ICAR-NBAGR, Karnal	27-29 Nov., 2024	Dr. Raja K. N.
Training Programme	DNA testing training for field veterinarians of Haryana	ICAR-NBAGR, Karnal	22-26 July, 2024	Dr Sonika Ahlawat

Training Attended

Type of Program	Title	Organizing Agency	Duration	Scientist Attended
International Training	Tropical Livestock Genetic Improvement Training Session	International Livestock Research Institute, Nairobi (Kenya)	19-25 Feb., 2024	Dr. SK Niranjan
Training Programme	Next generation Sequencing : Focus on RNA Sequencing	DBT-Sponsored	20-26 Sept., 2024	Dr. Ravi Kumar Gandham
Training Programme	Quality Check in Real-Time PCR Data Analaysis		14-19 Oct., 2024	Dr. Ravi Kumar Gandham
Training Programme	Characterization, Documentation and Sustainable Utilization of Indigenous Livestock and Poultry Genetic Resources		27-29 Nov., 2024	Dr. Ravi Kumar Gandham

Conferences / Seminars /Symposia attended

Type of Program	Title	Organizing Agency	Duration	Scientist Attended
Symposium	SOCDAB-2024: Animal Production systems and its role in sustainable use of AnGR	NTR College of Veterinary Science, Gannavaram, Andhra Pradesh	15-16 Feb., 2024	Dr B P Mishra Dr R K Pundir Dr A K Mishra Dr. Karan Veer Singh Dr Dige MS
Conference	Achieving Sustainable Development Goals in Challenged Agro-Ecosystems (ASDGCAE-24)	ICAR-Central Arid Zone Research Institute, Jodhpur	03-06 Mar., 2024	Dr. Rekha Sharma
International Conference	ISSGPU: Recent trends and future perspectives to improve the performance, health and welfare of small ruminants under changing climate scenario	Rajiv Institute of Veterinary Education and Research (RIVER), Puducherry	24 – 26 Apr., 2024	Dr. Raja K. N. Dr. Sonika Ahlawat
International Conference	ICRISD-2024: Research and Innovation for Sustainable Development	University Institute of Engineering & Technology, M.D.U, Rohtak	04-05 May, 2024	Dr. Reena Arora, Dr. Sonika Ahlawat
Conference	Regional Consultation on Science of Natural farming	Hotel Centrum Lucknow	19 July, 2024	Dr. A.K. Mishra

Type of Program	Title	Organizing Agency	Duration	Scientist Attended
Conference	"Small Holders' Goat Production In Tropical Counkies - Opportunities and Constraints" (ICGPT2024)	PGRIAS, Kattupakkam, TANUVAS, Chennai, Tamil Nadu	08-09 Aug., 2024	Dr. R. K. Gandham
Conference	Hindi Divas Evam Chaturth Rajbhasha Sammelan	Bharat Mandapam, New Delhi	13-15 Sept. 2024	Dr. A.K. Mishra
Conference	NCMBN-2024: Managing Agro-Biodiversity in North Eastern India	ICAR Research Complex for NEH Region, Umiam, Meghalaya	22-26 Oct., 2024	Dr. R. K. Pundir
Seminar	Unlocking genomic potential of Indian goats: towards enhanced production, In National Seminar on Policy and Strategies for Indian Goat Sector in 'Amrit Kaal'	ICAR-Central Institute for Research on Goats (CIRG), Mathura	19 Nov., 2024	Dr. Reena Arora
Conference	ISAGBCON-2024: New Vistas in Harnessing Genetic Resources for Sustainable Animal Production	Bihar Veterinary College, Bihar Animal Sciences University, Patna-800014	21-22 Nov., 2024	Dr B P Mishra Dr. R. K. Pundir Dr. R. K. Gandham Dr. RS Kataria Dr. Reena Arora Dr. Sonika Ahlawat
Symposium	ISBD: Innovative Approaches for Boosting Buffalo Productivity		16-18 Dec., 2024	Dr. R. K. Gandham Dr. Sonika Ahlawat
Symposium	SVBBICON-2024: Unlocking the Potential of Veterinary Biochemistry and Biotechnology for Food and Nutrition Security	College of Veterinary Science and Animal Husbandry, Mathura	20-21 Dec., 2024	Dr. Reena Arora, Dr. Sonika Ahlawat

Workshops/ Meetings Organized

Type of Program	Title	Organizing Agency	Duration	Scientist Attended
Characterization and documentation of AnGR of Odisha, Mission towards Zero non –Descript AnGR of India	"Ecosystem services of AnGR"	Organized in collaboration with FARD, Govt. of Odisha, and OLRDS, Bhubaneshwar	26 Sept., 2024, Bhubaneshwar	Dr. Bina Mishra
Characterization and Documentation of AnGR of Lakshadweep under Mission towards Zero Non-Descript AnGR of India	Ecosystem services (ESS) by Animal Genetic Resources (AnGR)	In collaboration with KVK-Lakshadweep and Deptt. of Animal Husbandry and Veterinary Services, Lakshadweep	26 Sept, 2024	Dr. Bina Mishra
Characterization and Documentation of AnGR of Goa under Mission towards Zero Non-Descript AnGR of India	"Role of Animal Genetic Resources in Eco-system services"	-	07 June, 2024	Dr. Bina Mishra
	International Year of Camelids-2024	In collaboration with animal husbandry department, Leh	09 Sept, 2024	Dr. Dige Mahesh

Lecture Delivered

Type of Program	Title	Organizing Agency	Duration	Scientist Attended
Training	Record Keeping of performance traits at organized farm for higher productivity'	Training on 'Technological innovation in Assisted Reproductive Technologies for the improvement of Caprine germplasm" at ICAR-CIRG, Makhdoom	05-14 Feb. 2024	Dr. Dige Mahesh
National Symposium	Protection and Recognition of Indigenous Animal Genetic Resources –Registration of New Breeds	SOCDAB Symposium on 'Animal Production Systems and its Role in Sustainable use of AnGR'	15-16 Feb., 2024	Dr. Pundir RK

Type of Program	Title	Organizing Agency	Duration	Scientist Attended
Training	Status of registered native livestock and poultry breeds of India	In: MANAGE sponsored Training Programme on Characterization, Documentation and Sustainable Utilization of Indigenous Livestock and Poultry Genetic Resources 3 days.	27-29 November, 2024	Dr. A K Mishra
Training	Status of registered native livestock and poultry breeds of India,	In: training program titled "Characterization, Registration and Conservation of Native Animal Genetic Resources" sponsored by the Fisheries and Animal Resources Development Department (FARD), Govt. of Odisha	27-29 November, 2024	Dr. A K Mishra
Conference	Achieving Sustainable Development Goals in Challenged Agro-Ecosystems	ASDGCAE-24 Conference at ICAR-Central Arid Zone Research Institute, Jodhpur; March 3-6, 2024		Dr. Rekha Sharma
Training	Molecular and Bioinformatics Analytic Tools	Training on 'Basics of ENSEMBLE genome browser and primer designing' at ICAR-CIRG, Makhdoom	15-18 Mar., 2024	Dr. Dige Mahesh
Training	Sequence submission to NCBI - Bankit and obtaining GenBank accession numbers	Training on 'Basic Bioinformatics Tools for Genome Analysis' at ICAR-NBAGR, Karnal	18-22 Mar., 2024	Dr. Dige Mahesh
Training	Genome Browser	Training on 'Basic Bioinformatics Tools for Genome Analysis' at ICAR-NBAGR, Karnal	18-22 Mar., 2024	Dr. Dige Mahesh
International Conference	The trajectory of small ruminants' genomics in India	ISSGPU Conference on "Recent trends and future perspectives to improve the performance, health and welfare of small ruminants under changing climate scenario' at RIVER, Puducherry	24-26 Apr., 2024	Dr. Sonika Ahlawat
International Conference	Identification and validation of stable reference genes for quantitative PCR in small ruminant populations under high-altitude hypoxic and arid conditions	ISSGPU Conference on "Recent trends and future perspectives to improve the performance, health and welfare of small ruminants under changing climate scenario' at RIVER, Puducherry	24-26 Apr., 2024	Dr. Sonika Ahlawat
International Conference	Imperative role of the livestock sector in accomplishing Sustainable Development Goals	ICRISD-2024 Conference on 'Research and Innovation for Sustainable Development' UIET, MDU, Rohtak (Haryana)	04-05 May, 2024	Dr. Reena Arora, Dr. Sonika Ahlawat
International Conference	Somatic cell conservation: symphony of SDG target and indigenous livestock conservation,	ICRISD-2024 Conference on 'Research and Innovation for Sustainable Development' UIET, MDU, Rohtak (Haryana)	04-05 May, 2024	Dr. Reena Arora, Dr. Sonika Ahlawat
International Conference	Comparative transcriptomics of heart tissue reveals insights into adaptation of Changthangi sheep to high altitudes of Ladakh.	ICRISD-2024 Conference on 'Research and Innovation for Sustainable Development' UIET, MDU, Rohtak (Haryana)	04-05 May, 2024	Dr. Reena Arora, Dr. Sonika Ahlawat

Type of Program	Title	Organizing Agency	Duration	Scientist Attended
Workshop	Genetic Variant and its Application in Livestock Research	Workshop on 'Next Generation Sequence (NGS) Data Analysis and its Applications in Livestock Research' at NIAB, Hyderabad	20-24 May 2024	Dr. Ravi Gandham
Workshop	Trait characterization of Animal Genetic Resources for value addition	ICAR- Central Coastal Agricultural Research Institute, Ela, Old Goa-403402	07-08 June, 2024	Dr. Indrajit Ganguly
Training	Introduction to NGS with a special reference to transcriptomics	CVAS, Kishanganj, BASU, Patna	14-19 June 2024	Dr. Ravi Gandham
Training	Whole Genome Sequencing Analysis: An Approach for Genetic Characterization of Farm Animals	SERB sponsored training	15-18 July, 2024	Dr. Amod Kumar
Training	Genetic characterization and diversity analysis of native AnGR using candidate gene approach	Training on 'Characterization, registration and conservation of native Animal Genetic Resources (AnGR)', at ICAR-NBAGR, Karnal	05-09 Aug. 2024	Dr. R.S. Kataria
Training	"Characterization, registration and conservation of native animal genetic resources"	Training on 'Characterization, registration and conservation of native Animal Genetic Resources (AnGR)', at ICAR-NBAGR, Karnal	05-09 Aug., 2024	Dr Rekha Sharma
Training	"Characterization, Registration and Conservation of Native Animal Genetic Resources"	Training on 'Characterization, registration and conservation of native Animal Genetic Resources (AnGR)', at ICAR-NBAGR, Karnal	05-09 Aug., 2024	Dr. A.K. Mishra
Training	Characterization, Documentation and Sustainable Utilization of Indigenous Livestock and Poultry Genetic Resources	Training on 'Characterization, registration and conservation of native Animal Genetic Resources (AnGR)', at ICAR-NBAGR, Karnal	05-09 Aug., 2024	Dr. Bina Mishra
Training	Approaches for phenotypic characterization of native AnGR during the training programme	Training on 'Characterization, registration and conservation of native Animal Genetic Resources (AnGR)', at ICAR-NBAGR, Karnal	05-09 Aug., 2024	Dr. Raja K. N.
Training	Development of SNP chips for AnGR management	Training on 'Characterization, registration and conservation of native Animal Genetic Resources (AnGR)', at ICAR-NBAGR, Karnal	05-09 Aug., 2024	Dr. Ravi Gandham
Training	Concept of population genetics in understanding population structure, diversity, inbreeding and genetic relationship	Odisha	07-19 Aug., 2024	Dr. Indrajit Ganguly
Training	Genetic characterization and diversity analysis of native AnGR using candidate gene approach	Training on 'Characterization, registration and conservation of native Animal Genetic Resources (AnGR)', at ICAR-NBAGR, Karnal	19- 23 Aug., 2024	Dr. R.S. Kataria
Training	Characterization, Documentation and Sustainable Utilization of Indigenous Livestock and Poultry Genetic Resources	Training on 'Characterization, registration and conservation of native Animal Genetic Resources (AnGR)', at ICAR-NBAGR, Karnal	19- 23 Aug., 2024	Dr. Bina Mishra

Type of Program	Title	Organizing Agency	Duration	Scientist Attended
Training	"Characterization, Registration and Conservation of Native Animal Genetic Resources"	Training on 'Characterization, registration and conservation of native Animal Genetic Resources (AnGR)', at ICAR-NBAGR, Karnal	19- 23 Aug., 2024	Dr. A.K. Mishra
Training	Approaches for phenotypic characterization of native AnGR during the training programme	Training on 'Characterization, registration and conservation of native Animal Genetic Resources (AnGR)', at ICAR-NBAGR, Karnal	19- 23 Aug., 2024	Dr. Raja K. N.
Training	Next generation Sequencing : Focus on RNA Sequencing	College of Veterinary Science, Khanapara, Assam Agricultural University (AAU), Guwahati, Assam	20-26 Sept., 2024	Dr. Ravi Gandham
Training	Quality Check in Real-Time PCR Data Analysis	College of Veterinary and Animal Sciences, MAFSU Parbhani (Maharashtra)	14-19 Oct., 2024	Dr. Ravi Gandham
Training	Quality Check in Real-Time PCR Data Analysis	College of Veterinary and Animal Sciences, MAFSU Parbhani (Maharashtra)	14-19 Oct., 2024	Dr. Ravi Gandham
Training	Application of NGS in Animal Sciences	ICAR-NAARM, Hyderabad	21-25 Oct., 2024	Dr. Ravi Gandham
Training	Genomics and conservation of indigenous animal breeds'	National Conference on Managing Agro-Biodiversity in North Eastern India (NCMBN-2024)	22-26 Oct., 2024	Pundir RK
National Seminar	Unlocking genomic potential of Indian goats: towards enhanced production	In National Seminar On 'Policy and Strategies for Indian Goat Sector in 'Amrit Kaal' ICAR-CIRG, Mathura (UP)	19 Nov., 2024	Dr. Reena Arora
National Conference	Genomic selection in dairy animals: its status and future prospects	ISAGB National Conference on 'New Vistas in Harnessing Genetic Resources for Sustainable Animal Production', at BASU, Patna	21-22 Nov., 2024	Pundir RK
National Conference	Livestock sector: key to achieving effective sustainable development goals (SDGs).	ISAGB National Conference on 'New Vistas in Harnessing Genetic Resources for Sustainable Animal Production', at BASU, Patna	21-22 Nov., 2024	Dr. Reena Arora, Dr. Sonika Ahlawat
	Initiative on cryo-conserving somatic cells of indigenous livestock germplasm of Bihar.	ISAGB National Conference on 'New Vistas in Harnessing Genetic Resources for Sustainable Animal Production', at BASU, Patna	21-22 Nov., 2024	Dr. Reena Arora, Dr. Sonika Ahlawat
	Growth and proliferation of livestock dermal fibroblasts pre and post-long-term cryopreservation	ISAGB National Conference on 'New Vistas in Harnessing Genetic Resources for Sustainable Animal Production', at BASU, Patna	21-22 Nov., 2024	Dr. Reena Arora, Dr. Sonika Ahlawat
Training	Genetic characterization and diversity analysis of native AnGR using candidate gene approach	Training on 'Characterization, Documentation and Sustainable Utilization of Indigenous Livestock and Poultry Genetic Resources' at ICAR-NBAGR, Karnal (Haryana)	27-29 Nov., 2024	Dr. R.S. Kataria

Type of Program	Title	Organizing Agency	Duration	Scientist Attended
Training		Training on 'Characterization, Documentation and Sustainable Utilization of Indigenous Livestock and Poultry Genetic Resources' at ICAR-NBAGR, Karnal (Haryana)	27-29 Nov., 2024	Dr Rekha Sharma
Training	Characterization, Documentation and Sustainable Utilization of Indigenous Livestock and Poultry Genetic Resources	Training on 'Characterization, Documentation and Sustainable Utilization of Indigenous Livestock and Poultry Genetic Resources' at ICAR-NBAGR, Karnal (Haryana)	27-29 Nov., 2024	Dr. A.K. Mishra
Training	Characterization, Documentation and Sustainable Utilization of Indigenous Livestock and Poultry Genetic Resources	Training on 'Characterization, Documentation and Sustainable Utilization of Indigenous Livestock and Poultry Genetic Resources' at ICAR-NBAGR, Karnal (Haryana)	27-29 Nov., 2024	Dr. Bina Mishra
Training	Characterization, Documentation and Sustainable Utilization of Indigenous Livestock and Poultry Genetic Resources	Training on 'Characterization, Documentation and Sustainable Utilization of Indigenous Livestock and Poultry Genetic Resources' at ICAR-NBAGR, Karnal (Haryana)	27-29 Nov., 2024	Dr. Ravi Gandham
Training	Approaches for phenotypic characterization of native AnGR	Training on 'Characterization, Documentation and Sustainable Utilization of Indigenous Livestock and Poultry Genetic Resources' at ICAR-NBAGR, Karnal (Haryana)	27-29 Nov., 2024	Dr. Raja K. N.
Training	Recent Advances in Biotechnology for AnGR Management	MMEC, Maharishi Markandeshwar University, Mullana (Haryana)	12-14 Dec., 2024	Dr. Raja K. N
National Conference	Genomic insights into Indian buffaloes using contemporary approaches	(ISBD Conference on 'Innovative Approaches for Boosting Buffalo Productivity'	16-18 Dec., 2024	Dr. Sonika Ahlawat
National Symposium	Transcriptomic Insights into Pulmonary Adaptation of Indian Sheep Breeds in Diverse Environments.	SVBBICON-2024 National Symposium on 'Unlocking the Potential of Veterinary Biochemistry and Biotechnology for Food and Nutrition Security' DUVASU, Mathura	20-21 Dec., 2024	Dr. Reena Arora, Dr. Sonika Ahlawat
National Symposium	Identification of selection signature contributing to high altitude adaptation in Changthangi goats. 2024.	SVBBICON-2024 National Symposium on 'Unlocking the Potential of Veterinary Biochemistry and Biotechnology for Food and Nutrition Security' DUVASU, Mathura	20-21 Dec., 2024	Dr. Reena Arora,
National Symposium	Unraveling Maternal Lineages and Genetic Diversity in Indian Livestock: Insights from Mitochondrial DNA Analyses	SVBBICON-2024 National Symposium on 'Unlocking the Potential of Veterinary Biochemistry and Biotechnology for Food and Nutrition Security' DUVASU, Mathura	20-21 Dec., 2024	Dr. Sonika Ahlawat

Farmers awareness and outreach program

Distribution of Elite Germplasm of Malabari Goat under SCSP

A farmer-scientist interaction program under SCSP plan was organized at Earathu grama panchayat Parakode (Minor) block, Kollam district, Kerala in collaboration with College of Veterinary and Animal Sciences, Mannuthy (Kerala Veterinary and Animal Sciences University) and Animal Husbandry Deportment, Govt. of Kerala. The program was formally inaugurated by Sri. Chittayam Gopakumar, Deputy Speaker of the Kerala Legislative Assembly. The ceremony was presided over by Sri. Thulaseedharan Pillae, President, Parakode Block Panchayat, and Sri. Santosh Chathanupuzha, President, Earathu Gramma Panchayat. Forty scheduled caste goat farmers were meticulously selected and organized into 11 clusters. Each cluster was supplied with a Malabari buck of high genetic worth for breeding, along with a comprehensive support package including utensils, goat feed, mineral mixture, de-wormers, a training manual, leaflets, and an anaemia check card for forty SC beneficiaries. A focused skill development training program on goat rearing was conducted for the selected goat farmers in the area. The training, held at the Earathu Panchayat community hall in Parakode block from 4th & 5th of March, 2024, covered crucial topics such as goat nutrition, breeding, and disease control. The faculties from KVASU, including Dr. Thirupathy Venkattachalapathy, Dr. Syamala K, Dr. Lalu. K, and Dr. Marykutty Thomas, were involved in imparting knowledge and skills to the participants. The program was coordinated by Dr. A Kannan, Senior Veterinary Surgeon (AHD, Kollam) and Dr. Thirupathy Venkattachalapathy, Professor & Head.

Training program under TSP

A two-day focused skill development training program (under TSP fund of ICAR-NBAGR) for tribal goat farmers was conducted from December 3 to 4, 2024, at the Parappanthara community hall, Agali Panchayat, Attappady Block, Palakkad district, Kerala in collaboration with College of Veterinary Sciences, Mannuthy. The program was inaugurated by Sri. Selvaraj V., Local Self-government representative of Agali Panchayat. During the training program about 113 tribal goat farmers attended and to all the beneficiaries a comprehensive support package comprising utensils, goat feed, mineral mixture, de-wormers, training manuals, leaflets, and an anaemia

check card were distributed. The sessions emphasized skill development on critical areas of goat rearing, including nutrition, breeding, and disease management. A major highlight of the training was the introduction of the Combined Targeted Selective Treatment (C-TST) strategy, which empowers farmers to sustainably manage gastrointestinal parasitism using an anaemia colour card developed by KVASU. Faculties from KVASU, including Dr. R. Thirupathy Venkatachalapathy, Dr. Syamala K, and Dr. Marykutty Thomas, were involved in imparting knowledge and skills to the participants during two days program. Dr Raja K N, Principal Scientist and Dr. Sonika Ahlawat, Senior Scientist from ICAR-NBAGR, Karnal participated in the inaugural session and interacted with the farmers about the role of ICAR-NBAGR in identification, characterization and documentation of indigenous AnGR of the country and also about the objectives of organizing the TSP program.

Farmer's scientist interface meet

A farmer's scientist interface meet under Schedule Caste Sub-Plan program was organized at Panchalavaram village in Amruthalur Mandal of Bapatla district (erstwhile Guntur district before bifurcation) in Andhra Pradesh on 16.02.2024 in collaboration with Animal Husbandry Department, Andhra Pradesh and about 50 farmers participated in the event. Dr. G K Gaur, ADG (AP&B) from ICAR Headquarters, Dr. R K Pundir, Head, AGR Division and Dr. Raja K N, Senior Scientist from ICAR-NBAGR, Dr. M. Hanumantha Rao, District Animal Husbandry officer, Bapatla district, Dr. Y. Kedareswar, Deputy Director, AH, Tenali division, Dr. M Nageswara Rao, Assistant Director, Area veterinary hospital, Nagaram, Sri. Raparla. Narendra Kumar, Mandal Praja Parishad, Amruthalur Mandal and Sri. Pavuluri. Hemachand, Sarpanch, Panchalavaram village participated in the farmer-scientist interface meet. Scientists and the Animal Husbandry officers of Andhra Pradesh interacted with the farmers about the purpose of the program, explained in detail about the importance of rearing indigenous livestock, breeding and management practices to followed etc., and distributed the animal feed and mineral mixture to 50 beneficiaries belonging to SC category. The program was coordinated by Dr. Mounika Veterinary Assistant Surgeon, Amruthalur.

Exhibitions displayed for appraising institute activities & achievements:

Our institute participated in seven different mela, functions of various ICAR and State Veterinary/ Agricultural Universities, state AHD and exhibited the activities and achievements of the bureau during the last financial year (2024-25) as per the enclosed list.

S. No.	Date	Programme	Location	Number of farmers/ visitors visited the stall
1	03-05th Feb., 2024	National Agricultural Fair, (NAF-2024) ICAR-IIVR, Varanasi, UP.	ICAR-IIVR, Varanasi	500
2	08-10th Feb., 2024	Regional Agricultural Fair-2024	Rani Lakshmi Bai Central Agricultural University, Jhansi	1500
3	08-09th Nov., 2024	National Conference	MHU, Karnal	500
4	11th Nov., 2024	Honorable Union Minister of Agriculture and Farmers Welfare, GoI	ICAR-National dairy research Institute, Karnal	250

Exhibitions and Farmers Programme

Kollam district, Kerala- ICAR-NBAGR organized a Farmer-scientist Interaction program at Earathu grama panchayat Parakode (Minor) block, Kollam district, Kerala on 5th March 2024; in collaboration with KVASU, Mannuthy and AHD, Govt. of Kerala under SCSP plan. During the program, 11 clusters of 40 goat keepers (SC category) were supplied elite Malabari buck for their goat breeding and improvement in the region. Comprehensive support package (utensils, goat feed, mineral mixture, de-wormers, a training manual, leaflets, and an anaemia check card) was also supplied to individual goat farmers. Skill Development Training on goat rearing was also conducted in collaboration for the selected goat farmers in the Parakode block during 4th - 5th March, 2024. Farmers were trained on various animal husbandry topics including goat nutrition, breeding, and disease control.

Mallimajra-Mustafabad village of Yamunanagar- A program under Schedules Caste Sub-Plan (SCSP) was organized and an interactive programme with farmers and livestock keepers was conducted at Mallimajra-Mustafabad village of Yamunanagar district (Haryana) on 13th March 2024. The programme was attended by about 125 farmers and they were educated about importance of rearing indigenous livestock. A kit consisting of nutritional supplements and de-worming medicines was distributed to the 90 SC beneficiaries to enhance the productivity of their livestock.

Munak village, Karnal- A women farmers and scientists interface meet under SCSP program was organized at Munak village in Karnal district (Haryana) on 7th March 2024 in collaboration with LUVAS wherein 100 women farmers participated in the event. The officers interacted with the women farmers and explained in detail about the program, scientific housing, management and health aspects of livestock as well as characterization and conservation of Animal Genetic resources. Mineral mixture, liver tonic, calcium, dewormer, digestive stimulant etc were distributed among100 beneficiaries belonging to SC community.

Sumbli village, Samba district of Jammu & Kashmir (UT) - ICAR-NBAGR in collaboration with SKUAST-Jammu organized a Farmers Interactive Meet cum Animal Health Camp in Sumbli village, Samba district of Jammu & Kashmir (UT) on 14th March, 2024. Farmers were informed about animal health, nutrition, breeding, feeding, and management, as well as the prevention and control of major livestock diseases. The initiative included the provision of feed, medicines, and parasite screening. Concurrently, a human health camp was conducted Medical Officer of SKUAST-Jammu, offering free haemoglobin estimation, blood tests, and supplements to the villagers. Over eighty farmers attended, they received livestock kits and actively engaged in enlightening discussions facilitated by domain experts.

Kavaratti, Lakshadweep (UT) - ICAR-NBAGR in collaboration of CMFRI –KVK organized a 17th State Interface Meet on 'Characterization and documentation of Animal Genetic Resources of Lakshadweep' under the Mission at Kavaratti, Union Territory of Lakshadweep on 26th April 2024. Officers of ICAR, KVK, Animal Husbandry Department, Lakshadweep and livestock keepers attended the meet. Local agencies and farmers were sensitized for management of indigenous AnGR. NBAGR and KVK scientists delivered the lecture on AnGR resources and their documentation strategies in the Lakshadweep islands.

Title: Survey and Documentation of Indigenous Animal Genetic Resources of Andaman & Nicobar Islands (Co - PI).

- Organized a Stakeholder Meet on 'Animal Genetic Resources of Lakshadweep (UT): Strategy for Documentation and Sustainable Management' at Atal Paryavaran Bhawan, Dept. of Environment & Forest, Union Territory of Lakshadweep, Kavaratti (HQ); in collaboration with ICAR- KVK and Department of Veterinary & Animal Husbandry Services, Union Territory of Lakshadweep on 9.02.25
- Organized Farmer-Scientist Interactive Meet at Kadmat. Dr Raghavendra Bhatta, DDG (AS), ICAR, New Delhi was the Chief Guest. Director, ICAR-NBAGR, BDO, Kadmat, Veterinary Officer, Kadmat, NBAGR scientists and about 40 livestock keepers attended the program. Also distributed Veterinary kits to the livestock keepers under TSP scheme. Also collected various data pertaining to Ecosystem Services from the livestock keepers on 12.02.25. Surveyed Kiltan, Ameni and Chatlat Islands of Lakshadweep and collected Blood samples.

Goa-ICAR-National Bureau of Animal Genetic Resources on 7th June, 2024 organized 18th State Interface Meet with Goa state, in collaboration with the ICAR-Central Coastal Agricultural Research Institute (CCARI), Goa. The meet was organized on "Animal Genetic Resources (AnGR) of Goa State" under the "Mission towards Zero Non-Descript AnGR of India". About 50 participants from ICAR, Department of Animal Husbandry and Veterinary Services, Govt. of Goa, Goa State Biodiversity Board (GSBB) and progressive farmers participated in the Meet.

Changthang–Ladakh- Scientists -Farmers Interface Meet was organized on 11th September 2024 at Sapo, Changthang (Ladakh) with highland pastoralists of Changthang region. Farmers were sensitized about scientific management of indigenous AnGR and pastoralism. Around 25 pastoralists attended the program.

A Farmers–Scientist meet were organised under SC SP programmae and to distribution of health kit to SC beneficiaries at Village Auli, Chakrata and KVK of Dhakarani, Dehardun (Uttarakhand).

Women farmers and Scientists Interface Meet under SC-Sub Plan

A women farmers and scientists interface meet under Schedule Caste Sub-Plan program was organized at Munak village in Karnal district (Haryana) on 07.03.2024 in collaboration with Haryana Pashu Vigya Kendra, Uchani (LUVAS) wherein 100 women farmers participated in the event. Dr. Satpal Dixit, Head (Animal Genetics), Dr. Indrajit Ganguly and Dr. Sanjeev Singh, Principal Scientists from ICAR-NBAGR, Dr. Anita Ganguly, Regional Director, Dr. Sujoy Khanna and Dr. Bishwaranjan Maharana from Haryana Pashu Vigya Kendra, Uchani (LUVAS) and Dr. Amit Kumar, Veterinary Officer, Munak, from Animal Husbandry Department (Haryana) participated in the meet. The officers interacted with the women farmers and explained in detail about the program, scientific housing, management and health aspects of livestock as well as characterization and conservation of Animal Genetic resources. Mineral mixture, liver tonic, calcium, dewormer, digestive stimulant etc were distributed among100 beneficiaries belonging to SC community. The women participants were encouraged to participate in the government schemes like Lakhpati Didi for the upliftment of their economic status.

- A documentary on Chilika Buffalo: preserving a vital genetic legacy Ladakh. (2024).B P Mishra, Raja K N, M.S. Dige, S. K. Niranjan, and Aarti Shree.
- A documentary on 'Ladakh's Livestock Heritage: Resilience in the Highlands'. (2024).**M. S. Dige**, Manishi Mukesh, S K Niranjan, Raja K N, Karanveer Singh, F. D. Sheikh, B P Mishra, AartiShree R. K. Pundir
- Dr. Sonika Ahlawat delivered a radio talk on the topic "बदलते जलवायु में देसी नस्लों का महत्त्व" on Akashwani Rohtak on 31.10.2024.


CAR-NBAGR

INSTITUTE'S ACTIVITIES

भाकृअनुप
ICAR

NBAGR
रा.प.आ.सं.ब्यूरो

Celebrations

Celebration of the International Biodiversity Day, 2024

Bureau celebrated International for Biodiversity (IBD) on 22nd May, 2024 among Arunachali Yak pastoralists at ICAR- NRC on Yak, Dirang (Arunachal Pradesh). Program was organized in collaboration with the NRC on Yak, Deptt. of Animal Husbandry, Veterinary and Dairy Development, Govt. of Arunachal Pradesh. About 120 pastoralists and scientists of ICAR, Officers of AHV& DD attended the program. Dr. Raghavendra Bhatta, DDG (AS), ICAR was the Chief Guest of the Day. Ten Yak pastoralists belonging to different regions of West Kameng and Tawang were also felicitated by the Chief Guest for promoting Arunachali Yak. A Memorandum of Understanding (MoU) was signed between ICAR-NBAGR, ICAR-National Research Centre on Yak (ICAR-NRCY) and Arunachal Pradesh Yak Herders & Products Development Cooperative Society Ltd. for sustainable utilization, promotion and improvement of Arunachali yak on 22nd May, 2024 at NRCY.

Establishing Tibetan sheep conservation unit

Conservation Unit was established for Tibetan sheep of Arunachal Pradesh at Regional Sheep Breeding Farm, Deptt. Of AHV&DD, Sangti, Dirang (Arunachal Pradesh) under the Network project on AnGR. Tibetan sheep is a threatened indigenous breed as per Breed Watchlist 2022 released by ICAR-NBAGR.

Celebrating International Year of Camelids- 2024 in Ladakh

Bureau, in collaboration with Animal Husbandry Department of the Ladakh organized the International Year of Camelids-2024 with the double humped camel keepers and other stakeholders in Nubra valley of Ladakh (UT) on 9th September, 2024. About 60 double humped owners, along with the Bureau scientists, Dr Raghvendra Bhatta, Deputy Director General (Animal Science), ICAR; Dr B P Mishra, Director NBAGR, scientists of the Bureau, Officers of Animal Husbandry Department, DIHAR, District Administration attended the program. Camel owners were felicitated for conservation of the species. Three monographs on Double humped camel, yak and donkey of Ladakh were also released.

Bureau's Foundation Day celebration

ICAR-NBAGR celebrated its 41st Foundation Day on 21st September, 2024. Sh. Sanjay Kumar, Chairman, ASRB gave the Foundation Lecture and emphasized over the true role of the AnGR, in terms of bio economy as well as their economical, ecological, values and nutraceutical uses. Breed calendars for indigenous cattle and buffalo breeds was released by the chief guest. An official YouTube channel of the Bureau was also launched. Bureau staff along with Chairman, ASRB also participated in Swachhta Abhiyan and made a Human chain for the awareness and planted the trees along with staff.

Breed Conservation Awards on Rashtriya Kisan Diwas

Bureau organized "Breed Conservation Award-2024" on 23rd December, 2024 on "National Farmers Day" and felicitated animal breeders/farmers and institutions, across the country, for their efforts for conserving the indigenous animal breeds. Dr A K Srivastava, Vice Chancellor, U.P. Pt. DUVASU, Mathura and chief guest of the occasion. Shri Jagat Hazarika, Advisor (Statistics), DAHD, MoFAHD, Govt. of India, on the occasion told that native livestock breeds are country's heritage and addressed the delegates. Total 5 farmers/ livestock keepers and five institutions/organizations were awarded for conservation and improvement of indigenous breeds.

List of Breed Conservation Awardees

Prize	Awardee	Breed Conserved
Individual category		
First	Shri Bhanwar lal, Bara, Rajasthan.	Malvi camel
Second	Shri Margundan Nandukuppannam, Dharmapuri, Tamilnadu	Tiruchi black sheep
Third	Shri Dilip Ganpatrao Kulkarni, Udgir, Maharashtra Shri Balan Maadhappan, Salem, Tamilnadu.	Red Kandhari cattle Mecheri sheep
Consolation	Shri Surendra Awana, Dudu, Rajasthan	Bikaneri Camel
Institutional category		
First	Animal Breeding Farm, Dehradun Uttarakhand	Red Sindhi cattle
Second	ICAR- National Research Centre on Camel, Bikaner, Rajasthan	Mewari camel
Third	Khillar Cattle Breeding Centre, Haveri, Karnataka	Khillar cattle
	ICAR-National Research Centre on Equines, Regional Station, Bikaner, Rajasthan	Halari Donkey
Consolation	Livestock Research and Information Centre (Deoni), Karnataka Veterinary, Animal and Fisheries Sciences University, Bidar, Karnataka	Deoni cattle

Republic Day Celebration

75th Republic Day was celebrated in the Bureau with high zeal and enthusiasm among the Bureau staff and family members. The National Flag was unfurled by the Director, NBAGR on the occasion. Cultural program by the children of the staff was also organized on the occasion.

Vigilance Awareness Week

ICAR- National Bureau of Animal genetic Resources celebrated Vigilance Awareness Week from October,

28 to November 3, 2024. The theme of this year's celebration was "Culture of Integrity for Nation's Prosperity". All staff of NBAGR was administered Integrity pledge on 28th October, 2024 by the Director, NBAGR. He also briefed about theme of Vigilance Awareness Week.

Independence Day Celebration

Bureau celebrated the 78th Independence Day with the hoisting of the National Flag by the Director of the institute. followed by cultural program at the Bureau campus. Children of the staff displayed cultural programs with patriotic essence during the celebration.

Brain Storming Session in Maharashtra

Bureau scientists attended the Brain Storming Session Workshop on "Advanced Research Avenues for Genetic Improvement in AnGR of Maharashtra" at MAFSU, Nagpur on 29th August 2024. Dr BP Mishra, Director, ICAR-NBAGR was the Chief Guest. Head, Animal Genetics Division and two other scientists along with MAFSU faculty participated in the Session.

Workshop on the Animal Genetic Resources of Ladakh

A workshop and stakeholder meet on 'Status and Way forward for Characterization, Registration & Value Addition of Animal Genetic Resources of Ladakh' was organized by ICAR-National Bureau of Animal Genetic Resources, Karnal, in collaboration with the Animal Husbandry Department of Ladakh at Leh (Ladakh) on 17th December 2024. The workshop was attended by the scientists of the ICAR-NBAGR, DRDO-Defence Institute of High Altitude Research (DIHAR), KVK-Leh, Officers of Dept. of Animal Husbandry, and Sheep Husbandry, Ladakh, livestock keepers and pastoralists.

The Chief Guest Shri Tashi Gyalson, Chief Executive Councillor, Ladakh Autonomous Hill Development Council, emphasized the importance of conserving Ladakh's distinct breeds and lauded work carried out by NBAGR. Dr Raghavendra Bhatta, DDG (Animal Science), ICAR, highlighted the importance of such initiatives in sustaining the biodiversity of high-altitude regions and creating avenues for value addition and economic upliftment for local communities. The Guest of Honour, Tashi Namgyal Yakzee, Executive Councillor (Animal Husbandry), LAHDC, Leh highlighted the activities and schemes carried out by the council for farmers of Ladakh. Dr B P Mishra, Director, ICAR-NBAGR, Karnal, Dr O.P. Chaurasia, Director, DIHAR also addressed the delegates. The workshop featured the release of publications on Ladakh's animal genetic resources

Meetings

Institute Management Committee Meeting

Meeting of Institute Management Committee (IMC) was conducted on 5th January, 2024 under the chairmanship of Director, ICAR-NBAGR. Another Institute Management Committee (IMC) Meeting of ICAR-NRCC, Bikaner was held on 31.01.2024.

Meeting of Steering Committee

An Online Eleventh Meeting of Steering Committee of Network Project on "Agricultural Bioinformatics and Computational Biology" was held on May 21, 2024.

Technical Committee-Livestock Census 2024 Meeting

A Technical Committee-Livestock Census 2024 meeting organized by Animal Husbandry Statistics, DAHD at DAHD, New Delhi ON 9th January, 2024 and discussed the modalities for conducting Breed-wise Livestock Census in the Country.

RAC Meeting

Meeting of Research Advisory Committee of the institute was conducted on 15th May, 2024 under the Chairmanship of Dr. K. Thangraj, J.C. Bose Fellow, CCMU. Various research programs including mission were discussed and suggestions were made by the members.

Institute Technology Management Committee Meeting

17th ITMC meeting of the Bureau was held on 23rd Sept. 2024 under the chairmanship of the Director ICAR-NBAGR. Filing of application for Geographical Indication registration of 'Chilika Curd', through local agency, was recommended.

Institute Research Council (IRC) meeting

Annual Institute Research Council (IRC)-2024 meeting was held in the committee room of the institute on 29th and 30th July, 2024 under the Chairmanship of Dr. B. P. Mishra, Director, ICAR-NBAGR to discuss the completed and ongoing research projects running at the institute as well as to consider new project proposals.


Historical Background of ICAR-NBAGR
(ऐतिहासिक पृष्ठभूमि)
राष्ट्रभाषा के बिना राष्ट्र गूंगा है।

PERSONALIA

भाकृअनुप
ICAR

NBAGR
रा.प.आ.सं.ब्यूरो

Personalia

SCIENTIFIC STAFF

S. No.	Name of Scientist	Designation
1	Dr. B.P.Mishra	Director
2	Dr. R.K. Pundir	Pri. Sci. /Head AGR
3	Dr. Satpal Dixit	Pri. Sci./Head AG
4	Dr. Ravi Kumar Gandham	Pri.Sci. /Head AB
5	Dr. R.S. Kataria	Principal Scientist
6	Dr. Anil Kumar Mishra	Principal Scientist
7	Dr. (Mrs.) Monika Sodhi	Principal Scientist
8	Dr. Dinesh Kumar Yadav	Principal Scientist
9	Dr. (Mrs.) Reena Arora	Principal Scientist
10	Dr. ManishiMukesh	Principal Scientist
11	Dr. Avnish Kumar	Principal Scientist
12	Dr. Rahul Behl	Principal Scientist
13	Dr. (Mrs.) Bina Mishra	Principal Scientist
14	Dr. (Mrs.) Rekha Sharma	Principal Scientist
15	Dr. Saket Kumar Niranjan	Principal Scientist
16	Dr. Indrajit Ganguly	Principal Scientist
17	Dr. Sanjeev Singh	Principal Scientist
18	Dr. Karan Veer Singh	Principal Scientist
19	Dr. K.N. Raja	Principal Scientist
20	Dr. (Mrs.) Sonika Ahlawat	Senior Scientist
21	Dr. Dige Mahesh Shivanand	Senior Scientist
22	Dr. Amod Kumar	Scientist (SS)

TECHNICAL STAFF

S. No.	Name	Designation
1	Sh. S. K. Jain	Chief Technical Officer
2	Sh. Harvinder Singh	Asstt. Chief Technical Officer
3	Sh. Naresh Kumar	Asstt. Chief Technical Officer
4	Sh. Rakesh Kumar	Sr. Technical Officer
5	Sh. Jamer Singh	Sr.Technical Officer
6	Smt. Pravesh Kumari	Technical Officer
7	Sh. Subhash Chander	Technical Officer
8	Sh. Balwinder Singh	Senior Technical Assistant
9	Sh. Deepak	Technician Trainee (T-I)
10	Sh. Ashok Kumar Singh	TechnicianTrainee (T-I)
11	Sh. Balwan Kumar	Technician (T-I)

ADMINISTRATIVE STAFF

S. No.	Name	Designation
1	Sh. Anil Kumar	Administrative Officer
2	Sh. Randhir Singh	Finance & Account Officer
3	Sh. Ramesh Behl	Assistant Admn. Officer (Estt.)
4	Sh. Yoginder	Assistant Admn. Officer (P)
5	Smt. Anita Chanda	Private Secretary
6	Smt. AmitaKumari	Private Secretary
7	Smt. ShashiBala	Assistant
8	Sh. Satish Kumar	Assistant
9	Sh. Shiv Chander	Upper Division Clerk
10	Smt. Neerja Kaul	Upper Division Clerk
11	Sh. Naresh Kumar	Upper Division Clerk

SKILLED SUPPORTING STAFF

1	Sh. Deepak	Skilled Supporting Staff
2	Sh. Satbir	Skilled Supporting Staff
3	Sh. Ramesh Pal	Skilled Supporting Staff
4	Sh. Mohinder Singh	Skilled Supporting Staff

Joining

Sh. Deepak, Technician Trainee (T-1), joined as ICAR-NBAGR on 30 April, 2024.

Sh. Ashok Kumar Singh, Technician Trainee (T-1), joined as ICAR-NBAGR on 07 June, 2024.

Sh. Balwan Kumar, Technician (T-1), joined as ICAR-NBAGR.

Sh. Ramesh Pal, Skilled Supporting Staff, joined as ICAR-NBAGR on 01 August, 2024.

Sh. Mohinder Singh, Skilled Supporting Staff, joined as ICAR-NBAGR on 01 August, 2024.

Superannuation

Dr. RAK Aggarwal, Principal Scientist, superannuated on 30 September, 2024.

Dr. PS Dangi, Chief Technical Officer, superannuated on 29 February, 2024.

Sh. Om Prakash, Technical Officer, superannuated on 31 March, 2024.

Sh. Krishan Lal, Skilled Supporting Staff, superannuated on 29 February, 2024

Transfer

Mrs. Priya Phogat, Assistant, transferred on Promotion on 22 August, 2024.

Distinguished Visitors

Dr. Prakash Rao, President, NAVS visited on 16.03.2024.

Dr. Santosh Kumar Singh, Senior Agricultural Specialist and Joseph Brian Meko, FAS Intern from U.S. Embassyvisited on 15.07.2024.

Dr. Sanjay Kumar, Hon'ble Chairman, ASRB and Dr.T.K.Datta, Director, ICAR-CIRB visited on 21.09.2024.

Dr. A.K. Srivastava, Hon'ble Vice-Chancellor, DUVASU, Mathura and Sh. Jagat Hazarika, Advisor (Statistics) DAHD,New Delhi visited on 23.12.2024.

राजभाषा प्रकोष्ठ

संस्थान राजभाषा कार्यान्वयन समिति की बैठकें:

संस्थान में राजभाषा हिंदी के प्रचार-प्रसार और इसके प्रगामी प्रयोग की प्रगति को बल देने हेतु संस्थान राजभाषा कार्यान्वयन समिति की बैठकें दिनांक 14 मार्च, 2024, 11 जून, 2024, 16 अगस्त, 2024 व 29 नवम्बर, 2024 को आयोजित की गई | इन बैठकों में संस्थान में राजभाषा हिंदी के प्रगामी प्रयोग की प्रगति की समीक्षा की गई तथा इसके प्रचार-प्रसार एवं प्रगामी प्रयोग को बल देने हेतु विभिन्न निर्णय लिए गए |

धारा 3(3) के अन्तर्गत जारी पत्र:

तिमाही (वर्ष 2024)	द्विभाषीय रूप में जारी पत्र	हिंदी या अंग्रेजी में जारी पत्र	कुल जारी पत्र	द्विभाषीय पत्र का प्रतिशत
जनवरी से मार्च	127	शून्य	127	100%
अप्रैल से जून	89	शून्य	89	100%
जुलाई से सितंबर	99	शून्य	99	100%
अक्टूबर से दिसंबर	135	शून्य	135	100

बाह्य हिंदी पत्राचार:

तिमाही (वर्ष 2024)	हिंदी या द्विभाषीय रूप में भेजे गए पत्र	केवल अंग्रेजी में भेजे गए पत्र	कुल पत्राचार	हिंदी या द्विभाषीय रूप में भेजे गए पत्रों का प्रतिशत
जनवरी से मार्च	144	54	198	72.7%
अप्रैल से जून	118	07	125	94.4%
जुलाई से सितंबर	110	06	116	94.8%
अक्टूबर से दिसंबर	118	03	121	97.5%

हिंदी कार्यशालाओं का आयोजन

संस्थान में राजभाषा हिंदी के प्रचार-प्रसार के क्रम में समय-समय पर कार्यशालाओं/व्याख्यानों का आयोजन किया जाता है, वर्ष के दौरान निम्न कार्यशालाओं का आयोजन किया गया:

- दिनांक 27 मार्च, 2024 को "कार्यालय प्रक्रिया एवं व्यवहार" विषय पर हिंदी कार्यशाला/व्याख्यान का आयोजन किया गया जिसमें वक्ता के रूप में श्री अनिल कुमार, इस संस्थान के प्रशासनिक अधिकारी थे |
- दिनांक 26 जून, 2024 को संस्थान में "इलेक्ट्रॉनिक मानव संसाधन प्रबंधन प्रणाली का कार्यान्वयन" विषय पर हिंदी कार्यशाला/व्याख्यान का आयोजन किया गया जिसमें वक्ता के रूप में श्री रविन्दर हुड्डा, वरिष्ठ प्रशासनिक अधिकारी, राष्ट्रीय डेयरी अनुसन्धान संस्थान, करनाल को आमंत्रित किया गया | इस आयोजन में 24 ब्यूरो कर्मी श्रोताओं के रूप में सम्मिलित हुए | भारतीय कृषि अनुसंधान परिषद् के संस्थानों में उपरोक्त प्रणाली को हाल ही में आरम्भ किया गया है |
- इसी क्रम में दिनांक 17 दिसम्बर, 2024 को "हिंदी में कार्य करना सरल है" विषय पर हिंदी कार्यशाला/व्याख्यान का आयोजन किया गया जिसमें वक्ता के रूप में डॉ. अनुज कुमार प्रधान वैज्ञानिक, भारतीय गेंहू एवं जौ अनुसन्धान संस्थान, करनाल को आमंत्रित किया गया |

पशुधन प्रकाश के तेरहवे अंक (वर्ष-2023) के पुरस्कृत लेख

प्रथम पुरस्कार:- "घुमंतू भारतीय गौवंश के साथ प्राकृतिक खेती" लेखक सत्येन्द्र पाल सिंह एवं अनन्या जेना, राजमाता विजयाराजे सिंधिया कृषि विश्विद्यालय- कृषि विज्ञान केन्द्र, लहार, भिण्ड, मध्य प्रदेश |

द्वितीय पुरस्कार:- "घुमंतू जातियाँ- पशु चारण क्षेत्र और पशुधन सम्पदा के सजग प्रहरी" लेखक शालिनी यादव, सुषमा प्रसाद, रेखा शर्मा, सोनिका अहलावत एवं रीना अरोड़ा, भाकृअनुप- राष्ट्रीय पशु आनुवंशिक संसाधन ब्यूरो, करनाल, हरियाणा |

तृतीय पुरस्कार:- "कांकरेज गायों का संवर्धन एवं नस्ल सुधार: मौजूदा स्थिति एवं भविष्य की रणनीति" लेखक अर्थ बी. चौधरी, भरत सिंह राठोड, मयंक पटेल, योगेश गामी, जगदीश डी. चौधरी, जय प्रकाश गुप्ता, मयंक दरजी एवं हर्षद पंचासरा, पशु चिकित्सा एवं पशु पालन महाविद्यालय, कामधेनु विश्विद्यालय, सरदार कृषिनगर, गुजरात |

हिंदी पखवाड़े का आयोजन

प्रत्येक वर्ष की भांति इस वर्ष भी संसथान में हिंदी पखवाड़ा 17-30 सितम्बर 2024 तक उत्साहपूर्वक मनाया गया | इस आयोजन में विभिन्न हिंदी की लिखित एवं मौखिक प्रतियोगिताएं करवाई गई | इस पूरे आयोजन की देख-रेख विधिवत रूप से गठित आयोजन समिति द्वारा की गई | ब्यूरो के निदेशक डॉ. बी. पी मिश्रा ने दिनांक 30 सितंबर 2024 को सभी विजेताओ को प्रमाण-पत्र एवं नकद पुरस्कारों से सम्मानित किया |

हिंदी दिवस एवं चतुर्थ अखिल भारतीय राजभाषा सम्मलेन में सहभागिता

राजभाषा विभाग द्वारा माननीय गृह एवं सहकारिता मंत्री की अध्यक्षता में 14 सितम्बर 2024 को हिंदी दिवस तथा 14 एवं 15

हिंदी पखवाड़े में आयोजित प्रतियोगिताएं एवं विजेता

दिनांक	प्रतियोगिता	शीर्षक	प्रथम	द्वितीय	तृतीय	प्रोत्साहन
17 सितम्बर, 2024	निबंध लेखन	"ग्लोबल वार्मिंग: कारण, प्रभाव एवं निदान"	सुषमा प्रसाद	रितिका गेरा	मीना बगियाल एवं विजय कुमार	विधि गर्ग
18 सितम्बर, 2024	पत्र-लेखन	सडकों पर आवारा पशुओं के कारण होने वाली घटनाओं को रोकने के लिए उचित व्यवस्था करने हेतु अनुरोध	पूजा छाबड़ा	प्रियंका शर्मा	अमिता कुमारी	मोनिका शर्मा
19 सितम्बर, 2024	टिप्पणी-मसौदा लेखन	हिंदी अनुवादक का पद सृजित करवाने हेतु निदेशक महोदय की ओर से भारतीय कृषि अनुसंधान परिषद् मुख्यालय को लिखे जाने वाले पत्र का मसौदा एवं टिप्पणी	रणजीत सिंह कटारिया	रितिका गेरा	अमिता कुमारी	प्रियंका शर्मा अशोक सिंह
20 सितम्बर, 2024	शब्दार्थ/अनुवाद	25 अंग्रेजी तथा 25 हिंदी भाषा के शब्दों को क्रमश: हिंदी तथा अंग्रेजी में अनुदित करना	अनीता चंदा	मीना बगियाल एवं राम प्रसाद	रितिका गेरा	उपासना शर्मा अशोक सिंह
23 सितम्बर, 2024	आशु-भाषण	-	अनीता चंदा	रितिका गेरा	आँचल सैनी	विधि गर्ग
	काव्य-पाठ	-	प्रियंका शर्मा	रितिका गेरा	विधि गर्ग	उपासना शर्मा मीना बगियाल
24 सितम्बर, 2024	वाद-विवाद	"सोशल मीडिया एवं शहरीकरण पारम्परिक मेल-मिलाप को विलुप्ति के कगार पर धकेल रहे हैं"	अनिल कुमार	प्रियंका शर्मा एवं विधि गर्ग	पूजा छाबड़ा	रितिका गेरा
25 सितम्बर, 2024	"उत्कृष्ट हिंदी कार्मिक वर्ष 2023-24"	-	सतीश कुमार	नरेश कुमार	अमिता कुमारी	शिव चन्द्र

सितम्बर 2024 को चतुर्थ अखिल भारतीय राजभाषा सम्मलेन का सम्मिलित आयोजन भारत मंडपम, नई दिल्ली में किया गया| इस आयोजन में डॉ. अनिल कुमार मिश्र एवं श्री राकेश कुमार ने भाग लिया |

वर्ष के दौरान संस्थान को हिन्दी में प्राप्त पुरस्कार

हिंदी में उत्कृष्ट कार्य हेतु संस्थान राजभाषा शील्ड प्रथम पुरस्कार

वर्ष 2023-24 के दौरान राजभाषा में उत्कृष्ट कार्य हेतु राष्ट्रीय पशु आनुवंशिक संसाधन ब्यूरो, करनाल को नगर राजभाषा कार्यान्वयन समिति, करनाल द्वारा राजभाषा शील्ड प्रथम पुरस्कार से सम्मानित किया गया | यह पुरस्कार नराकास करनाल की दिनांक 12/06/2024 को आयोजित 79वीं समीक्षा बैठक में प्रदान किया गया |

संस्थान की हिंदी पत्रिका 'पशुधन प्रकाश' को पुरस्कार

नगर राजभाषा कार्यान्वयन समिति, करनाल ने हिंदी पत्रिकाओं के श्रेष्ठता क्रम में संस्थान की हिंदी पत्रिका 'पशुधन प्रकाश' के चौदहवें अंक (वर्ष 2023) को प्रथम पुरस्कार से सम्मानित किया |


Breed Watchlist 2022
ICAR-NBAGR
भारत का राजपत्र
The Gazette of India
GUIDELINES FOR
MANAGEMENT OF ANIMAL
GENETIC RESOURCES OF INDIA
ICAR-National Bureau of Animal Genetic Resources
WEL COME

ICAR-NBAGR is committed to the UN's

Sustainable Development Goal 2: Zero Hunger

Indicator 2.5.1: *Number of plant and animal genetic resources for food and agriculture secured in either medium or long-term conservation facilities.*

Indicator 2.5.2: *Proportion of local breeds classified as being at risk of extinction.*

ICAR-NATIONAL BUREAU OF ANIMAL GENETIC RESOURCES

ISO 9001:2015 Certified Institute

G.T. Road By-Pass, Near Basant Vihar, Karnal-132 001 (Haryana) India

Phone: 0184-2961000 | E-mail: directornbagr@gmail.com | Twitter: @IcarNbagr

Facebook: https://www.facebook.com/people/Icar-nbagr-Karnal-India/100056955934193/