



वार्षिक प्रतिवेदन ANNUAL REPORT

2025



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.



ICAR-NBAGR



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



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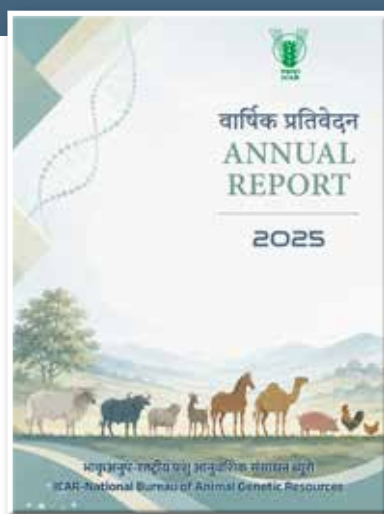
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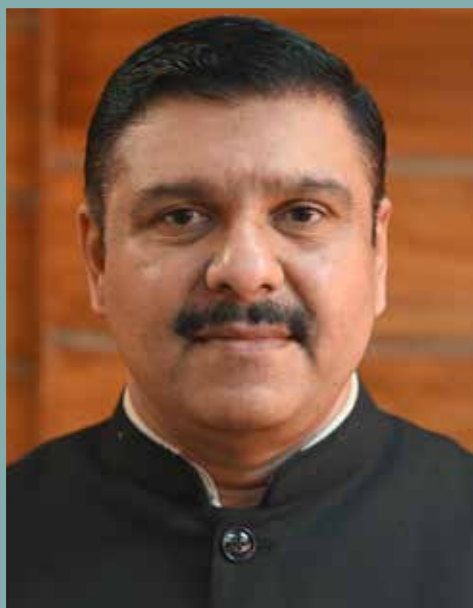
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From the Director's Desk

I am enraptured to present the Annual Report-2025 of the ICAR-National Bureau of Animal Genetic Resources, Karnal to all our revered readers and AnGR stakeholders and it's privilege to reach all through this edition of the bureau's annual report. Bureau is committed for conservation and promotion of India's rich melange of

livestock and poultry genetic resources, a treasure that sustains millions of livelihoods. It's high time to highlight the outstanding contribution and achievements of the bureau during the year 2025, as we are committed to our scientific quest in the identification, characterization, conservation, evaluation and sustainable utilization of Animal Genetic Resources. We share our commitments and efforts towards effective management of AnGR biodiversity of the country, with great pride.

From the initiation of the "Mission towards Zero Non-Descript AnGR of India" on 11th August, 2021, excellent achievements have been accomplished over the span of five years. During 2025, under the mission, 11 projects were implemented across 16 States/Union Territories. This mission paves the way for systematic documentation, characterization and registration of country's vast livestock and poultry diversity. Our scientist team conducted surveys along the length and breadth of the country, including the remote and challenging ecosystems, in collaboration with state Veterinary/Agriculture Universities, Animal Husbandry Departments, NGO's and all other stakeholders, with a foot ahead towards the zero non-descript AnGR. Field survey visit by our team in 8 states/UTs and explored 10 new populations, which are being further characterized by the Bureau in collaboration with state agencies. Frequent interaction of the bureau scientists with all the stake holders through interface meetings and awareness programs sensitized the importance of indigenous AnGR and there by helpful in achieving our goal.

It's a proud moment for me to share the achievement of registering twenty-three (23) indigenous livestock and poultry breeds along with two synthetic cattle and one synthetic sheep, based on the recommendations of the Breed Registration Committee, along with Gazette notification of all the newly registered breeds. Presently under the Network Project on Animal Genetic Resources about 38 Centres, including five new Centres added in 2025, which characterization of more than 80 indigenous livestock, poultry and dog populations along with the in-situ conservation of five critical indigenous breeds are also being carried out.

It's my immense pleasure to share that the bureau's concentrated commitment under medium & long-term conservation of AnGR the germplasm of a total of 6 indigenous breeds in form of semen, 23 indigenous breeds in form of somatic cells and **more than 20 cryopreserved cloned embryos**, were cryopreserved in the National Gene Bank.

The genomic research of our bureau scientists contributed significantly in admixture mapping of non-descript indigenous cattle genetic resources of Eastern and Western India and also selection signatures associated with economically important traits, like milk production, fertility, growth, immunity, stress tolerance, and hypoxia tolerance etc., in cattle of Ladakh and north-eastern states. The diversity analysis of various indigenous livestock

and poultry through microsatellite, whole genome sequence data and Unified SNP array based analysis were accomplished in various indigenous breeds of cattle, buffalo, sheep, goat and horses, contributed significantly towards the breakthrough in the genomic selection as well as for the country's genomic resources database.

Bureau developed a high-quality chromosome-level reference genome of Indian Red Jungle fowl, which exceptional completeness and accuracy, providing an improved genomic resource for avian and evolutionary studies. Whole Genome Sequencing data of about 90GB was generated for indigenous dog breeds/populations, which was complemented by microsatellite-based genetic diversity analysis using ISAG recommended 25 STR markers, which adds to the genome resources of the Nation.

In the year 2025, bureau's immense contribution in generation of epigenetic and transcriptomic signatures data of native animals, lipidomic profiling of milk and colostrum, milk compositional and transcriptomic landscape of major and minor dairy species of India, baseline compositional data for milk from 14 indigenous goat breeds across diverse agro-climatic regions, demonstrating a consistent macronutrient profile with moderate breed-wise variation influenced by genetics and environment. A nationwide comprehensive information on the genetic basis of lower susceptibility of indigenous cattle to bovine anaplasmosis, was accomplished, provides evidence of inter-state transmission, co-infections, and global phylogenetic linkages, highlighting complex epidemiology and substantial species diversity across India's agro-climatic regions.

During the year, the Bureau implemented 38 research projects, including 12 externally funded projects, covering diverse areas of animal genetic resources research and the scientific output included 41 research papers, comprising 29 articles in international journals and five review articles. Four Copyright Certificates were obtained on the breed documents and calendars developed by the Bureau. Scientific contribution of bureau represented as MeshaDB, a comprehensive RNA expression database for Indian sheep, GgaMusTransDb, a curated chicken muscle transcriptome database.

I am delighted to convey that the "Post-Graduate Diploma Programme on Animal Genetic Resources Management" has been launched at ICAR-IVRI in coordination with ICAR-NBAGR, from the academic session 2025-26. Apart from this eighteen bureau scientists are involved in academic

activities, and carrying out teaching and guidance as faculty member. ICAR-NDRI/IVRI.

I extend my best wishes to all the scientists and research scholars of the institute for achieving recognition at various scientific platforms. Hearty congratulations to all the scientific, technical administrative and other staff members of the institute for their outstanding contributions to the progress of the institute and their professional achievements. Bureau family members to strive for excellence and fulfil the mandate was achievable because of constant words of encouragement and motivation from the esteemed visitors. I express my heartfelt gratitude to Dr. M L Jat, Hon'ble Secretary DARE and DG, ICAR, 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, Former ADG (AP&B) ICAR and Dr H K Narula ADG (AP&B) ICAR in all the activities of the Bureau.

I sincerely hope that the Annual Report-2025 of ICAR-NBAGR will serve as a ready source of information for all the stake holders of AnGR in the country. Suggestions drives for the continuous improvement, as we step forward towards our mission.

Jai Hind

NH Mohan

निदेशक की कलम से...

मुझे भाकृअनुप-राष्ट्रीय पशु आनुवंशिक संसाधन ब्यूरो, करनाल की 'वार्षिक रिपोर्ट-2025' को अपने सभी सम्मानित पाठकों और पशु आनुवंशिक संसाधन से जुड़े लोगों के सामने पेश करते हुए बहुत खुशी हो रही है। ब्यूरो भारत के पशुधन और पोल्ट्री आनुवंशिक संसाधनों की समृद्ध विविधता के संरक्षण और बढ़ावा देने के लिए प्रतिबद्ध है; यह एक ऐसा खजाना है जो लाखों लोगों की आजीविका का आधार है। अब समय आ गया है कि 2025 के दौरान ब्यूरो के बेहतरीन योगदान और उपलब्धियों को उजागर किया जाए, क्योंकि हम पशु आनुवंशिक संसाधनों की पहचान, विशेषता-निर्धारण, संरक्षण, मूल्यांकन और टिकाऊ उपयोग की अपनी वैज्ञानिक खोज के लिए प्रतिबद्ध हैं। हम देश की पशु आनुवंशिक संसाधन विविधता के प्रभावी प्रबंधन के प्रति अपनी प्रतिबद्धताओं और प्रयासों को बहुत गर्व के साथ साझा कर रहे हैं।

11 अगस्त, 2021 को शुरू किए गए "भारत के ज़ीरो नॉन-डिस्क्रिप्ट (बिना पहचान वाली नस्ल) पशु आनुवंशिक संसाधन की ओर मिशन" के तहत, पिछले पांच वर्षों में शानदार उपलब्धियां हासिल की गई हैं। 2025 के दौरान, इस मिशन के तहत 16 राज्यों/केंद्र शासित प्रदेशों में 11 परियोजनाएं लागू की गईं। यह मिशन देश की विशाल पशुधन और पोल्ट्री विविधता के व्यवस्थित दस्तावेजीकरण, विशेषता-निर्धारण और पंजीकरण का मार्ग प्रशस्त करता है। हमारी वैज्ञानिक टीम ने राज्य के पशु चिकित्सा/कृषि विश्वविद्यालयों, पशुपालन विभागों, एनजीओ और अन्य सभी हितधारकों के सहयोग से देश भर में - दूरदराज और कठिन पारिस्थितिक तंत्रों सहित - सर्वेक्षण किए, ताकि 'ज़ीरो नॉन-डिस्क्रिप्ट पशु आनुवंशिक संसाधन' के लक्ष्य की ओर बढ़ा जा सके। हमारी टीम ने 8 राज्यों/केंद्र शासित प्रदेशों का दौरा किया और 10 नई आबादी (नस्लों) की खोज की, जिनकी आगे की जांच और विशेषता-निर्धारण ब्यूरो द्वारा राज्य एजेंसियों के सहयोग से किया जा रहा है। इंटरफ़ेस बैठकों और जागरूकता कार्यक्रमों के माध्यम से ब्यूरो के वैज्ञानिकों की सभी हितधारकों के साथ लगातार

बातचीत ने स्वदेशी पशु आनुवंशिक संसाधन के महत्व के प्रति जागरूकता बढ़ाई है और इस प्रकार हमारे लक्ष्य को प्राप्त करने में मदद की है।

मेरे लिए यह गर्व का क्षण है कि मैं 'नस्ल पंजीकरण समिति' की सिफारिशों के आधार पर तेईस (23) स्वदेशी पशुधन और पोल्ट्री नस्लों के साथ-साथ दो सिंथेटिक गोवंश और एक सिंथेटिक भेड़ की नस्लों के पंजीकरण की उपलब्धि साझा कर रहा हूं, साथ ही इन सभी नई पंजीकृत नस्लों की राजपत्र अधिसूचना भी जारी की गई है। अभी 'एनिमल जेनेटिक रिसोर्सेज' (जानवरों के आनुवंशिक संसाधनों) पर नेटवर्क प्रोजेक्ट के तहत लगभग 38 केंद्र काम कर रहे हैं (जिनमें 2025 में जोड़े गए पांच नए केंद्र भी शामिल हैं)। इन केंद्रों पर 80 से ज़्यादा देसी पशुओं, पोल्ट्री और कुत्तों की नस्लों की विशेषताओं की पहचान करने और पांच गंभीर रूप से लुप्तप्राय देसी नस्लों के 'इन-सिटू' (प्राकृतिक आवास में) संरक्षण का काम किया जा रहा है।

मुझे यह बताते हुए बहुत खुशी हो रही है कि पशु आनुवंशिक संसाधन के मध्यम और दीर्घकालिक संरक्षण के प्रति ब्यूरो की प्रतिबद्धता के तहत, नेशनल जीन बैंक में कुल 6 देसी नस्लों का जर्मप्लाज्म (सीमेन के रूप में), 23 देसी नस्लों का जर्मप्लाज्म (सोमैटिक सेल्स के रूप में) और 20 से ज़्यादा क्रायोप्रीजर्व्ड क्लोन्ड भ्रूण सुरक्षित किए गए हैं।

हमारे ब्यूरो के वैज्ञानिकों के जीनोमिक शोध ने पूर्वी और पश्चिमी भारत के बिना किसी खास पहचान वाली देसी गोवंश नस्लों की 'एडमिक्सचर मैपिंग' (मिश्रित आनुवंशिक संरचना की पहचान) में महत्वपूर्ण योगदान दिया है। साथ ही, लद्दाख और पूर्वोत्तर राज्यों के गोवंश में आर्थिक रूप से महत्वपूर्ण गुणों - जैसे दूध उत्पादन, प्रजनन क्षमता, विकास, रोग प्रतिरोधक क्षमता, तनाव सहने की क्षमता और हाइपोक्सिया (कम ऑक्सीजन) सहने की क्षमता - से जुड़े 'सिलेक्शन सिग्नेचर' की पहचान में भी मदद की है। माइक्रोसेटेलाइट, होल जीनोम सीक्वेंस डेटा और यूनिफाइड एसएनपी ऐरे-आधारित विश्लेषण के माध्यम से गोवंश, भैंस, भेड़, बकरी और

घोड़ों की विभिन्न देसी नस्लों में विविधता का विश्लेषण किया गया। इसने जीनोमिक चयन और देश के जीनोमिक संसाधन डेटाबेस में बड़ी सफलता हासिल करने में महत्वपूर्ण योगदान दिया।

ब्यूरो ने भारतीय 'रेड जंगल फाउल' (जंगली मुर्गे) का उच्च-गुणवत्ता वाला क्रोमोसोम-स्तर का रेफरेंस जीनोम तैयार किया है, जो असाधारण रूप से पूरा और सटीक है और पक्षियों व विकासवादी अध्ययनों के लिए एक बेहतर जीनोमिक संसाधन प्रदान करता है। देसी कुत्तों की नस्लों/आबादी के लिए लगभग 90जीबी का होल जीनोम सीक्वेंसिंग डेटा तैयार किया गया। इसे आईएसएजी द्वारा अनुशंसित 25 एसटीआर मार्करों का उपयोग करके माइक्रोसेटेलाइट-आधारित आनुवंशिक विविधता विश्लेषण के साथ और बेहतर बनाया गया, जिससे देश के जीनोम संसाधनों में वृद्धि हुई।

वर्ष 2025 में, ब्यूरो ने कई क्षेत्रों में महत्वपूर्ण योगदान दिया: जैसे देसी जानवरों के एपिजेनेटिक और ट्रांसक्रिप्टोमिक सिग्नेचर डेटा तैयार करना; दूध और कोलोस्ट्रम (खीस) की लिपिडोमिक प्रोफाइलिंग; भारत की प्रमुख और छोटी डेयरी प्रजातियों के दूध की संरचना और ट्रांसक्रिप्टोमिक स्थिति का अध्ययन; और विभिन्न कृषि-जलवायु क्षेत्रों की 14 देसी बकरी नस्लों के दूध का आधारभूत संरचना डेटा तैयार करना। इस डेटा से पता चला कि मैक्रोन्यूट्रिएंट प्रोफाइल एक जैसा है, जिसमें आनुवंशिकी और पर्यावरण से प्रभावित नस्ल-वार मामूली अंतर है। देश भर में देसी गोवंश में बोवाइन एनाप्लाज्मोसिस के प्रति कम संवेदनशीलता के आनुवंशिक आधार पर व्यापक जानकारी जुटाई गई है। इससे अंतर-राज्यीय प्रसार, सह-संक्रमण और वैश्विक फाइलोजेनेटिक संबंधों के प्रमाण मिलते हैं, जो भारत के कृषि-जलवायु क्षेत्रों में जटिल महामारी विज्ञान और प्रजातियों की व्यापक विविधता को उजागर करते हैं।

इस साल, ब्यूरो ने पशु आनुवंशिक संसाधनों पर शोध के विभिन्न क्षेत्रों में 38 शोध परियोजनाएं पूरी कीं, जिनमें 12 बाहरी रूप से वित्तपोषित परियोजनाएं शामिल थीं। वैज्ञानिक नतीजों में 41 शोध पत्र शामिल थे, जिनमें अंतरराष्ट्रीय पत्रिकाओं में 29 लेख और पांच समीक्षा लेख शामिल हैं। ब्यूरो द्वारा विकसित नस्ल दस्तावेजों और कैलेंडर के लिए चार कॉपीराइट प्रमाण पत्र प्राप्त किए गए। ब्यूरो के वैज्ञानिक योगदान में 'MeshaDB' (भारतीय भेड़ों के लिए एक व्यापक RNA अभिव्यक्ति डेटाबेस) और 'GgaMusTransDb' (मुर्गी की मांसपेशियों के ट्रांसक्रिप्टोम का एक क्यूरेटेड डेटाबेस) शामिल हैं।

मुझे यह बताते हुए खुशी हो रही है कि शैक्षणिक सत्र 2025-26 से भाकृअनुप-राष्ट्रीय पशु आनुवंशिक संसाधन ब्यूरो के सहयोग से भाकृअनुप-भारतीय पशु विज्ञान शोध संस्थान में "पशु आनुवंशिक संसाधन प्रबंधन पर पोस्ट-ग्रेजुएट डिप्लोमा कार्यक्रम" शुरू किया गया है। इसके अलावा, ब्यूरो के अठारह वैज्ञानिक शैक्षणिक गतिविधियों में

शामिल हैं और फैकल्टी सदस्य के रूप में शिक्षण और मार्गदर्शन का काम कर रहे हैं।

मैं संस्थान के सभी वैज्ञानिकों और शोधार्थियों को विभिन्न वैज्ञानिक मंचों पर पहचान हासिल करने के लिए शुभकामनाएं देता हूं। संस्थान की प्रगति और पेशेवर उपलब्धियों में उत्कृष्ट योगदान के लिए संस्थान के सभी वैज्ञानिक, तकनीकी, प्रशासनिक और अन्य कर्मचारियों को हार्दिक बधाई। प्रतिष्ठित आगंतुकों से लगातार प्रोत्साहन और प्रेरणा मिलने के कारण ही ब्यूरो परिवार के सदस्य उत्कृष्टता के लिए प्रयास करने और अपने लक्ष्यों को पूरा करने में सफल हो पाए। मैं, डॉ. एम.एल. जाट माननीय सचिव डेयर और महानिदेशक भाकृअनुप का उनके निरंतर प्रोत्साहन और ज्ञानपूर्ण मार्गदर्शन के लिए हार्दिक आभार व्यक्त करता हूं। मैं ब्यूरो की सभी गतिविधियों में भाकृअनुप के माननीय उप महानिदेशक (पशुविज्ञान) डॉ. राघवेंद्र भट्टा, भाकृअनुप के पूर्व सहायक महानिदेशक (एपीएंडबी) डॉ. जी.के. गौर और महानिदेशक के सहायक महानिदेशक (एपीएंडबी) डॉ. एच.के. नरूला से मिले सहयोग और मार्गदर्शन के लिए भी उनका धन्यवाद करता हूं।

मुझे पूरी उम्मीद है कि भाकृअनुप-राष्ट्रीय पशु आनुवंशिक संसाधन ब्यूरो की वार्षिक रिपोर्ट-2025 देश में पशु आनुवंशिक संसाधन से जुड़े सभी हितधारकों के लिए जानकारी का एक उपयोगी स्रोत साबित होगी। जैसे-जैसे हम अपने मिशन की ओर आगे बढ़ रहे हैं, निरंतर सुधार के लिए सुझावों का स्वागत है।

जय हिंद

एनएच मोहन



ICAR-National Bureau of Animal Genetic Resources (NBAGR), one of the six Bureaus under the Indian Council of Agricultural Research (ICAR), was established in 1984 to protect and conserve indigenous farm Animal Genetic Resources (AnGR) for sustainable utilization and livelihood security in the country. The Bureau operates 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 is the nodal agency for animal breed registration and Gazette notification in India and has developed a distinctive framework for this purpose. It also coordinates with national and international organizations, including FAO, on AnGR-related activities and serves as the nodal agency for SDG 2 Indicators 2.5.1 and 2.5.2.

Bureau initiated the “Mission towards Zero Non-Descript AnGR of India” on 11th August, 2021. During 2025, Under the mission, **11 projects were implemented across 16 States/Union Territories**, namely Chhattisgarh, Himachal Pradesh, Goa, Andhra Pradesh, West Bengal, Gujarat, Uttar Pradesh, Uttarakhand, Madhya Pradesh, Rajasthan, Kerala, Tamil Nadu, Maharashtra, Telangana, Ladakh, Lakshadweep islands. Documentation of AnGR of all North-Eastern states have been completed by the Bureau in recent years.

During 2025, total 23 livestock and poultry breeds, along with three synthetic breeds, were registered based on the recommendations of the Breed Registration Committee. These indigenous animal breeds are- Manah buffalo (Assam),





Chaugarkha goat (Uttarakhand), Bundelkhandi goat (Uttar Pradesh & Madhya Pradesh), Kheri sheep (Rajasthan), Karkambi pig (Maharashtra), Ladakhi yak (Ladakh UT), Ladakhi donkey (Ladakh UT), Tripureswari duck (Tripura), Gaddi dog (Himachal Pradesh) and Changkhi dog (Ladakh UT), Medini cattle (Jharkhand), Rohilkhandi cattle (Uttar Pradesh), Melghati buffalo (Maharashtra), Palamu goat (Jharkhand), Udaipuri goat (Uttarakhand), Nagami mithun (Nagaland), Mala chicken (Jharkhand), Kodo duck (Jharkhand), Kudu duck (Odisha), Kuttanad duck (Kerala), Manipuri duck (Manipur), Nagi duck (Assam) and Rajdigheli geese (Assam). Further three synthetic breeds - Karan Fries synthetic cattle (Haryana), Vrindavani synthetic cattle (Uttar Pradesh) and Avishaan synthetic sheep (Rajasthan) were also registered.

By 2025, total 242 indigenous animal breeds, including 55 for cattle, 22 for buffalo, 43 for goat, 46 for sheep, 8 for horses & ponies, 9 for camel, 15 for pig, 4 for donkey, 5 for dog, 2 for yak, 21 for chicken, 9 for duck, 2 for geese and 1 for mithun; 3 synthetic breeds of cattle, and 1 synthetic breed of sheep were registered.

Gazette notification of animal breeds

Ten indigenous animal breeds- Manah buffalo (Assam), Chaugarkha goat (Uttarakhand), Bundelkhandi goat (Uttar Pradesh & Madhya Pradesh), Kheri sheep

(Rajasthan), Karkambi pig (Maharashtra), Ladakhi yak (Ladakh UT), Ladakhi donkey (Ladakh UT), Tripureswari duck (Tripura), Gaddi dog (Himachal Pradesh) and Changkhi dog (Ladakh UT), registered by the ICAR-NBAGR during January, 2025 have been gazette notified by DARE, Min. of Agriculture & Farmers Welfare, Govt. of India [No. 1689 (S.O.1720 (E), (April 15, 2025))].

Identification and characterization of indigenous AnGR

After launch of the Mission, institutional projects were initiated for survey and documentation of AnGR in 24 states and three Union Territories in collaboration with SAHD, KVKs, SAUs/SVUs. Bureau conducted survey in



these states/ UTs and explored more than 80 new populations of indigenous livestock, poultry and dog. During 2025, surveys were conducted in 8 states/UTs and explored 10 new populations, which are being further characterized by the Bureau in collaboration with state agencies.

Many new populations of indigenous livestock, poultry and dog species were identified through institute based projects. These populations included - Awadhi and Shamali sheep, Jaunpuri and Bamdoli goat of Uttar Pradesh; Kow Bakar goat of Uttarakhand; indigenous cattle population in the Kolli Hills region of Tamil Nadu; Attappady cattle of Kerala; Rewanchal cattle and Rewanchal buffalo in the Rewa Division of Madhya Pradesh; Phagi sheep of Rajasthan; indigenous cattle, pig, and duck of Bastar region of Chhattisgarh; Lakshadweep goat and Lakshadweep chicken of Lakshadweep (UT) and white-coated cattle population of West Bengal.

Bureau is running 'Network Project on Animal Genetic Resources' for documentation and characterization of indigenous populations in the country, involving State AHDs, SAUs/SVUs, ICAR institutions NGOs. At present, 38 Centres, including five new Centres added in 2025, of 30 states/UTs are under the Network Project. Presently, NWP-AnGR is involved in characterization of more than 80 indigenous livestock, poultry and dog populations. Further, *In situ* conservation program for five critical indigenous breeds (Tibetan & Karnah sheep, Zanskari horse, Halari donkey and Mewari camel) is also being carried out.

Eighteen new native populations of 14 states/UT were characterized during 2025; mainly through Network Project on AnGR. These populations are - Narainpuri goat (Chhattisgarh), Tyaji pony (West Bengal), Eki dog (Arunachal Pradesh), Gola pig (Odisha), Mala chicken (Jharkhand), Charkha chicken (Jharkhand), Jharkhandi buffalo (Jharkhand), Ara goat (Bihar), Jaunpuri goat (UP), Lakshadivi goat (Lakshadweep), Gangavathi cattle (Karnataka), Melghati cattle (Maharashtra), Tirhuti goat (Bihar), Kashmir Pony (J&K), Kodo

duck (Jharkhand), Attapady cattle (Kerala), Gomanchal buffalo (Goa), Abujhmari-Bastar pig (Chattisgarh), Meitei-Yen chicken (Mizoram). Till now, more than 270 indigenous populations have been characterized by the Bureau.

In a project on Stray cattle, the data based on 20th Livestock Census (2019), with district-level mapping to identify high-density regions and facilitate targeted field surveys Compiled and analysed. A comprehensive questionnaire and initiated field data collection in selected districts of Haryana and the National Capital Territory of Delhi was also developed to generate primary insights on stray cattle dynamics.

Conservation of AnGR

Under Medium & Long-term conservation of AnGR under (SDG) Indicator 2.5.1, the germplasm of a total of 6 indigenous breeds in form of semen (21500 semen doses) and 23 indigenous breeds in form of somatic cells (1840 vials) were cryopreserved in the National Gene Bank of the Bureau during 2025. Till 2025, semen of 63 indigenous breeds/populations (3.27 Lakh semen doses), -and Somatic cell of 115 breeds/populations (13950 vials) have been cryopreserved at the National Gene Bank of the Bureau. The Bureau has cryopreserved the germplasm of the 37 threatened indigenous breeds 'out of total 38 such breeds in its National Gene bank.

A repository of more than 20 cryopreserved cloned embryos, representing both sexes, was also established, further strengthening the *ex situ* conservation of valuable animal genetic resources. A reproducible, quality-controlled workflow was developed for zona-free somatic cell nuclear transfer (SCNT), enabling efficient production of cloned embryos and successful generation of cloned blastocysts of the Chilika buffalo.

Further, *In situ* conservation program for five critical indigenous breeds (Tibetan & Karnah sheep, Zanskari horse, Halari donkey and Mewari camel) is also being carried out under the Network Project on AnGR.

Genomic analysis of AnGR

For assessing the admixture mapping of cattle in Eastern and Western India, the genetic structure of indigenous cattle populations was elucidated, revealing that non-descript populations (Jharkhandi and Ranchi/Hazaribag cattle) predominantly belong to the Haryana type when compared with Shahabadi and 18 registered/exotic breeds. Key genomic regions under selection associated with economically important traits, including milk production, fertility, growth, immunity, and stress tolerance in Lakhimi cattle, and hypoxia tolerance, muscle development, fertility, and stress adaptation in Masilum cattle were also identified; revealing distinct adaptive signatures.

Genome-wide SNP analysis of 18 Indian indigenous cattle breeds using ddRAD sequencing revealed substantial breed-specific variation in genomic diversity and homozygosity, providing a basis for targeted conservation and sustainable breeding strategies.

Microsatellite-based genetic diversity analysis of Bastar, Chhattisgarhi, and Manda buffaloes revealed that Bastar buffalo represents a genetically diverse, stable, and well-adapted indigenous population with a distinct genetic identity. The study established genetic distinctness and substantial diversity of local buffalo populations from Bastar and northern hilly regions, differentiating them from recognized Manda and Chhattisgarhi buffalo breeds.

Generated NGS data for island goat populations (Lakshadweep, Andamani, and Teresa) and established their genetic structure, revealing distinct clustering and differentiation of Andamani and Lakshadweep goats, while indicating admixture in Teresa goats.

For delineating genomic diversity, population structure and demographic dynamics in diverse native buffalo breeds of India Generated high-coverage (~20×) whole-genome sequence data

for multiple buffalo breeds, creating a dataset of 80 animals across 10 breeds, with analyses revealing substantial within-breed genetic diversity. Elucidated breed relationships through Principal Component Analysis, highlighting the distinct genetic identity of Toda and Chilika buffalo, clustering of geographically proximate breeds such as Chhattisgarhi and Manda, and closer genetic affinity among Murrah, Banni, Jaffarabadi, and Dharwari populations. Genomic analysis of 10 buffalo breeds revealed pronounced genetic stratification among breeds, with distinct northeastern and Toda populations reflecting unique genetic backgrounds shaped by geographical separation and breed-specific evolution.

For development of reference panel and admixture analysis of buffalo genetic resources of India a total of 384 samples representing 11 buffalo breeds were genotyped using the Unified Buffalo SNP Array (61,353 markers), retaining 54,777 high-quality SNPs for downstream analyses following quality control. Included 300 whole-genome sequencing (WGS) samples from nine breeds for variant calling.

Genetic diversity in cryopreserved semen of cattle and buffalo bulls was evaluated using



microsatellite markers, covering 192 cattle bulls and 96 buffalo bulls.

Whole-genome re-sequencing data (~10× coverage) was generated for 100 Indian horses across five breeds, followed by rigorous quality control and alignment to the latest reference genome assembly. A genomic dataset by integrating >220 horses, including Indian and global breeds for population structure and ancestry analyses was established. Preliminary study revealed substantial genomic diversity and distinct breed-specific population structure, reflecting their unique evolutionary histories, geographic adaptation, and historical gene flow. Bureau also initiated work for characterization of genetic loci associated with endurance traits in horses.

A high-quality chromosome-level reference genome of Indian Red Jungle fowl was developed, consisting of 38 autosomes (including 9 macro, 10 dot and 19 micro chromosomes) along with Z and W chromosomes, with an N50 of 91.4 Mb. It achieved exceptional completeness and accuracy and providing an improved genomic resource for avian and evolutionary studies.

The first Indian chicken pangenome, identifying 34,531 novel sequences was generated that substantially improved WGS and RNA-Seq mapping efficiency, thereby strengthening resources for genomic research and genetic improvement.

Genomic characterization through whole-genome sequencing of 36 animals (~90 GB data) across Bhotia, RamandMandai, and Bhakarwali dogs, complemented by microsatellite-based genetic diversity analysis of Bhotia dogs using 25 STR markers under the Advanced Research Project on Canine project.

Evaluation and trait characterization of AnGR

To explore epigenetic and transcriptomic signatures in native and non-native bovines of Ladakh for adaptation to high altitude Generated comparative haematological profiles of Ladakhi cattle, yak, and Sahiwal cattle, revealing superior oxygen transport capacity and hypoxia resilience in Ladakhi yak, intermediate levels in Ladakhi cattle, and lower erythrocytic indices with lymphocyte-dominant immunity in Sahiwal cattle. Identified significant upregulation of hypoxia-responsive genes (e.g., HIF1A, VEGF family, EPAS1) in Ladakhi cattle compared to Sahiwal, elucidating molecular mechanisms underlying high-altitude adaptation.

Lipidomic profiling of Ladakhi cow milk and colostrum revealed distinct stage-specific lipid signatures, with colostrum supporting neonatal immunity and adaptation to high-altitude conditions and mature milk primarily supporting calf growth and metabolic needs. Ladakhi cow colostrum-derived ghee improved biochemical parameters and demonstrated potential protective effects against pancreatitis-associated tissue damage in mice model.

To develop biotechnological package for Badri cattle of Uttarakhand nutritional attributes of Badri cattle milk, demonstrating enrichment of key vitamins (A and E) and minerals (calcium and magnesium) was assessed, highlighting the breed's nutritional significance.

To unravel breed signatures behind variability susceptibility to Lumpy skin disease, 4765 SNPs within 564 immune genes that clearly clustered the clinically infected and apparently healthy animals were identified. Genomic variants in IL20RA and ARHGAP15 genes were identified to be associated with differential susceptibility and resistance to lumpy skin disease, providing potential markers for LSD-resilient breeding in indigenous cattle.

For Comparison of milk compositional and transcriptomic landscape of major and minor dairy species of India, baseline compositional data for milk from 14 indigenous goat breeds across diverse agro-climatic regions, demonstrating a consistent macronutrient profile with moderate breed-wise variation influenced by genetics and environment was generated. High nutritional and functional value of goat milk through detailed profiling of vitamins, minerals, amino acids, and fatty acids, highlighting its richness in essential nutrients, balanced mineral composition, and digestible bioactive components were also established. Comparative profiling of sheep and goat milk revealed distinct and complementary nutritional and metabolomic profiles, underscoring their species-specific nutritional and functional potential for diverse food and dietary applications. For deciphering the genetic basis of lower susceptibility of indigenous cattle to bovine anaplasmosis, a nationwide molecular survey of *Anaplasma* spp. (*A. marginale*, *A. bovis*, and *A. platys*), across 23 states and 3 UTs was conducted, which revealing 35.5% prevalence with higher susceptibility in crossbred cattle and widespread dominance of *A. marginale*. Identified 21 genetically diverse strains of *A. marginale* through MSP4-based sequencing with evidence of inter-state transmission, co-infections, and global phylogenetic linkages, highlighting complex epidemiology and substantial species diversity across India's agro-climatic regions.

Selection signature analysis in Changthangi goats identified candidate genes and pathways associated with fiber quality, tissue integrity, metabolic efficiency, and adaptation to high-altitude hypoxic conditions.

Dual-tissue transcriptomic analysis of Changthangi sheep revealed coordinated cardiac and pulmonary molecular adaptations involving hypoxia tolerance,

oxidative stress defense, tissue remodeling, and inflammatory regulation, underpinning high-altitude resilience.

Comparative hepatic transcriptomics across diverse chicken breeds identified a conserved core of >11,000 genes supporting essential metabolic, immune, lipid, and hemostatic functions. Indigenous chicken breeds showed distinct liver expression signatures associated with lipid metabolism, stress tolerance, hypoxia response, reproduction, and environmental adaptation. Comparative analysis of Kadaknath and Aseel revealed breed-specific metabolic and stress-response pathways, providing molecular insights into their contrasting production traits and resilience.

Comparative skin transcriptomics in Broiler and Naked Neck chickens revealed distinct molecular adaptations, with Broilers emphasizing structural development and tissue integrity, while Naked Neck chickens showed enhanced pathways linked to muscle activity, calcium signaling, and thermoregulatory adaptation, offering potential targets for climate-resilient poultry production.

For computer vision approaches for animal morphometric measurement, various computer vision models, including YOLO-based frameworks were explored and sourced relevant training datasets for animal keypoint detection from Kaggle





and GitHub repositories. Implemented Python-based workflows to detect keypoints in cattle images using trained YOLO models available online.

Research projects and publications

During the year, the Bureau implemented 38 research projects, including 12 externally funded projects, covering diverse areas of animal genetic resources research. The scientific output included 41 research papers, comprising 29 articles in international journals and five review articles.

Technology, databases & services

Provided nationwide karyotyping and genetic testing services for cattle and buffalo breeding bulls maintained at semen stations, supporting quality control and genetic health of breeding programmes. Identified six novel lethal mutations in Indian Holstein Friesian, Jersey, and crossbred cattle, developed PCR-based diagnostic assays for their detection, and uncovered additional deleterious variants in cattle and buffalo through *in silico* analyses.

Four Copyright Certificates were obtained on the breed documents and calendars developed by the Bureau. Further 2 copyright applications were filed. MeshaDB, a comprehensive RNA expression database for Indian sheep was developed, enabling

the identification of tissue-specific regulatory networks and key adaptive genes. GgaMusTransDb, a curated chicken muscle transcriptome database was developed by integrating RNA-seq data from five diverse breeds to enable comparative analysis of muscle growth, development, physiology, and breed-specific meat quality traits.

Academic activities

Bureau scientists are involved in academic activities, and carrying out teaching and guidance as faculty member. Eighteen scientists are faculty of NDRI/IVRI. Eight Master and 20 PhD scholars are pursuing research in the institute. A “Post-Graduate Diploma Programme on Animal Genetic Resources Management” has been launched at ICAR-IVRI in coordination with ICAR-NBAGR, from the academic session 2025-26.

Awards and recognitions

The scientific contributions of the Bureau’s scientists and scholars received recognition through best presentation awards at national and international conferences and seminars, along with fellowships from professional scientific societies.

Capacity building and awareness programmes

The Bureau conducted three specialized training programmes covering diverse aspects of animal genetic resources management and catering to the capacity-building needs of different stakeholder groups.

Awareness programmes and exposure visits were organized for farmers and school students to promote awareness of indigenous AnGR and highlight the role and activities of the Bureau in their conservation and sustainable utilization.

Viksit Krishi Sankalp Abhiyan: Bureau participated in the nation-wide campaign “Viksit Krishi Sankalp Abhiyan” organized by the MoAFW from 29 May to 12 June, 2025. During the fifteen days program, more than 3500 farmers of about 250 villages participated.

ICAR felicitated applicants of animal breeds registered during 2023 to 2025 in a ceremony held on January 17, 2025, at New Delhi. In the ceremony, about 80 breed applicants were honored

for registering 18 breeds of indigenous livestock, poultry and dog breeds.

Celebrations

Republic Day, International Day for Biological Diversity, Independence Day, Foundation Day, and Hindi Pakhwada were observed with enthusiasm throughout the year, with active participation of Bureau personnel in the various programmes and activities organized on these occasions.

Meetings

Meetings of the Institute Research Committee (IRC), Research Advisory Committee (RAC), Institute Management Committee (IMC), and Quinquennial Review Team (QRT), along with the annual review of the Network Project, were conducted as scheduled during the year.

Personnel

Director ICAR-NBAGR and two scientist joined the institute. Six bureau staff members were superannuated.





देशी नस्लों का रजिस्ट्रेशन

साल 2025 के दौरान, 'नस्ल रजिस्ट्रेशन समिति' की सिफारिशों के आधार पर कुल 23 पशु और पोल्ट्री नस्लों के साथ-साथ तीन सिंथेटिक नस्लों का रजिस्ट्रेशन किया गया। इन देशी पशु नस्लों में शामिल हैं- मनाह भैंस (असम), चौगरखा बकरी (उत्तराखंड), बुंदेलखंडी बकरी (उत्तर प्रदेश और मध्य प्रदेश), खेरी भेड़ (राजस्थान), करकाम्बी सुअर (महाराष्ट्र), लद्दाखी याक (लद्दाख केंद्र शासित), लद्दाखी गधा (लद्दाख केंद्र शासित), त्रिपुरेश्वरी बत्तख (त्रिपुरा), गद्दी कुत्ता (हिमाचल प्रदेश) और चांगखी कुत्ता (लद्दाख केंद्र शासित), मेदिनी गोवंश (झारखंड), रोहिलखंडी गोवंश (उत्तर प्रदेश), मेलघाटी भैंस (महाराष्ट्र), पलामू बकरी (झारखंड), उदयपुरि बकरी (उत्तराखंड), नागामी मिथुन (नागालैंड), माला मुर्गी (झारखंड), कोडो बत्तख (झारखंड), कुडू बत्तख (ओडिशा), कुट्टनाड बत्तख (केरल), मणिपुरी बत्तख (मणिपुर), नागी बत्तख (असम) और राजदिघेली हंस (असम)। इसके अलावा तीन सिंथेटिक नस्लों - करन फ्राइज सिंथेटिक गोवंश (हरियाणा), वृंदावनी सिंथेटिक गोवंश (उत्तर प्रदेश) और अविशान सिंथेटिक भेड़ (राजस्थान) का भी रजिस्ट्रेशन किया गया।

साल 2025 तक, कुल 242 देशी पशु नस्लों का रजिस्ट्रेशन किया गया, जिनमें गोवंश की 55, भैंस की 22, बकरी की 43, भेड़ की 46, घोड़ों और टट्टुओं की 8, ऊंट की 9, सुअर की 15, गधे की 4, कुत्ते की 5, याक की 2, मुर्गी की 21, बत्तख की 9, हंस की 2 और मिथुन की 1 नस्ल शामिल हैं; साथ ही गोवंश की 3 सिंथेटिक नस्लें और भेड़ की 1 सिंथेटिक नस्ल भी रजिस्टर्ड की गईं। पशु नस्लों की राजपत्र अधिसूचना जनवरी के दौरान आईसीएआर-एनबीएजीआर द्वारा पंजीकृत दस देशी पशु नस्लें- मनाह भैंस (असम), चौगरखा बकरी (उत्तराखंड), बुंदेलखंडी बकरी (उत्तर प्रदेश और मध्य प्रदेश), खेरी भेड़ (राजस्थान), करकाम्बी सुअर (महाराष्ट्र), लद्दाखी याक (लद्दाख यूटी), लद्दाखी गधा (लद्दाख यूटी), त्रिपुरेश्वरी बत्तख (त्रिपुरा), गद्दी कुत्ता



(हिमाचल प्रदेश) और चांगखी कुत्ता (लद्दाख यूटी)। 2025 को डेयर, कृषि एवं किसान कल्याण मंत्रालय, भारत सरकार द्वारा राजपत्रित अधिसूचित किया गया है। कृषि एवं किसान कल्याण विभाग, सरकार। भारत के [सं. 1689 (एस.ओ.1720 (ई), (15 अप्रैल, 2025)]।

देशी पशु आनुवंशिक संसाधन की पहचान और उनकी विशेषताएं

मिशन शुरू होने के बाद, एसएचडी, केवीके और एसएयू/एसवीयू के सहयोग से 24 राज्यों और तीन केंद्र शासित प्रदेशों में पशु आनुवंशिक संसाधन के सर्वे और डॉक्यूमेंटेशन के लिए संस्थागत प्रोजेक्ट शुरू किए गए। ब्यूरो ने इन राज्यों/केंद्र शासित प्रदेशों में सर्वे किया और देशी पशुधन, पोल्ट्री और कुत्तों की 80 से ज्यादा नई आबादी का पता लगाया। 2025 के दौरान, 8 राज्यों/केंद्र शासित प्रदेशों में सर्वे किए गए और 10 नई आबादी का पता लगाया गया, जिनकी विशेषताओं का पता ब्यूरो राज्य एजेंसियों के सहयोग से लगा रहा है।

संस्थान-आधारित प्रोजेक्ट के ज़रिए देशी पशुधन, पोल्ट्री और कुत्तों की प्रजातियों की कई नई आबादी की पहचान की गई। इन आबादी में शामिल हैं - उत्तर प्रदेश की अवधी और शामली भेड़, जौनपुरी और बामडोली बकरी; उत्तराखंड की कोव बकर बकरी; तमिलनाडु के कोल्ली हिल्स क्षेत्र में देशी गोवंश की आबादी; केरल के अट्टापपडी गोवंश; मध्य प्रदेश के रीवा डिवीजन में रेवांचल गोवंश और रेवांचल भैंस; राजस्थान की फागी भेड़; छत्तीसगढ़ के बस्तर क्षेत्र में देशी गोवंश, सूअर और बत्तख; लक्षद्वीप (केंद्र शासित प्रदेश) की लक्षद्वीप बकरी और लक्षद्वीप मुर्गी और पश्चिम बंगाल की सफेद रंग के गोवंश की आबादी।

ब्यूरो देश में देशी आबादी के डॉक्यूमेंटेशन और उनकी विशेषताओं का पता लगाने के लिए 'एनिमल जेनेटिक रिसोर्सेज पर नेटवर्क

प्रोजेक्ट' चला रहा है, जिसमें राज्य एचडी, एसएयू/एसवीयू, भाकृअनुप के संस्थान और एनजीओ शामिल हैं। अभी, नेटवर्क प्रोजेक्ट के तहत 30 राज्यों/केंद्र शासित प्रदेशों के 38 केंद्र हैं, जिनमें 2025 में जोड़े गए पांच नए केंद्र भी शामिल हैं। फिलहाल, नेटवर्क प्रोजेक्ट-पशु आनुवंशिक संसाधन देशी पशुधन, पोल्ट्री और कुत्तों की 80 से ज्यादा आबादी की विशेषताओं का पता लगाने का काम कर रहा है। इसके अलावा, पांच गंभीर रूप से खतरे में पड़ी देशी नस्लों (तिब्बती और करनाह भेड़, जंस्करी घोड़ा, हलारी गधा और मेवाड़ी ऊंट) के लिए इन-सिटू संरक्षण कार्यक्रम भी चलाया जा रहा है।

2025 के दौरान 14 राज्यों/केंद्र शासित प्रदेशों की अठारह नई देशी आबादी की विशेषताओं का पता लगाया गया; मुख्य रूप से पशु आनुवंशिक संसाधन पर नेटवर्क प्रोजेक्ट के ज़रिए। इन नस्लों में शामिल हैं – नारायणपुरी बकरी (छत्तीसगढ़), त्याजी टट्टू (पश्चिम बंगाल), एकी कुत्ता (अरुणाचल प्रदेश), गोला सुअर (ओडिशा), माला मुर्गी (झारखंड), चरखा मुर्गी (झारखंड), झारखंडी भैंस (झारखंड), आरा बकरी (बिहार), जौनपुरी बकरी (यूपी), लक्षद्वीपी बकरी (लक्षद्वीप), गंगावती गोवंश (कर्नाटक), मेलघाटी गोवंश (महाराष्ट्र), तिरहुती बकरी (बिहार), कश्मीर टट्टू (जम्मू एवं कश्मीर), कोडो बत्तख (झारखंड), अट्टापपडी गोवंश (केरल), गोमंचल भैंस (गोवा), अबूझमारी-बस्तर सुअर (छत्तीसगढ़), मेइतेई-येन मुर्गी (मिजोरम)। अब तक, ब्यूरो ने 270 से ज्यादा देसी नस्लों की पहचान और विशेषताओं का विवरण तैयार किया है।

आवारा गोवंश पर एक प्रोजेक्ट में, 20वीं पशुधन जनगणना (2019) के डेटा का इस्तेमाल किया गया। इसमें ज्यादा आबादी वाले इलाकों की पहचान करने और खास तौर पर फील्ड सर्वे में मदद के लिए ज़िले-वार मैपिंग की गई और डेटा का विश्लेषण किया गया। आवारा गोवंश की स्थिति के बारे में ज़रूरी जानकारी

जुटाने के लिए हरियाणा और दिल्ली (राष्ट्रीय राजधानी क्षेत्र) के चुने हुए जिलों में एक विस्तृत प्रश्रावली तैयार की गई और फील्ड डेटा इकट्ठा करने का काम शुरू किया गया।

पशु आनुवंशिक संसाधन का संरक्षण

एसडीजी इंडिकेटर 2.5.1 के तहत पशु आनुवंशिक संसाधन के मीडियम और लॉन्ग-टर्म संरक्षण के अंतर्गत, 2025 के दौरान ब्यूरो के नेशनल जीन बैंक में कुल 6 देसी नस्लों का जर्मप्लाज्म सीमेन (21,500 सीमेन डोज़) के रूप में और 23 देसी नस्लों का जर्मप्लाज्म सोमैटिक सेल्स (1,840 शीशियों) के रूप में क्रायोप्रीजर्व किया गया। 2025 तक, ब्यूरो के नेशनल जीन बैंक में 63 देसी नस्लों/आबादी (3.27 लाख सीमेन डोज़) का सीमेन और 115 नस्लों/आबादी (13,950 शीशियों) की सोमैटिक सेल्स क्रायोप्रीजर्व की जा चुकी हैं। ब्यूरो ने ऐसी कुल 38 संकटग्रस्त देसी नस्लों में से 37 का जर्मप्लाज्म अपने नेशनल जीन बैंक में क्रायोप्रीजर्व किया है।

दोनों लिंगों का प्रतिनिधित्व करने वाले 20 से अधिक क्रायोप्रीजर्व्ड क्लोन्ड भ्रूणों का एक भंडार भी स्थापित किया गया, जिससे मूल्यवान पशु आनुवंशिक संसाधनों के 'एक्स-सीटू' संरक्षण को और मजबूती मिली। ज़ोना-फ्री सोमैटिक सेल न्यूक्लियर ट्रांसफर के लिए एक दोहराने योग्य और गुणवत्ता-नियंत्रित वर्कफ्लो विकसित किया गया, जिससे क्लोन्ड भ्रूणों का कुशल उत्पादन और चिलिका भैंस के क्लोन्ड ब्लास्टोसिस्ट का सफल निर्माण संभव हो सका।

इसके अलावा, पशु आनुवंशिक संसाधन पर नेटवर्क प्रोजेक्ट के तहत पांच गंभीर रूप से संकटग्रस्त देसी नस्लों (तिब्बती और करनाह भेड़, जंस्करी घोड़ा, हलारी गधा और मेवाड़ी ऊंट) के लिए 'इन-सीटू' संरक्षण कार्यक्रम भी चलाया जा रहा है।

पशु आनुवंशिक संसाधन का जीनोमिक विश्लेषण

पूर्वी और पश्चिमी भारत में गोवंश की 'एडमिक्सचर मैपिंग' (मिश्रण का पता लगाने) के लिए, देसी गोवंश आबादी की आनुवंशिक संरचना का अध्ययन किया गया। इससे पता चला कि गैर-विशिष्ट आबादी (झारखंडी और रांची/हजारीबाग गोवंश) मुख्य रूप से हरियाणवी प्रकार की हैं, जब उनकी तुलना शाहाबादी और 18 पंजीकृत/विदेशी नस्लों से की जाती है। लखीमी गोवंश में दूध उत्पादन, प्रजनन क्षमता, विकास, रोग प्रतिरोधक क्षमता और तनाव सहनशीलता जैसे आर्थिक रूप से महत्वपूर्ण गुणों से जुड़े प्रमुख जीनोमिक क्षेत्रों की पहचान की गई; साथ ही मसिलम गोवंश में हाइपोक्सिया (ऑक्सीजन की कमी) सहनशीलता, मांसपेशियों के विकास, प्रजनन क्षमता और तनाव अनुकूलन से जुड़े क्षेत्रों की भी पहचान की गई, जिससे विशिष्ट अनुकूलन संकेतकों का पता चला। डीडी-रैड सीक्वेंसिंग का इस्तेमाल करके भारत की 18 देसी गोवंश नस्लों के जीनोम-वाइड एसएनपी एनालिसिस से जीनोमिक विविधता और होमोज़ायगोसिटी में नस्ल-के-हिसाब से काफी अंतर का पता चला, जिससे खास तौर पर संरक्षण और टिकाऊ ब्रीडिंग रणनीतियों के लिए आधार मिला।



बस्तर, छत्तीसगढ़ी और मंडा भैंसों के माइक्रोसेटेलाइट-आधारित जेनेटिक विविधता एनालिसिस से पता चला कि बस्तर भैंस एक जेनेटिक रूप से विविध, स्थिर और अच्छी तरह से अनुकूलित देसी आबादी है, जिसकी अपनी अलग जेनेटिक पहचान है। इस स्टडी ने बस्तर और उत्तरी पहाड़ी इलाकों की स्थानीय भैंस आबादी की जेनेटिक विशिष्टता और काफी विविधता को स्थापित किया, और उन्हें मान्यता प्राप्त मंडा और छत्तीसगढ़ी भैंस नस्लों से अलग बताया।

आइलैंड पर रहने वाली बकरियों की आबादी (लक्षद्वीप, अंडमानी और टेरेसा) के लिए एनजीएस डेटा तैयार किया गया और उनके जेनेटिक स्ट्रक्चर का पता लगाया गया, जिससे अंडमानी और लक्षद्वीप बकरियों की अलग-अलग क्लस्टरिंग और अंतर का पता चला, जबकि टेरेसा बकरियों में मिलावट (एडमिक्सचर) का संकेत मिला।

भारत की अलग-अलग देसी भैंस नस्लों में जीनोमिक विविधता, आबादी की संरचना और डेमोग्राफिक बदलावों को समझने के लिए, कई भैंस नस्लों का हाई-कवरेज (~20×) होल-जीनोम सीक्वेंस डेटा तैयार किया गया। इसमें 10 नस्लों के 80 जानवरों का डेटासेट बनाया गया, जिसके विश्लेषण से नस्ल के भीतर काफी जेनेटिक विविधता का पता चला। 'प्रिंसिपल कंपोनेंट एनालिसिस' के ज़रिए नस्लों के आपसी संबंधों को समझा गया, जिसमें टोडा और चिल्का भैंस की अलग जेनेटिक पहचान, छत्तीसगढ़ी और मंडा जैसी भौगोलिक रूप से पास की नस्लों का एक साथ समूह बनना, और मुर्रा, बन्नी, जाफराबादी और धारवाड़ी आबादी के बीच करीबी जेनेटिक समानता सामने आई। 10 भैंस नस्लों के जीनोमिक विश्लेषण से नस्लों के बीच स्पष्ट जेनेटिक अंतर का पता चला; पूर्वोत्तर और टोडा आबादी ने भौगोलिक अलगाव और नस्ल-विशिष्ट विकास से बने अनोखे जेनेटिक बैकग्राउंड को दिखाया।

भारत के भैंस जेनेटिक संसाधनों के लिए रेफरेंस पैनल और मिक्सचर एनालिसिस (एडमिक्सचर एनालिसिस) विकसित करने के मकसद से, 11 भैंस नस्लों के कुल 384 सैंपल को 'यूनिफाइड बफेलो एसएनपी एरे' (61,353 मार्कर) का इस्तेमाल करके जीनोटाइप किया गया। क्वालिटी कंट्रोल के बाद आगे के विश्लेषण के लिए 54,777 हाई-क्वालिटी एसएनपी रखे गए। वैरिएंट कॉलिंग के लिए नौ नस्लों के 300 होल-जीनोम सीक्वेंसिंग सैंपल भी शामिल किए गए।

माइक्रोसेटेलाइट मार्कर का इस्तेमाल करके गाय और भैंस के सांडों के क्रायोप्रिजर्व्ड (जमाकर रखे गए) वीर्य में जेनेटिक विविधता का मूल्यांकन किया गया, जिसमें 192 गाय के सांड और 96 भैंस के सांड शामिल थे।

पांच नस्लों के 100 भारतीय घोड़ों के लिए होल-जीनोम री-सीक्वेंसिंग डेटा (~10× कवरेज) तैयार किया गया, जिसके बाद कड़ी क्वालिटी जांच और लेटेस्ट रेफरेंस जीनोम असेंबली के साथ अलाइनमेंट किया गया। आबादी की संरचना और वंशावली विश्लेषण के लिए भारतीय और वैश्विक नस्लों सहित 220 से ज़्यादा घोड़ों को मिलाकर एक जीनोमिक डेटासेट बनाया गया। शुरुआती अध्ययन से काफी जेनेटिक विविधता और अलग-अलग नस्ल-विशिष्ट आबादी संरचना का पता चला, जो उनके अनोखे विकासवादी इतिहास, भौगोलिक अनुकूलन और ऐतिहासिक जीन प्रवाह को दर्शाते हैं। ब्यूरो ने घोड़ों में सहनशक्ति (एंड्योरेंस) से जुड़े जेनेटिक लोकी (जीन के स्थान) की पहचान करने का काम भी शुरू किया।

भारतीय रेड जंगल फाउल का हाई-क्वालिटी क्रोमोसोम-लेवल रेफरेंस जीनोम विकसित किया गया, जिसमें 38 ऑटोसोम (9 मैक्रो, 10 डॉट और 19 माइक्रो क्रोमोसोम सहित) और Z व W क्रोमोसोम शामिल थे, और इसका N50 91.4 Mb था। इसने बेहतरीन पूर्णता और सटीकता हासिल की और पक्षियों व

विकासवादी अध्ययनों के लिए एक बेहतर जीनोमिक संसाधन प्रदान किया। पहला भारतीय चिकन पैन-जीनोम तैयार किया गया, जिसमें 34,531 नए सीक्वेंस की पहचान की गई। इससे होल-जीनोम सीक्वेंसिंग और आरएनए-सैंक मैपिंग की क्षमता में काफी सुधार हुआ, जिससे जीनोमिक रिसर्च और जेनेटिक सुधार के लिए संसाधन मजबूत हुए।

‘एडवांस्ड रिसर्च प्रोजेक्ट ऑन कैनाइन’ के तहत, भोटिया, रामन-मंडई और भाकरवाली कुत्तों (लगभग 90 GB डेटा) की होल-जीनोम सीक्वेंसिंग के ज़रिए जीनोमिक जानकारी हासिल की गई। साथ ही, 25 एसटीआर मार्कर्स का इस्तेमाल करके भोटिया कुत्तों में माइक्रोसेटेलाइट-आधारित जेनेटिक विविधता का विश्लेषण भी किया गया।

पशु आनुवंशिक संसाधन का मूल्यांकन

लद्दाख के देसी और विदेशी गोजातीय जानवरों में ज़्यादा ऊंचाई पर ढलने के लिए एपिजेनेटिक और ट्रांसक्रिप्टोमिक सिग्नेचर का पता लगाना। लद्दाखी गोवंश, याक और साहीवाल गोवंश की तुलना वाली हेमाटोलॉजिकल प्रोफाइल बनाई गई, जिससे पता चला कि लद्दाखी याक में ऑक्सीजन पहुंचाने की बेहतर क्षमता और हाइपोक्सिया रेजिलिएंस है, लद्दाखी गोवंश में बीच का लेवल है, और साहीवाल गोवंश में लिम्फोसाइट-डोमिनेंट इम्यूनोटी के साथ एरिथ्रोसाइटिक इंडेक्स कम हैं। साहीवाल की तुलना में लद्दाखी गोवंश में हाइपोक्सिया-रिस्पॉन्सिव जीन (जैसे, HIF1A, VEGF फैमिली, EPAS1) का काफी ज़्यादा बढ़ना पहचाना गया, जिससे ज़्यादा ऊंचाई पर ढलने के पीछे के मॉलिक्यूलर मैकेनिज्म का पता चला।

लद्दाखी गाय के दूध और कोलोस्ट्रम की लिपिडोमिक प्रोफाइलिंग से अलग-अलग स्टेज-स्पेसिफिक लिपिड सिग्नेचर का पता चला, जिसमें कोलोस्ट्रम नवजात की इम्यूनोटी और ऊंचाई वाली स्थितियों में ढलने में मदद करता है और मैच्योर दूध मुख्य

रूप से बछड़े की ग्रोथ और मेटाबोलिक ज़रूरतों में मदद करता है। लद्दाखी गाय के कोलोस्ट्रम से बने घी ने बायोकेमिकल पैरामीटर्स को बेहतर बनाया और चूहों के मॉडल में पैक्रियाटाइटिस से जुड़े टिशू डैमेज के खिलाफ संभावित बचाव के असर दिखाए।

उत्तराखंड के बद्री गोवंश के लिए बायोटेक्नोलॉजिकल पैकेज बनाने के लिए, बद्री गोवंश के दूध के न्यूट्रिशनल गुणों का मूल्यांकन किया गया, जिसमें मुख्य विटामिन (A और E) और मिनरल्स (कैल्शियम और मैग्नीशियम) की मात्रा को बेहतर दिखाया गया, जिससे नस्ल के न्यूट्रिशनल महत्व पर रोशनी पड़ी।

लंपी स्किन डिजीज के प्रति अलग-अलग संवेदनशीलता के पीछे नस्ल के सिग्नेचर को समझने के लिए, 564 इम्यून जीन के अंदर 4765 एसएनपी की पहचान की गई, जो साफ तौर पर क्लिनिकली इन्फेक्टेड और दिखने में स्वस्थ जानवरों को एक साथ लाए थे। IL20RA और ARHGAP15 जीन में जीनोमिक वेरिएंट की पहचान की गई जो लंपी स्किन डिजीज के प्रति अलग-अलग संवेदनशीलता और रेजिस्टेंस से जुड़े थे, जो देसी गोवंश में एलएसडी-रेसिलिएंट ब्रीडिंग के लिए संभावित मार्कर देते हैं।

भारत की प्रमुख और लघु डेयरी प्रजातियों के दूध की संरचना और ट्रांसक्रिप्टोमिक परिदृश्य की तुलना के लिए, विभिन्न





कृषि-जलवायु क्षेत्रों में 14 देशी बकरी नस्लों के दूध के लिए आधारभूत संरचना डेटा तैयार किया गया था, जो आनुवंशिकी और पर्यावरण से प्रभावित मध्यम नस्ल-वार भिन्नता के साथ एक सुसंगत मैक्रोन्यूट्रिएंट प्रोफाइल प्रदर्शित करता है। विटामिन, खनिज, अमीनो एसिड और फैटी एसिड की विस्तृत प्रोफाइलिंग के माध्यम से बकरी के दूध के उच्च पोषण और कार्यात्मक मूल्य, आवश्यक पोषक तत्वों, संतुलित खनिज संरचना और सुपाच्य जैव सक्रिय घटकों में इसकी समृद्धि पर प्रकाश डाला गया। भेड़ और बकरी के दूध की तुलनात्मक प्रोफाइलिंग से अलग और पूरक पोषण और चयापचय प्रोफाइल का पता चला, जो विविध खाद्य और आहार अनुप्रयोगों के लिए उनकी प्रजाति-विशिष्ट पोषण और कार्यात्मक क्षमता को रेखांकित करता है।

(ए. मार्जिनेल, ए. बोविस, और ए. प्लैटिस) का 23 राज्यों और 3 केंद्र शासित प्रदेशों में सर्वे किया गया, जिससे पता चला कि क्रॉसब्रेड गोवंश में 35.5% तक ए. मार्जिनेल का फैलाव ज्यादा है और यह बहुत ज्यादा है। MSP4-बेस्ड सीक्वेंसिंग के ज़रिए ए. मार्जिनेल के 21 जेनेटिक रूप से अलग-अलग तरह के स्ट्रेन की पहचान की गई, जिसमें राज्यों के बीच ट्रांसमिशन, को-इंफेक्शन और ग्लोबल फाइलोजेनेटिक लिंकेज के सबूत मिले, जिससे

भारत के एग्रो-क्लाइमैटिक इलाकों में मुश्किल एपिडेमियोलॉजी और काफी स्पीशीज डायवर्सिटी का पता चला।

चांगथांगी बकरियों में सिलेक्शन सिग्नेचर एनालिसिस से फाइबर क्वालिटी, टिशू इंडीग्रिटी, मेटाबोलिक एफिशिएंसी और ऊंचाई वाली हाइपोक्सिक कंडीशन में एडैप्शन से जुड़े कैंडिडेट जीन और पाथवे की पहचान हुई।

चांगथांगी भेड़ों के डुअल-टिशू ट्रांसक्रिप्टोमिक एनालिसिस से हाइपोक्सिया टॉलरेंस, ऑक्सीडेटिव स्ट्रेस डिफेंस, टिशू रीमॉडलिंग और इंप्लेमेंटरी रेगुलेशन से जुड़े कोऑर्डिनेटेड कार्डियक और पल्मोनरी मॉलिक्यूलर एडैप्शन का पता चला, जो ऊंचाई वाली रेजिलिएंस को सपोर्ट करता है। अलग-अलग चिकन ब्रीड में कम्पेरेटिव हेपेटिक ट्रांसक्रिप्टोमिक्स से >11,000 जीन के एक कंजर्व्ड कोर की पहचान हुई जो ज़रूरी मेटाबोलिक, इम्यून, लिपिड और हीमोस्टैटिक फंक्शन को सपोर्ट करते हैं। देसी चिकन ब्रीड में लिपिड मेटाबॉलिज्म, स्ट्रेस टॉलरेंस, हाइपोक्सिया रिस्पॉन्स, रिप्रोडक्शन और एनवायरनमेंटल अडैप्शन से जुड़े अलग लिवर एक्सप्रेशन सिग्नेचर दिखा। कड़कनाथ और असील के कम्पेरेटिव एनालिसिस से ब्रीड-स्पेसिफिक मेटाबोलिक और स्ट्रेस-रिस्पॉन्स पाथवे का पता

चला, जिससे उनके अलग-अलग प्रोडक्शन ट्रेट्स और रेजिलिएंस के बारे में मॉलिक्यूलर इनसाइट्स मिलीं।

ब्रॉयलर और नेकेड नेक चिकन में कम्पेरेटिव स्कन ट्रांसक्रिप्टोमिक्स से अलग मॉलिक्यूलर अडैप्टेशन का पता चला, जिसमें ब्रॉयलर में स्ट्रक्चरल डेवलपमेंट और टिशू इंटीग्रिटी पर जोर दिया गया, जबकि नेकेड नेक चिकन में मसल एक्टिविटी, कैल्शियम सिग्नलिंग और थर्मोरेगुलेटरी अडैप्टेशन से जुड़े बेहतर पाथवे दिखे, जो क्लाइमेट-रेसिलिएंट पोल्ट्री प्रोडक्शन के लिए पोटेन्शियल टारगेट देते हैं। जानवरों के मॉर्फोमेट्रिक मेजरमेंट के लिए कंप्यूटर विज्ञान अप्रोच के लिए, YOLO-बेस्ड फ्रेमवर्क समेत अलग-अलग कंप्यूटर विज्ञान मॉडल को एक्सप्लोर किया गया और जानवरों के कीपॉइंट डिटेक्शन के लिए Kaggle और GitHub रिपॉजिटरी से ज़रूरी ट्रेनिंग डेटासेट लिए गए।

रिसर्च प्रोजेक्ट और पब्लिकेशन

इस साल, ब्यूरो ने पशु आनुवंशिक संसाधनों पर रिसर्च के अलग-अलग क्षेत्रों में 38 रिसर्च प्रोजेक्ट पूरे किए, जिनमें 12 बाहरी फंडिंग वाले प्रोजेक्ट शामिल थे। साइंटिफिक आउटपुट में 41 रिसर्च पेपर शामिल थे, जिनमें इंटरनेशनल जर्नल्स में 29 आर्टिकल और पांच रिव्यू आर्टिकल शामिल हैं।

टेक्नोलॉजी, डेटाबेस और सर्विस

सीमेन स्टेशनों पर रखे गए गाय और भैंस के ब्रीडिंग सांडों के लिए देश भर में कैरियोटाइपिंग और जेनेटिक टेस्टिंग सर्विस दी गई, जिससे ब्रीडिंग प्रोग्राम की क्वालिटी कंट्रोल और जेनेटिक हेल्थ में मदद मिली। भारतीय होल्स्टीन फ्रिसियन, जर्सी और क्रॉस-ब्रीड गायों में छह नए जानलेवा म्यूटेशन की पहचान की गई, उनकी जांच के लिए PCR-बेस्ड डायग्नोस्टिक टेस्ट विकसित

किए गए, और इन-सिलिको एनालिसिस के ज़रिए गाय और भैंस में अन्य हानिकारक वैरिएंट्स का पता लगाया गया।

ब्यूरो द्वारा तैयार किए गए ब्रीड डॉक्यूमेंट और कैलेंडर के लिए चार कॉपीराइट सर्टिफिकेट हासिल किए गए। इसके अलावा, 2 और कॉपीराइट एप्लीकेशन फाइल किए गए।

भारतीय भेड़ों के लिए RNA एक्सप्रेशन का एक व्यापक डेटाबेस 'MeshaDB' विकसित किया गया, जिससे टिशू-स्पेसिफिक रेगुलेटरी नेटवर्क और मुख्य एडेप्टिव जीनों की पहचान संभव हो सकी। पांच अलग-अलग नस्लों के RNA-seq डेटा को मिलाकर 'GgaMusTransDb' नाम का एक क्यूरेटेड चिकन मसल ट्रांसक्रिप्टोम डेटाबेस विकसित किया गया, ताकि मांसपेशियों की वृद्धि, विकास, फिजियोलॉजी और नस्ल-विशिष्ट मांस की क्वालिटी की विशेषताओं का तुलनात्मक विश्लेषण किया जा सके।

एकेडमिक गतिविधियां

ब्यूरो के वैज्ञानिक एकेडमिक गतिविधियों में शामिल हैं और फैकल्टी मेंबर के तौर पर टीचिंग और गाइडेंस का काम कर रहे हैं। अठारह वैज्ञानिक राइडअनुसं/IVRI में फैकल्टी हैं। संस्थान में आठ मास्टर और 20 PhD स्कॉलर रिसर्च कर रहे हैं। भाकृअनुप-राष्ट्रीय पशु आनुवंशिक संसाधन ब्यूरो के सहयोग से भाकृअनुप-भारतीय पशु चिकित्सा विज्ञान शोध संस्थान में एकेडमिक सेशन 2025-26 से "पशु आनुवंशिक संसाधन प्रबंधन पर पोस्ट-ग्रेजुएट डिप्लोमा प्रोग्राम" शुरू किया गया है।

पुरस्कार और सम्मान

ब्यूरो के वैज्ञानिकों और विद्वानों के वैज्ञानिक योगदान को राष्ट्रीय और अंतर्राष्ट्रीय सम्मेलनों और सेमिनारों में 'बेस्ट प्रेजेंटेशन

अवार्ड' और पेशेवर वैज्ञानिक सोसायटियों से फेलोशिप के ज़रिए पहचान मिली।

क्षमता निर्माण और जागरूकता कार्यक्रम

ब्यूरो ने पशु आनुवंशिक संसाधनों के प्रबंधन के विभिन्न पहलुओं को कवर करते हुए और अलग-अलग हितधारक समूहों की क्षमता निर्माण की ज़रूरतों को पूरा करते हुए तीन विशेष प्रशिक्षण कार्यक्रम आयोजित किए।

किसानों और स्कूली छात्रों के लिए जागरूकता कार्यक्रम और एक्सपोज़र विजिट आयोजित की गईं, ताकि उन्हें देसी पशु आनुवंशिक संसाधन के बारे में जागरूक किया जा सके और इनके संरक्षण और टिकाऊ इस्तेमाल में ब्यूरो की भूमिका और गतिविधियों को उजागर किया जा सके।

विकसित कृषि संकल्प अभियान: ब्यूरो ने मंत्रालय द्वारा 29 मई से 12 जून, 2025 तक आयोजित देशव्यापी अभियान "विकसित कृषि संकल्प अभियान" में हिस्सा लिया। पंद्रह दिनों तक चले इस कार्यक्रम में लगभग 250 गांवों के 3500 से ज्यादा किसानों ने भाग लिया।

भाकृअनुप ने 17 जनवरी, 2025 को नई दिल्ली में आयोजित एक समारोह में 2023 से 2025 के दौरान

पंजीकृत पशु नस्लों के आवेदकों को सम्मानित किया। इस समारोह में, देसी पशुधन, पोल्ट्री और कुत्तों की 18 नस्लों को पंजीकृत करने के लिए लगभग 80 नस्ल आवेदकों को सम्मानित किया गया।

आयोजन

पूरे साल गणतंत्र दिवस, अंतर्राष्ट्रीय जैव विविधता दिवस, स्वतंत्रता दिवस, स्थापना दिवस और हिंदी पखवाड़ा उत्साह के साथ मनाए गए, और इन मौकों पर आयोजित विभिन्न कार्यक्रमों और गतिविधियों में ब्यूरो के कर्मचारियों ने सक्रिय रूप से भाग लिया।

बैठकें

साल के दौरान तय कार्यक्रम के अनुसार इंस्टीट्यूट रिसर्च कमेटी, रिसर्च एडवाइजरी कमेटी, इंस्टीट्यूट मैनेजमेंट कमेटी और क्विनक्वेनियल रिव्यू टीम की बैठकें, साथ ही नेटवर्क प्रोजेक्ट की वार्षिक समीक्षा बैठकें आयोजित की गईं।

कार्मिक

भाकृअनुप-राष्ट्रीय पशु आनुवंशिक संसाधन ब्यूरो के निदेशक और दो वैज्ञानिक संस्थान में शामिल हुए। ब्यूरो के छह कर्मचारियों की सेवानिवृत्ति हुई।



**ICAR-NBAGR
Annual Report
2025**

**Institute's
Profile**





Bureau at a Glance

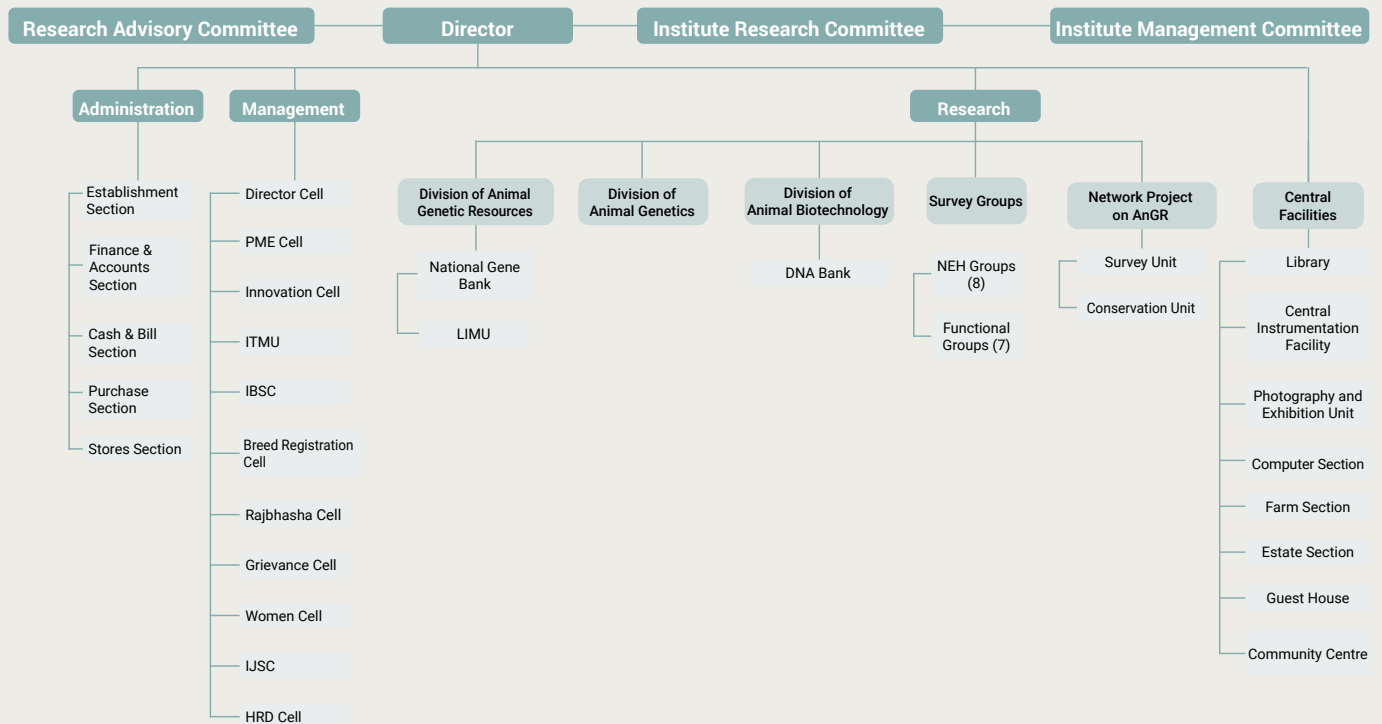


Established on 21st September 1984, ICAR-National Bureau of Animal Genetic Resources (NBAGR) is working with a mission to protect and conserve indigenous Farm Animal Genetic Resources for sustainable utilization and livelihood security, with many important national and international commitments, to date. The bureau has achieved a number of milestones, including registration of 246 and Gazette notification of 230 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

ORGANOGRAM

ICAR- National Bureau of Animal Genetic Resources



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.

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.

The foundation stone of NBAGR/NIAG was laid by Hon'ble Union Minister of Agriculture Sh. Buta Singh

LANDMARK EVENTS

Birth place of institute at NDRI, Bangalore



1984

Shifting of Institute To Karnal
Foundation stone of NBAGR/NIAG

1985

NBAGR & NIAB merged
New office building foundation laid for NBAGR

1995



NBAGR building inaugurated

1998

First Information System AGR-IS



2002

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

2008

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

Bureau celebrated Silver Jubilee

2009

Cryopreservation of 100 Thousand semen doses

2010

Release of first river buffalo genome draft

2012

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

2013

Registration of lines initiated by ICAR-NBAGR

2015

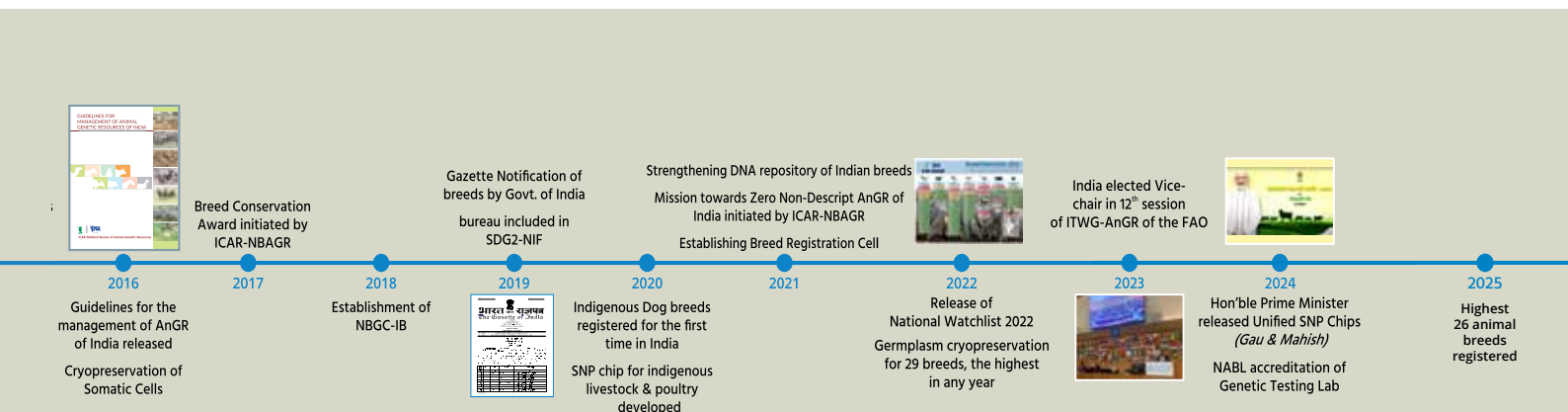


Ji, on 19th July, 1985. In 1995 the National Bureau of Animal Genetic Resources and National Institute of Animal Genetics were merged to function as a single unit, known as National Bureau of Animal Genetic Resources (NBAGR). The new office cum lab building of NBAGR was inaugurated on 28th November,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

Institute's organisational setup

Since its inception, ICAR-NBAGR has been evolved both in its organizational as well as functional setup. The institute engages in a variety of activities & possesses 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, 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



Priorities and Activities

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.

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-descript 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 coming 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 legal 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 around 270 breed/populations of native livestock and poultry in country.
- Registration of 246 animal breeds and Gazette notification of 230 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.
- PCR based tests for screening of 6 genetic diseases in cattle.

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 230 native animal breeds after notification.
- Descript livestock population increased upto about 46%.
- 109 new animal breeds described around 30 million livestock in country.
- Breed-wise Livestock Census on 220 breeds in the country conducted 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

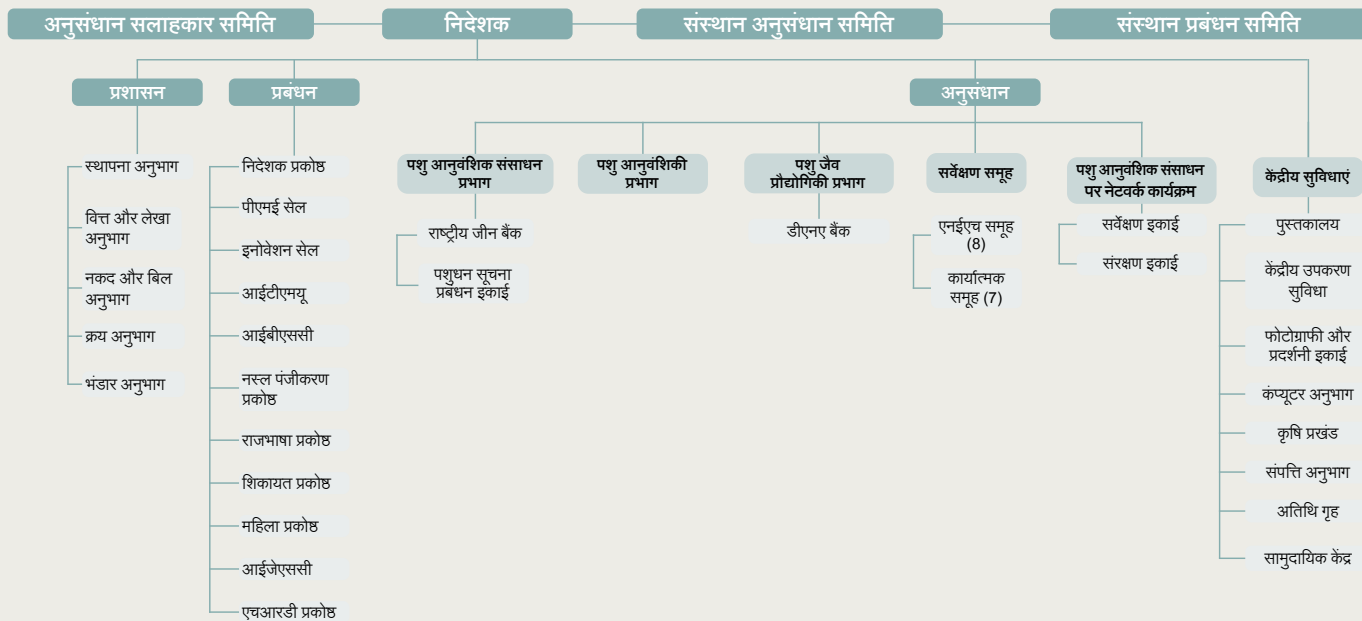


21 सितंबर 1984 को स्थापित, भाकृअनुप-राष्ट्रीय पशु आनुवंशिक संसाधन ब्यूरो (रापआनुसं ब्यूरो) कई महत्वपूर्ण राष्ट्रीय और अंतरराष्ट्रीय प्रतिबद्धताओं के साथ, स्वदेशी कृषि पशु आनुवंशिक संसाधनों की रक्षा, संरक्षण एवं सतत उपयोग एवं लोगों की आजीविका सुरक्षा मिशन के साथ काम कर रहा है। ब्यूरो ने अब तक देश के सभी हिस्सों से 246 पशुधन की नस्लों के पंजीकरण एवं 220 देशी नस्लों की अधिसूचना सहित अनेक महत्वपूर्ण उपलब्धियां हासिल की हैं। 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

संगठनात्मक चार्ट

भाकृअनुप - राष्ट्रीय पशु आनुवंशिक संसाधन ब्यूरो



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।

इतिहास एवं संगठनात्मक स्थापना

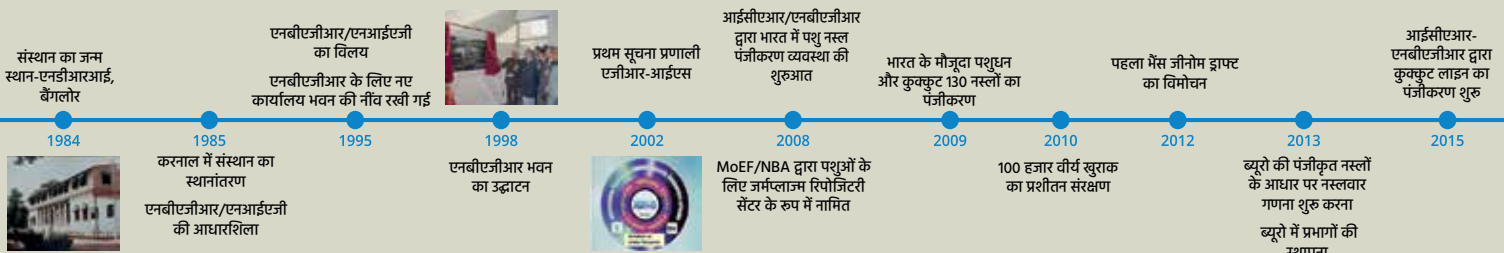


ब्यूरो का इतिहास

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 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

ऐतिहासिक घटनाक्रम





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 एस 5/21/2012.आईए.आई दिनांकित 22.07.2013) 2013 में अनुमोदित हुए, जो वर्तमान में, संस्थान के अनिवार्य लक्ष्यों और उद्देश्यों 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



आईसीएआर-एनबीएजीआर द्वारा नस्ल संरक्षण पुरस्कार शुरू

2016 भारत के पशु आनुवंशिक संसाधन के प्रबंधन के लिए दिशानिर्देश जारी पशु नस्लों की दैहिक कोशिकाओं का क्रायोप्रिजर्वेशन

2017 एनबीजीसी-आईबी की स्थापना

2018 भारत सरकार द्वारा नस्लों की राजपत्र अधिसूचना ब्यूरो एसडीजी2 के एनआईएफ में शामिल



2019 भारत में पहली बार देशी कुलों की नस्लें पंजीकृत स्वदेशी पशुधन और कुक्कुट के लिए एसएनपी चिप विकसित

2020 भारतीय नस्लों का डीएनए रिपोजिटरी का सुदृढ़ीकरण शून्य गैर-वर्णित पशु आनुवंशिक संसाधन की ओर मिशन शुरू नस्ल पंजीकरण प्रकोष्ठ की स्थापना



2021 पशुधन नस्ल निगरानी सूची -2022 का निर्माण, 29 नस्लों के जर्मप्लाज्म का अतिहिमीकरण



2022 भारत का एफएओ के 12वें आईटीडीब्ल्यूजी-एनजीआर सेशन में उपाध्यक्ष के रूप में चुनाव



2023 माननीय प्रधानमंत्री द्वारा एकीकृत SNP चिप्स (पी एवं महिष) का विमोचन किया गया। आनुवंशिक परीक्षण प्रयोगशाला (Genetic Testing Lab) को NABL मान्यता प्राप्त हुई।



2024 26 पशु नस्लों का पंजीकरण



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 मंजूरी 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 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 फिंगरप्रिंटिंग 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 हैं।

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: यूनिनयन 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 फैलाने 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 परीक्षण की सेवाएं भी प्रदान करता है।

संस्थान पुस्तकालय: संस्थान का अपना एक पुस्तकालय भी है जिसमें पशु आनुवंशिकी से सम्बंधित देश और दुनिया की हजारों



प्राथमिकताएं एवं गतिविधियाँ

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।

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 गैर-विवरणित पशु आनुवंशिक संसाधन के लक्ष्य के साथ सभी पशु आनुवंशिक संसाधनों का दस्तावेजीकरण: 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 अंतरगत 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 आनुवंशिक 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 दस्तावेजीकरण करना।
- देश में शून्य गैर-विवरणीत 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

- विलुप्त 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 आकलन 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 एजेंसीयों 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 लगभग 270 नस्ल/आबादी की विशेषता का अध्ययन उनका और प्रलेखन।
- 246 पशु नस्लों का पंजीकरण एवं 230 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।
- गोवंश में 6 आनुवंशिक रोगों का PCR आधारित टेस्टिंग।

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 230 पशु नस्लों की वैधानिक मान्यता और जननद्रव्य संरक्षण।
- वर्णित पशुधन आबादी लगभग 46% तक पहुंची।
- 109 नई नस्लों ने देश में लगभग 3 करोड़ पशुओं को वर्णित किया।
- पशुपालन और डेयरी विभाग द्वारा देश में 220 नस्लों पर नस्ल-वार पशु संगणना।
- 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, 2024 to March, 2025 along with expenditure

(Rs. In lakhs)

HEAD	Grants		Network Project	
	RE	Exp.	RE	Exp.
Capital				
Works	0.00	0.00	0.00	0.00
Other capital expenditure	89.46	89.46	30.00	30.00
Total Capital	89.46	89.46	30.00	30.00
Revenue				
Establishment expenses	1283.09	1283.09	0.00	0.00
Traveling Allowance	31.42	31.42	0.00	0.00
Research & Operational expenses	304.40	304.40	367.00	367.00
Administrative expenses	345.34	345.34	0.00	0.00
Miscellaneous expenses	10.17	10.17	0.00	0.00
Total Revenue	1974.42	1974.42	367.00	367.00
Pension & Retirement benefits	341.50	341.50	0.00	0.00
Grand Total	2405.38	2405.38	397.00	397.00
Additional financial support under Non-Scheme	78.49	78.48	0.00	0.00

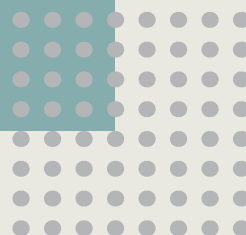
Revenue Generated for the month April, 2024 to March, 2025

(Rs. in lakhs)

Head of Account	2024-25
Sale of Publication & Advertisement	57150
Licence Fee	320834
Hostel and Guest house rent	648450
Sale of Technology	0
Sale of Other Machine Tools	10212
Others Misc. Revenue Receipt	1701554
Total	2738200

**ICAR-NBAGR
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2025**

Research Accomplishments

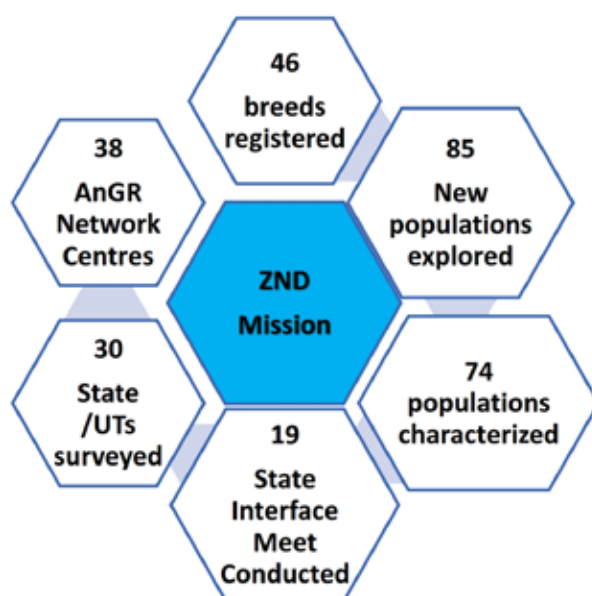


Mission towards zero non-descript AnGR of India

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.

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 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



Network centres in different states & UTs

100 distinct breeds of different livestock and poultry in coming years, which would be registered and notified accordingly. 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: After launch of the Mission, institutional projects were initiated for survey and documentation of AnGR in 24 states and three Union Territories in collaboration with SAHD, KVKs, SAUs/SVUs. Bureau conducted survey in these states/ UTs and explored more than 80 new populations of indigenous livestock, poultry and dog. During 2025, surveys were conducted in 8 states/UTs and explored 10 new populations, which are being further characterized by the Bureau in collaboration with state agencies. Till now, more than 270 indigenous populations have been characterized by the Bureau.

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 2025, five new Network Centres in various states were initiated. At present, total 38 Network centres are involved in characterization of potential populations in 26 states/ UT.

Documentation of AnGR and identification of new populations

Rajasthan

Surveys were carried out across the districts of Bharatpur, Karauli, Dholpur, and Sawai Madhopur in the Bharatpur Division, as well as Alwar, Jaipur, and Kotputli- Behror in the Jaipur Division of Rajasthan, with the objective of documenting indigenous animal genetic resources and evaluating populations for potential characterization. In Bharatpur Division native cattle were found to be predominantly mixed types, medium-sized and grey-white in appearance, with notable grades of Mewati and Haryana cattle in Bharatpur district, while Gir and crossbred Holstein cattle were present in more accessible areas of the division. Productivity levels remain comparatively lower among native cattle, while upgraded and crossbred cows demonstrated moderate yields. A distinct population of *Dang* buffalo was observed in the Chambal ravines of Karauli and Dholpur, characterized by medium size, greyish-black coats, long dense hair, and forward-looping horns, with milk yields ranging from 6 to 12 kg per day. However, the genetic purity of this population has been compromised due to the introduction of Murrah germplasm, and Murrah grades were widely prevalent across the Division. A newly identified indigenous sheep population, locally referred to as *Phagi*, was documented in Bharatpur, Alwar and Jaipur districts, distinguished by its creamish-white coat, Roman-shaped face, sharp nasal bone, exceptionally long tapering tail, and cropped ears with tufts of hair. The Phagi sheep, producing coarse wool with minimal curliness, were deemed suitable for further characterization, while grades of Marwari sheep were also noted. Goat populations across the Division were largely mixed, dominated by Sirohi and Karauli breeds along with Sirohi-Jamunapari crosses, with pure Karauli goats specifically identified in Karauli district, though no distinct indigenous goat breed of

potential was found. Survey of Alwar district identified a notable goat population locally referred to as *Battisi* exhibiting traits suitable for further characterization. Minor species such as camels, horses, donkeys, pigs, and chickens were present in limited numbers and lacked homogeneity.

Overall, the surveys highlight the richness and diversity of Rajasthan's livestock resources, emphasizing both the opportunities and challenges in managing indigenous animal genetic resources. Distinct populations such as *Battisi* goats, *Phagi* sheep, and *Dang* buffalo were identified as valuable genetic resources requiring urgent conservation and systematic characterization. While breeding policies and the introduction of improved breeds like Murrah buffalo and Gir cattle have enhanced productivity, they also pose risks to the genetic purity of native populations. These findings underscore the dual priorities of promoting productivity through selective breeding and safeguarding the unique indigenous populations that contribute to the region's genetic diversity.

The survey highlights both the richness and challenges of indigenous animal genetic resources in Bharatpur and Jaipur Divisions. While crossbreeding has enhanced productivity in certain species, conservation of unique populations such as *Battisi* goat, *Dang* buffalo and *Phagi* sheep is critical to maintaining genetic diversity and supporting sustainable livestock development in Rajasthan.

Uttarakhand

The Survey was completed in the Sahaspur, Vikasnagar, Doiwala and Kalsi blocks of Dehradun district, Jwalapur, block of Haridwar district, and Pratapnagar,

Chamba, Jhaknidhar, Bhilangna, Devprayag blocks of Tehri Garhwal district. In Dehradun, the majority of the cattle were identified as crosses of Jersey and Holstein Friesian (HF) breeds. The buffaloes were predominantly of the Murrah and Gojri types, while the goats consisted of mixed populations. Farmers are primarily rearing crossbred cattle for high milk production. Additionally, Aseel and Kadaknath poultry breeds, as well as strains distributed by state agencies, are also reared by the farmers. One farmers-scientist interaction meet was organised under SCSP programme and Animal Health management Kits were distributed to SC beneficiaries at Dehradun (Uttarakhand). In Tehri Garhwal, The goat and cattle population was found to be like Kow Bakar goat population and Badri cattle and its crosses, respectively. In addition, black sheep population was also found with some farmers. The sheep was a type of the Kow Debar sheep population. In addition, Bhotia dog population is also reared by farmers for guarding their livestock

Maharashtra

A survey on the Animal Genetic Resources of Maharashtra was undertaken during 6th to 9th May 2025 in the breeding tract of Nashik, Nandubar and Dhuledistricts of the Maharashtra. During the visit interaction with 25 farmers of 12 villages of 6 talukas of these districts was carried out. The relevant information, blood samples collection of non-descript cattle, videos recording and photographs of the various livestock species were taken. Cattle populations in this region is mainly Dangi, Khillar, Kankrej, Gir, and goat population is Osmanabadi type. Native animals crossed with different breeds were also observed. Buffalo population comprises of Surti, Jaffrabadi,

Murrah, Mehsana and their crosses. In the region close to M.P. state (Jalgaon district) Malvi type cattle and their crosses were observed. Artificial insemination of the cattle and buffalo in this region is carried out by HF 100%, Jersey 100%, HF cross, Jersey Cross, Gir, Dangi, Khillar, Sahiwal and Murrah semen. Further, no new homogenous population was identified during the visit.



Kow Debar sheep

Ladakh (UT)

Documentation Survey was conducted in Zaskar. Information about utility, uniqueness, distribution, production environment, management practices and migration system of native livestock species were gathered from stakeholders. Additionally, the farmers of the region were interviewed for information on their socio-economic conditions and about utility of these non-descript population of sheep and goat. Morphometric data, milk production and body weight of indigenous sheep and goat. In Suru valley, Most of the animals in the farmers flocks of the region were similar to Malluck sheep and Malra goat as observed in Lamayuru, Kanji, Markha, Skiu and other parts of Leh district.

Madhya Pradesh

Survey was conducted in Morena district of Chambal Division and Rewa, Mauganj, Sidhi. Singrauli and Maihar districts of Rewa Division of Madhya Pradesh. In districts of Rewa Division, documentation of native AnGR was carried out. New homogenous populations were also identified for further characterization. Information about their utility, uniqueness, distribution, production environment, management practices of native livestock species was gathered. In Rewa Division, two new populations - Rewanchal cattle and Rewanchal buffalo were explored as new populations. Rewanchal cattle is a medium sized, with white and grey coat mainly. It is reared in extensive farm and ranching based production system. It is reared for milk, agricultural work including ploughing and carting, and manuring. Rewanchal buffalo is mainly reared for milk, under semi intensive animal production system. Coat is highly hairy. Crest, hip and pin bones are sharp and prominent. Semi circular horns with prominent forehead and eyes are identifiable features of the population. It is reared mainly for milk and able to produce 10-12 Kg milk in a day.

Data pertaining to characterization of Lahuri goat of Chambal Division was collected. Body weights of different age groups were measured on for completing the documentation of Lahuri goat. Performance data for meat and milk of Lahuri goat was also collected. Lahuri

goat is a highly homogenous population, named after blood colour pattern of its coat. These animals are distributed in Sabalgarh area of Morena and Vijaipur, Birpur of Sheopur districts. It is a medium type goat well adapted to Chambal ravine and mainly reared for meat purpose. Data on physical, morphometric (7 traits) and performance traits of more than 300 Lahuri goats have now been completed, and breed descriptor has been prepared.

Lahuri goat

Lahuri goats seem to be originated in highland region of Chambal ravines mainly in Sabalgarh block of Morena district in Madhya Pradesh. History for the evolution of the Lahuri goat also seems very old, as the local communities are used to rear this stock for more than a century. These goats are well adapted to dry semi-arid region of the Chambal region, characterized by hot and dry climate with scarce fodder, grasses, thorny vegetation. Because of low vegetation, the region is much conducive environment for the goat rearing. Lahuri goats are reared under extensive production system, with some sort of pastoralism. Owners keep the goats in highland, making enclosures and shelters using local babool (*Accacia spp.*) and other tree materials, away from their homes. Animals are reared in local areas in day time and then kept in enclosures for night stay. Local goat keepers prefer these goats for their medium size and slim body and high agility and endurance to cover a long distances and its ability to browse. These goats browse in the dry and thorny vegetations even in high heat and dry conditions of the ravine and can sustain on less water and can remain healthy with less water intake.

Presently, Lahuri goat is distributed in all villages of Sabalgarh block of Morena and Vijaipur and Birpur

Lahuri goat

Identifiable features

- 1 Medium sized body
- 2 Brownish, reddish coat
- 3 Glossy reddish shine
- 4 Roman nose in males
- 5 Long ears
- 6 Screw shaped horns



blocks of Sheopur districts, along with some nearby blocks in these districts of the Madhya Pradesh.

Lahuri goat is a highly homogenous population, named after blood colour pattern of its coat. It is a medium type goat. Horns in both sexes are coiled. Ears are exceptionally long, with the highest length more than 30 cm on some occasions. These goats are well adapted to ravine areas of the Chambal Division. These goats provide different ecosystem services, including

provisioning. These goats are mainly reared for the meat and manure. Milking is generally not practiced. Lahuri goats are reared mainly by backward and schedule cast communities. Goat keepers are mainly dependent on the sale of live goats, and fulfil their financial needs by selling the animals. Rearing of these goats has now been changed to semi-intensive production system in some of the areas, mainly be progressive farmers.

Body weight (kg) of Lahori goats

Weight at	Male			Female		
	Average $\pm$ SE	Range	N	Average $\pm$ SE	Range	N
Birth	3.01 $\pm$ 0.03	2.6-3.5	34	2.88 $\pm$ 0.04	2.5-3.5	36
Weaning / 3 month	12.66 $\pm$ 0.27	8.5-19.0	47	10.61 $\pm$ 0.28	7.5-15.0	38
6 months	21.15 $\pm$ 0.32	18.0-25.0	36	20.23 $\pm$ 0.31	17.5-24.0	34
1 year	31.54 $\pm$ 0.66	25.0-44.0	35	27.72 $\pm$ 0.45	22.0-33.0	32
First Kidding	-	-	-	31.23 $\pm$ 0.39	24.5-38.0	62
6 Teeth (Adult)	59.21 $\pm$ 0.74	45.0-67.0	50	41.27 $\pm$ 0.31	31.0-65.0	255

Body measurements (cm) of Lahori goats

Body measurement	Male			Female		
	Average $\pm$ SE	Range	N	Average $\pm$ SE	Range	N
Chest-girth	86.18 $\pm$ 1.02	68.0-96.0	50	79.40 $\pm$ 0.28	65.0-89.0	255
Body length	75.36 $\pm$ 0.89	57.0-84.0	50	66.84 $\pm$ 0.28	55.0-77.0	255
Height at withers	81.76 $\pm$ 0.81	69.0-94.0	50	75.38 $\pm$ 0.26	63.0-84.0	255

Carcass characters

	Male			Female		
	Average $\pm$ SE	Range	N	Average $\pm$ SE	Range	N
Age at slaughter (days)	310.5 $\pm$ 7.06	250-450	32	362.5 $\pm$ 15.93	270-540	18
Weight at slaughter (kg)	28.56 $\pm$ 0.62	23.0-40.0	32	27.6 $\pm$ 0.49	24.0-31.0	18
Dressing % (Hot)	53.48 $\pm$ 0.23	51.6-56.6	32	52.21 $\pm$ 0.28	50.0-54.2	18
Dressing % (Cold)	52.25 $\pm$ 0.27	50-56.5	32	51.07 $\pm$ 0.26	48.0-52.0	18

Reproduction

	Average $\pm$ SE	Range	N
Age at first mating in males (days)	359.0 $\pm$ 5.9	290-470	50
Age at first mating in females (days)	351.0 $\pm$ 2.6	310-385	55
Age at first oestrus (days)	310.0 $\pm$ 3.2	270-365	55
Oestrous cycle duration (days)	20.7 $\pm$ 0.15	18-23	55
Age at first kidding (days)	503.0 $\pm$ 2.4	456-537	55
Gestation length (days)	150.0 $\pm$ 0.38	144-155	55
Kidding interval (days)	236.0 $\pm$ 7.6	180-365	55
Service period (days)	87.9 $\pm$ 7.6	30-215	55
Litter size	1.2 $\pm$ 0.05	1-2	55
Lifetime number of kiddings	7.88 $\pm$ 0.18	6-11	50

Dairy performance: Data could not be collected as Lahuri goats are not milked regularly. Occasional milking is carried out only for few does on instant demand (around 10% of total does). Such milking yields 250 to 500 gm milk. Milk of Lahuri goat consists 4.3 fat and SNF 8.7 percent.

Uttar Pradesh

Jaunpuri goat

Jaunpuri (Jaffarabadi) goat, found in the eastern part of U.P. has been evolved by crossing the local nondescript goat with the Jamunapari breed of goat. The home tracts lie in the belt between Ganga and Gomati rivers of eastern U.P. and distributed in Jaunpur, Ghazipur, Mau, Varanasi, Azamgarh and adjoining districts of Uttar Pradesh. The prominent coat colour is Black, Brown,

white and white with black & brown patches. Mainly reared for meat and milk. The average milk yield per day is 937.5 lit. Reared for milk and meat production.



The average adult body weight of males and female's animals were 29.42 and 27.34 kg, respectively which varies from 23 to 35 kg in males and 19 to 32.04 kg in females. The overall body length, height, chest girth and paunch girth were 61.93, 70.93, 70.80 and 74.40 cm. respectively. Body weight of lambs at the age of 3 months 10.09 Kg, which ranges between 6.45 to 12 kg respectively.

Body weight (kg) and biometry (cm) of adult Jaunpuri goat

Traits	N	BW	BL	Height	CG	PG
Overall	17	27.34±1.36	61.93±1.71	70.93±1.49	70.80±2.29	74.40±2.84
Sex						
Male	06	29.42±1.65	63.2 ± 2.03	74.4±1.28	74.8±2.29	77.6±3.80
Female	11	26.11±1.89	61.30±2.41	69.20±1.95	68.80±3.13	72.80±3.84
Range M		23-35	56-68	74-77	69-81	66-84
F		19-32.04	44-70	59-79	46-79	49-91

Awadhi sheep: Distributed in Ayodhya, Sultanpur, Ambedkar Nagar and adjoining districts of Uttar Pradesh. Reared for Meat, wool and manure purposes. The prominent coat colour is white, white with black & brown patches and some are black. Forehead is slightly convex and ears are small or rudimentary in majority of animals. The adult body weight is about 30 Kg. The sheep are primarily maintained on grazing with zero input system.

Shamli sheep: A distinct sheep population was observed, characterized by brown rings around the eyes and ears. Farmers reported that the average body weight of these sheep is approximately 10–12 kg at six months of age and 30–35 kg at maturity, with lambing season occurring in February.

Bamdoli goat: Also known as Doabi, Gangapari and Gulabi. This population of goat is traditionally reared in the Upper Ganga–Yamuna Doab region of Western Uttar

Pradesh, particularly in Shamli, Baghpat and Saharanpur. The name derives from Bamnoli village of Baghpat. It is medium-to-large in size and reared for milk and meat production. Wax like corkscrew pattern with upward and outward orientation of horns, long ears, compact body; deep chest; strong legs suited for extensive grazing; roman nose and white lustrous coat colour is unique traits of this goat population.



Body weight (kg) and biometry (cm) of adult Bamdoli goat

Traits	N	BW	BL	Height	CG
Male	16	54.41±2.65	84.27 ± 2.20	88.37±2.32	87.2±2.12
Female	36	38.72±1.14	82.12±1.23	85.25±1.75	81.52±1.41
Range M		35.4-71.0	74-96	75-98	72-95
F		27.5-49.5	73-95	73-97	72-92

The average adult body weight of males and female's animals were 54.41 and 38.72 kg, respectively which varies from 35.4-71.7 kg in males and 27.5-49.5 kg in females. Body weight of lambs at the age of 3 to 6 months ranges between 8.2 to 22.8 kg respectively.

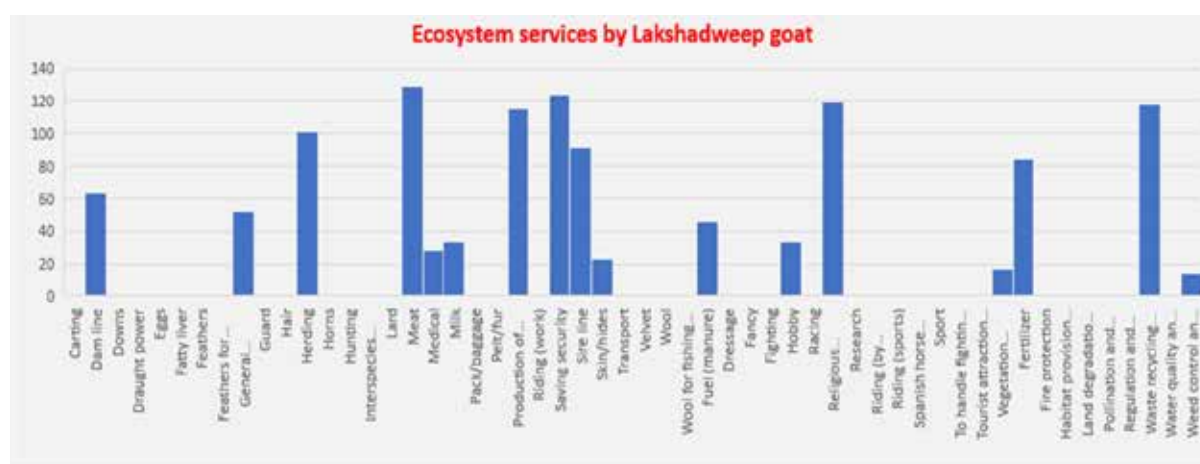
Most farmers in the western UP rear Sahiwal, Hariana, Jersey, and HF crossbred cattle, as well as Murrah buffalo. In Jasala village, crosses of Yorkshire pig breeds were also identified. Goats observed in this region were predominantly crossbred with the Sirohi breed. Sheep populations here exhibited characteristics of the Muzaffarnagari breed, although mixed populations were also evident. Farmers reported average body weights of 20–25 kg at six months of age and 30–35 kg at full maturity, with wool priced at approximately ₹10–15 per kilogram.

Survey revealed that Awadhi sheep and Jaunpuri goat are distributed in Eastern part of the Uttar Pradesh, and are distinct from other breeds of the region. Jaunpuri goat distributed in Jaunpur, Ghazipur, Mau, Varanasi, Azamgarh and adjoining districts of Uttar Pradesh. The prominent coat colour is Black, Brown, white and white with black & brown patches. Mainly reared for meat and milk. Awadhi sheep is distributed in Ayodhya, Sultanpur, Ambedkar Nagar and adjoining districts of Uttar Pradesh. Reared for Meat, wool and manure purposes. In western part of the Uttar Pradesh

a deshi sheep population is distributed in Shamli, Muzaffarnagar and Saharanpur districts and **Bamdoli Goat is distributed** particularly in Shamli, Baghpat and Saharanpur districts and needs detail characterization.

Lakshdweep island

Seven out of ten islands that is Agatti, Kavaratti, Kadmat, Amini, Chetlat, and Kiltan Islands were surveyed for the documentation of AnGR of Lakshadweep. Physical, morphometric, production and reproduction characters of native goat, Chicken and duck. On evaluation of indigenous livestock and poultry for uniformity and uniqueness, Lakshadweep goat and Lakshadweep chicken were identified as potential indigenous populations of the island to be studied further for breed registration. Average measurement in cm for Body length of female goat is 47.44, Body Height 47.02, Chest girth is 56.73, Paunch girth is 58.38, face length is 14.51, face width is 7.35, ear length is 12.64, horn length is 7.95, tail length is 11.35 and avg body weight is 18.66 kg. Further data for lakshadweep goat is collected and application is underway to be filed for registration. Questionnaire based survey data for Ecosystem services by livestock and poultry of Andaman and Nicobar (260 farmers) along with Lakshadweep island (108 farmers) was recorded in sizable number interacting with the stakeholders of the different islands.



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 ± 0.996 , 134.45 ± 1.635 , 139.53 ± 1.932 , 19.72 ± 0.940 , 15.93 ± 0.179 , 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, DevanurPuthur etc.,) at the foot hills of Western Ghats in the Anaimalai Tiger Reserve. During the survey body biometry and other information related to production, reproduction performances and management practices were recorded from about 25 adult animals along with blood samples of about 20 unrelated animals were also collected. 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. Breed registration application for Molai Aadu goat has been submitted

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 Attappady 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 Attappady area.

Andhra Pradesh

During the reporting period, a survey of indigenous goat and buffalo populations was undertaken in the Kadapa, Nellore, Nandyala, and Annamayya districts of Andhra Pradesh. The survey on indigenous non-descript goat populations was conducted across villages in these districts. Phenotypic characteristics and biometric parameters of approximately 158 adult (male and female) indigenous goats were recorded using the ICAR-NBAGR survey proforma for goat characterization. In addition, body weights of 45 kids belonging to different age groups were documented. The coat colour of the goats was predominantly solid black, with a few individuals exhibiting brown or brown-splashed coats. The mean body measurements (cm) of adult animals were as follows: body length (70.38 ± 0.76), height at withers (78.19 ± 0.50), chest girth (74.66 ± 0.73), paunch girth (75.39 ± 0.64), face length (19.59 ± 0.15), face width (11.13 ± 0.16), and tail length (17.40 ± 0.26). The average body weight recorded was 35.75 ± 2.70 kg. Kids are typically sold in local markets for meat purposes at 5–6 months of age. Buffaloes in this region are generally copper or light brown in colour, with wide horns. They are medium to large in size and are predominantly reared under an extensive system. Animals are taken for grazing

in nearby forest areas during the daytime and are tethered in open spaces in front of houses or kept under temporary shelters made from locally available low-cost materials. Farmers usually maintain herds of three to five animals, although some households keep larger herds of up to 25–30 animals. Animals from different households are often pooled together, forming groups of 150–300 animals that are grazed collectively, covering distances of 5–6 km daily. No supplementary feeding (concentrates or other feeds) is provided apart from grazing, except for young calves. Calves are not sent for grazing until about 2 months of age and are instead fed seasonally available roughages and tree fodder. Breeding is carried out mainly through natural service. Heifers typically attain puberty between 2 and 2.5 years of age. These buffaloes exhibit good disease resistance; however, occasional foot-related problems have been observed, likely due to grazing in rugged terrain. They are moderate milk producers, yielding approximately 3–5 litres of milk per day with a fat content of 6–8%. Milk is either sold directly to households or supplied to village-level milk collection centres. Male animals are usually sold for meat at 1.5–2 years of age.

Chhattisgarh

New homogenous populations of livestock and poultry were identified during field survey of Bastar region (7 districts and 24 blocks) of Chhattisgarh state. Different districts (blocks) surveyed were Bastar (Jagdalpur, Bastar, Bakawand, Lohandiguda, Tokapal, Bastanar, Darbha); Kanker- North Bastar (Kanker, Charama); Dantewada-South Bastar (Dantewada, Geedam, Katekalyan, Kuakonda); Narayanpur (Narayanpur, Orchha); Sukma (Sukma, Konta, Chhindgarh); Bijapur (Bijapur, Bhairamgarh, Bhopalpatnam, Usur) and Kondagaon (Kondagaon, Pharasgaon). The cattle population observed in dense forest areas of Dantewada, Bastar, Narayanpur and Bijapur districts showed phenotype different from Kosali, the registered cattle breed of Chhattisgarh. Pig population across whole of the Bastar division was observed to be homogenous and

unique. Similarly, the duck population commonly known as Nag Hans was also observed to be homogenous throughout the division. Conversely, the goat population was similar to goats observed in Surguja and central region (Surguji and Anjori types) of Chhattisgarh. Two different buffalo population representing typical local type and different from Chhattisgarhi buffalo were observed in Narayanpur; and Bastar/ Dantewada districts. Phenotypic records, blood samples and other information about local AnGR was collected from the farmers.

West Bengal

The survey for identification and characterization of indigenous Animal Genetic Resources of West Bengal was carried out in collaboration with local field organizations and livestock keepers. The places visited included Kolkata, Silda block of Jhargram district, Salboni block of Paschim Medinipur district, Jhalda block of Purulia district, and Khatra/ Mukutmanipur region of Bankura district. During the survey, preliminary information was recorded on morphometric traits, production, reproduction and management practices of local livestock and poultry populations. The major indigenous Animal Genetic Resources identified during the survey included homogeneous indigenous cattle, indigenous poultry, and buffaloes. A sizeable population of white-coated indigenous cattle was observed in Jhargram, Paschim Medinipur, Purulia and Bankura districts. These cattle are mainly maintained under extensive management systems and are used for ploughing, draught, transport and other agricultural operations. Indigenous poultry populations were also widely observed in almost all the surveyed villages, particularly in Jhargram and adjoining regions. These birds are mainly reared for fighting and meat purposes and appear to have strong socio-cultural and livelihood importance. The Black Bengal goat population, especially in Silda block of Jhargram, appeared well adapted to the local lateritic soil and forest-based ecosystem.

Registration and Gazette notification of animal breeds

Registration of native breeds of livestock and poultry has been envisioned to protect and check the bio piracy of indigenous AnGR. India has developed the mechanism for recognising breeds with known characteristics in form of authentic national documentation system. In 2007, Indian Council of Agricultural Research (ICAR) initiated "Registration of Animal Germplasm" specifically indigenous livestock and poultry breeds in the country. In the year, 2008, ICAR-National Bureau of Animal Genetic Resources (NBAGR), Karnal was given the temporary authority for the registration of germplasm related to livestock and poultry in the country. Subsequently, in same year, ICAR constituted a Breed Registration Committee (BRC) under the chairmanship of Deputy Director General (Animal Science), ICAR for the registration of new breeds. This mechanism is the sole recognised process for registration of "Animal Genetic Resources" at national level. Further to provide statutory recognition to the breeds, the registered breeds are the Gazette notified by the Govt. of India. 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.

Registration and Gazette notification of animal breeds has shown a greater impact on socioeconomic arena, including initiation of breed-based livestock census to formulating breeding policies and development programs for registered breeds in the country. The national framework for registration of native AnGR is unique in the world and is a model to other countries for claiming sovereignty over and protecting their own native germplasm. This framework has been very much useful for suitable policy formulating policies for

conservation and development of endangered breeds. Through Gazette notification, the breeds also get the statutory recognition; as notified breeds for the whole of India for purposes of animal husbandry, production, breeding, conservation, utilization, consumption and trade.

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 a 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 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 7200 animals for low prolific (cattle, buffalo, sheep, goat, horse, donkey, camel, yak, mithun) and 3600 for high prolific (pig, poultry and dog) species. 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 Gazette published by the Government of India.

Registration of Indigenous Animal Breeds in 2025

On the recommendation of Breed Registration Committee (BRC) during ITS 12th meeting held on 6th January, 2025 at New Delhi under the chairmanship

of Deputy Director General (Animal Science), ICAR-NBAGR registered 10 indigenous breeds of livestock (7), poultry (1) and dog (2). Further in its 13th meeting held on 12th November, 2025 at New Delhi, Bureau registered 13 indigenous of livestock and poultry and 3 synthetic breeds livestock in the country.

Till now, 242 indigenous animal breeds, including 55 for cattle, 22 for buffalo, 43 for goat, 46 for sheep, 8 for horses & ponies, 9 for camel, 15 for pig, 4 for donkey, 5 for dog, 2 for yak, 21 for chicken, 9 for duck, 2 for geese and 1 for mithun; 3 synthetic breeds of cattle, and 1 synthetic breed of sheep have been registered by the Bureau, so far. Bureau has also assigned the Accession numbers to the newly registered breeds.

Accession numbers of animal breeds registered in January 2025

S. No.	Species	Name of breed	Native tract	Accession Number
1	Buffalo	Manah	Assam	INDIA_BUFFALO_0200_MANAH_01021
2	Dog	Gaddi	Himachal Pradesh	INDIA_DOG_0600_GADDI_19004
3	Dog	Changkhi	Ladakh	INDIA_DOG_3800_CHANGKHI_19005
4	Donkey	Ladakhi	Ladakh	INDIA_DONKEY_3800_LADAKHI_05004
5	Duck	Tripureswari	Tripura	INDIA_DUCK_1900_TRIPURESWARI_11004
6	Goat	Chaugarkha	Uttarakhand	INDIA_GOAT_2400_CHAUGARKHA_06040
7	Goat	Bundelkhandi	Uttar Pradesh & Madhya Pradesh	INDIA_GOAT_2010_BUNDELKHANDI_06041
8	Pig	Karkambi	Maharashtra	INDIA_PIG_1100_KARKAMBI_09015
9	Sheep	Kheri	Rajasthan	INDIA_SHEEP_1700_KHERI_14046
10	Yak	Ladakhi	Ladakh	INDIA_YAK_3800_LADAKHI_16002

Accession numbers of animal breeds registered in November 2025

S. No.	Species	Breed	Native Tract	Accession number
1	Cattle	Medini	Jharkhand	INDIA_CATTLE_2500_MEDINI_03054
2	Cattle	Rohilkhandi	Uttar Pradesh	INDIA_CATTLE_2000_ROHILKHANDI_03055
3	Buffalo	Melghati	Maharashtra	INDIA_BUFFALO_1100_MELGHATI_01022
4	Goat	Palamu	Jharkhand	INDIA_GOAT_2500_PALAMU_06042
5	Goat	Udaipuri	Uttarakhand	INDIA_GOAT_2400_UDAIPURI_06043
6	Mithun	Nagami	Nagaland	INDIA_MITHUN_1400_NAGAMI_08001
7	Chicken	Mala	Jharkhand	INDIA_CHICKEN_2500_MALA_12021
8	Duck	Kodo	Jharkhand	INDIA_DUCK_2500_KODO_11005
9	Duck	Kudu	Odisha	INDIA_DUCK_1500_KUDU_11006
10	Duck	Kuttanad	Kerala	INDIA_DUCK_0900_KUTTANAD_11007
11	Duck	Manipuri	Manipur	INDIA_DUCK_1200_MANIPURI_11008
12	Duck	Nagi	Assam	INDIA_DUCK_0200_NAGI_11009
13	Geese	Rajdigheli	Assam	INDIA_GEESE_0200_RAJDIGHELI_18002
14	Synthetic cattle	Karan Fries	Haryana	INDIA_CATTLESYNTHETIC_0500_KARANFRIES_04002
15	Synthetic cattle	Vrindavani	Uttar Pradesh	INDIA_CATTLESYNTHETIC_2000_VRINDAVANI_04003
16	Synthetic sheep	Avishaan	Rajasthan	INDIA_SHEEPSYNTHETIC_1700_AVISHAAN_15001

Manah is a dual purpose buffalo used for milk and draught, distributed in Nalbari, Kamrup rural, Barpeta, Goalpara districts of Assam State. It is medium sized buffalo and reared for milk and draught purpose. The daily milk yield is around 1.75 kg.



Chaugarkha also called as Kumaoni goat, is distributed in the Almora, Pithoragarh, Nainital, Champawat and Bageshwar districts of Uttarakhand state. It is mainly reared for mutton production. Average adult body weight in male is 27 Kg and in female is 24 Kg.



Bundelkhandi goat is originated in Bundelkhand region of U.P. & M.P. It is a medium sized goat, mainly used for meat purpose. It is distributed in Jhansi, Banda, Chitrakoot, Mahoba, Hamirpur, Lalitpur and Jalaun districts of U.P. and Sagar, Panna, Damoh, Tikamgarh, Chhatarpur, Datia district of M.P. These animals are black in colour, well adapted and able to cover long distances while grazing.



Kheri sheep is distributed in the Tonk, Ajmer, Bhilwara, Jaipur, Nagaur, Pali, Jodhpur districts of Rajasthan.



These animals are tall and have majestic look. It has ability to walk long distance, that is why farmers prefer this breed for migration. These animals are well adapted to harsh climatic conditions and can survive during scarcity of feed and fodder resources.

Karkambi pig is distributed in Solapur, Pune, and Satara district of Maharashtra. It is mainly reared for

meat purpose under scavenging system. Litter size varies from 2 to 10. Average adult body weight in male is 45 Kg and in female is 43 Kg.



Tripureswari Duck is native to Tripura state and distributed in Sepahijala, Gomati, Kowai, Dhalai, South, West, Unokoti and North Tripura. It is mainly reared for egg and meat purpose. Average body weight is 1.199 kg at 12 months. The annual egg production of these ducks are ranged from 70 to 101.



Ladakhi yak is distributed in the Leh and Kargil districts of Ladakh (UT). It is reared mainly for milk, meat, fibre, manure, draught and transport purpose. Ladakhi yaks are medium in size, larger than Arunachali yak. Average adult body weight for male is 250 Kg and for female is 183 Kg.



Ladakhi Donkey is distributed in the Leh and Kargil districts of Ladakh (UT). This is only donkey population which are reared above 3000 meter msl and used for transportation at very high altitude with low oxygen and temperature. Average adult body weight for male is 82 Kg and for female is 78 Kg.



Gaddi dog is distributed in the Chamba, Kangra, Kullu, Mandi, Lahaul Spiti and Kinnaur districts



of Himachal Pradesh. It is named after the Gaddi tribe who is associated with the migratory farming since ages. It is mainly reared as guarding dog. The litter size varies from 4-8.

Changkhi dog is native of Ladakh (UT). Changkhi dog is used as watch dog to guard their livestock including sheep and goat from snow leopard, wild animals and other predators, and also for their safety.



Rohilkhandi cattle is distributed in Bareilly, Badaun and Pilibhit districts of Uttar Pradesh. It is having



predominantly white/ Grey coloured; with narrow, flat or dished face, and white eyelids. Horns are mostly curving outward, upward, pointed at tip.

Tail is long. Bullocks are relatively taller with immense draught power. The daily milk yield is 5.21 kg with a lactation length of 210 days, on average.

Medini cattle is Native tract of the breed is Palamu, Latehar and Garhwa, and adjoining districts of Jharkhand. It is medium sized cattle, mainly used for draught purpose. Coat colour is mostly grey.



Forehead is flat and ears are erect. Hump location is Pre-scapular in Medini cattle. Animals are well adapted to the agro-ecological conditions of the region and maintained mainly on grazing. Average milk production is around 1.6 Kg/day. Bullocks can work for 7-8 hrs during ploughing.

Melghati buffalo is distributed in Melghat Region of Amravati district of Maharashtra. Animals are black hairy coat; having broader forehead (dome shaped), long and tapering face, sharp nasal bone, prominent eyes. Horns are parallel to body, curved backward, pointed

upward/inward. Melghati buffalo produce average 4 kg of milk in a day, with peak milk yield of 10 kg/day. Milk fat is 7%.



Palamu goat: These goats are distributed in Palamu, Latehar and Garhwa districts of Jharkhand. Palamu



goats are taller in appearance with cylindrical body and medium in size. Coat colour is dark brown to black mainly. Breed utility is mainly for

meat. Body weight ranges between 26 to 34 Kg in adult males and 19 to 28 Kg in adult females. Animals are well adapted to the agro ecological conditions of the region and maintained mainly on grazing. Farmers prefer these goats due to their hardiness and commercial viability.

Udaipuri goat: Home tract of these goat is Pauri Garhwal of Uttarakhand. Udaipuri goats are medium in size with compact body and hairy coat. Tan coloured coat is having black strip on the top line. Head is slightly convex. The ears are pendulous and wattles & beard are absent. Horns are medium in size, flat in shape, pointed and turned outward/backward. Mainly used for meat purpose. Average body weight is 26.0 Kg for adult males.



Nagami mithun is distributed in Kohima, Peren, Chumoukedima, Zunheboto, Phek, Tuensang, Kiphire, Noklak, Shamator, Mon, Wokha, Tseminyiu and Longleng districts of Nagaland. Having strong and well-built muscular body. Animals with black body coat



with white stockings are most common. White patched coat colour & pie-bald are also present. Face is inverted triangular with straight forehead.

Line joining the base of the horns is completely straight. Prominent dorsal ridge in males & females. Horns are massive and corrugated at the base, emerging outward, further curved upward with pointed tip. Used mainly for meat and slaughter during ceremonies. Body weight ranges between 470 to 500 Kg in males. Cows can produce 184 -193 milk in around 300 days of lactation. Nagami mithun is having high social, economical and cultural values among the farmers.

Mala chicken: This chicken is distributed in Ranchi & Khunti districts of Jharkhand. It is having black & golden mix and white & black mix plumage colour



pattern. hackle and saddle feathers are rich golden yellow in males forming mala (garland) like shape with lacing plumage pattern. average annual egg production 67 with brooding, high survival rate under minimal resource

availability. Average adult body weights are 1.9 kg in males and 1.1 kg in females.

Kodo duck is native of West Singhbhum, Saraikela-Kharsawan, Ranchi, Pakur districts of Jharkhand. Kodo ducks are having black and white or brown and white plumage. Bill is greenish black in many birds. Shank and web are orange mainly. Body carriage slightly upright and horizontal bill shape. These ducks are reared for egg and meat. Annual egg production ranges between 40-90. High survival rate under low input system.



Kudu duck: Native tract of the breed is Mayurbhanj district of Odisha. Kudu ducks are having light brown mosaic pattern plumage. White ring



around neck. Beak, shank and feet are orange coloured. Reared for eggs and meat. As a good layer, average annual egg production of Kudu duck is 149. Egg size is large, weighing to 64 gm on average. Adult body weights are 1.3 Kg for males and 1.2 Kg in females.

Kuttanad duck: This duck is distributed in Alappuzha, Kottayam, and Pathanamthitta districts in Kerala. Estimated population is around 17.8 lakhs. There are two colour variants-Blackish brown plumage (Chara) and Lighter & varied plumage (Chemballi) are observed. Bill in Chara is of dull orange in colour, whereas, yellow in Chemballi. Black spots on bill are seen. The Kuttanad duck produces 200-210 eggs annually under semi-intensive systems with egg size of 69.15g. Adult ducks, weighing between 1.6 to 2 kg, are dual-purpose, being valuable for both egg and meat production. Their excellent foraging abilities further attest to the breed's sustainability and the efficiency in 'Duc-Rice' integrated production system.



Manipuri duck is found in Imphal West, Imphal East, Thoubal, Kakching, Bishnupur, Jiribam districts



of Imphal valley and other hill districts of Manipur. Manipuri duck possesses light to dark brown speckled plumage; whereas, drakes are having glossy green head with light to dark greyish body and wings. Bill is

predominantly yellow to dark greenish bill, tipped with black. Reared for egg and meat. Good layer, laying about 130 eggs in average in 6-7 months laying period. Body weights range between 1.8 to 2.4 Kg in adult males.

Nagi duck is native tract of Nagi duck is Cachar, Karimganj and Hailakandi districts of Assam. 'Nagi'

ducks are medium in size, having cylindrical body. Plumage colour is peculiarly black. Birds also carry white patch on the breast Reared for dual purpose- egg and meat. The shank is light grey with orange tinge in colour in both sexes. Nagi ducks are



good egg producer, producing 150-180 eggs /year. It produces eggs with greenish blue tinged egg shell (instead of white), and supposed to have higher nutritional values. Adult body weight in males ranges from 1.5 to 107 Kg.

Rajdigheli geese is also known as 'Rajhanh; is distributed in all district of Assam. Estimated population



is around 3 Lakh. It is a heavier goose, with distinct long neck. They possess predominantly two plumage colour: white and cinnamon. Bill is mostly orange and yellow in colour. Black and mixed colour are also not uncommon.

Their shank and feet are orange and yellow. Knob is present in some of the populations. It is mainly reared for meat, egg, ornamental and religious purposes. Average adult body weights are 3.9 Kg in males and 3.6 kg in females. It produces 19 eggs/year, with egg weight of 116 gm, as an average.

Karan Fries cattle (synthetic): This Synthetic cattle breed has been developed by ICAR-NDRI. Main distribution areas include Karnal, Kurukshetra, Panipat, Kaithal, Jind, Yamuna Nagar districts of Haryana. Karan Fries is developed



through crossbreeding of Holstein Friesian (HF) and Tharparkar breeds and has now stabilized with 62.5% HF and 37.5% Tharparkar inheritance. Body coat colour is Black and white. Hump is absent. The cows produce 3550 kg of milk in a lactation, with ability to produce 5851 kg in 305 days. Peak milk yield is 46.5 kg. The germplasm is well adapted to hot-humid sub-tropical climatic conditions.

Vrindavani Synthetic cattle has been developed by ICAR-IVRI. It is distributed in Bareilly, Pilibhit, Shahjahanpur, Budaun districts of Uttar Pradesh.



It has been developed through crossbreeding of 4 different cattle germplasm. The blood has stabilized with 39.5% inheritance of HF, 26.9% of Haryana, 22% of Jersey and 10.7% of Brown Swiss. Animals have predominantly brown coat colour. Head with prominent poll & concave forehead, Laterally oriented medium sized ears with round edge. Milk yield ranges from 3000 to 3500 kg/lactation.

Avishan sheep (synthetic): Avishan, first synthetic sheep breed has been developed by ICAR-CSWRI.



The breed is characterized by high prolificacy, more litter weight, more milk and adaptable to harsh climatic conditions.

Composite crosses is having 12.5% Garole, 37.5% Malpura and 50% Patanwadi inheritance. FecB gene has also been introgressed from Garole. It is a medium to large sized mutton type sheep. The face is light to dark brown extended to neck and the body coat colour is off white/creamy. It has typical Roman nose and ears are flat. Tail is thin and medium in length. Both male and female are polled. Body weights in adult males range from 38 to 64 Kg. Average litter size is 1.8. Wool is coarse type. It is distributed in Tonk district of Rajasthan.

Registered animal breeds in India

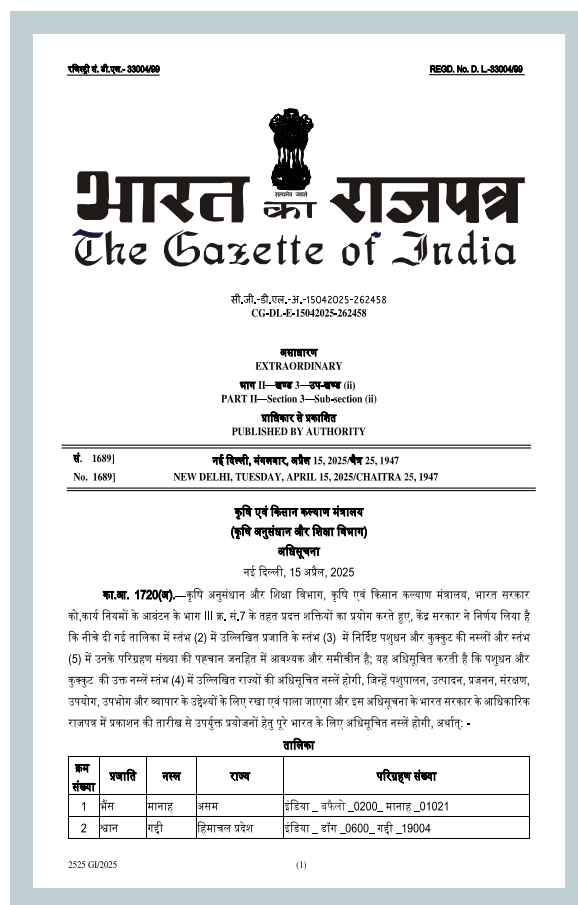
Species	Extant breeds	Newly registered breeds	Total breeds
Cattle	30	25	55
Synthetic cattle breed		3	3
Buffalo	10	12	22
Sheep	39	7	46
Synthetic sheep breed	0	1	1
Goat	21	22	43
Horse	6	2	8
Pig	0	15	15
Camel	8	1	9
Donkey	0	4	4
Yak	0	2	2
Mithun	0	1	1
Chicken	15	6	21
Duck	0	9	9
Geese	0	2	2
Dog	0	5	5
Total	129	117	246
Chicken Line	0	2	2

Gazette Notification of animal breeds

Ten indigenous animal breeds- Manah buffalo (Assam), Chaugarkha goat (Uttarakhand), Bundelkhundi goat (Uttar Pradesh & Madhya Pradesh), Kheri sheep (Rajasthan), Karkambi pig (Maharashtra), Ladakhi yak (Ladakh UT), Ladakhi donkey (Ladakh UT), Tripureswari duck (Tripura), Gaddi dog (Himachal Pradesh) and Changkhi dog (Ladakh UT), registered by the ICAR-NBAGR during January, 2025 have been gazette notified by DARE, Min. of Agriculture & Farmers Welfare, Govt. of India [No. 1689 (S.O.1720 (E), (April 15, 2025)].

Six Gazette notifications have been released upto December 2025 for 230 breeds and 2 chicken lines by Ministry of Agriculture and Farmers' Welfare, Govt. of India.

1. Gazette Notification of 184 breeds of livestock and poultry [No. 3364 (S.O. 3699(E)) (October 14, 2019)]



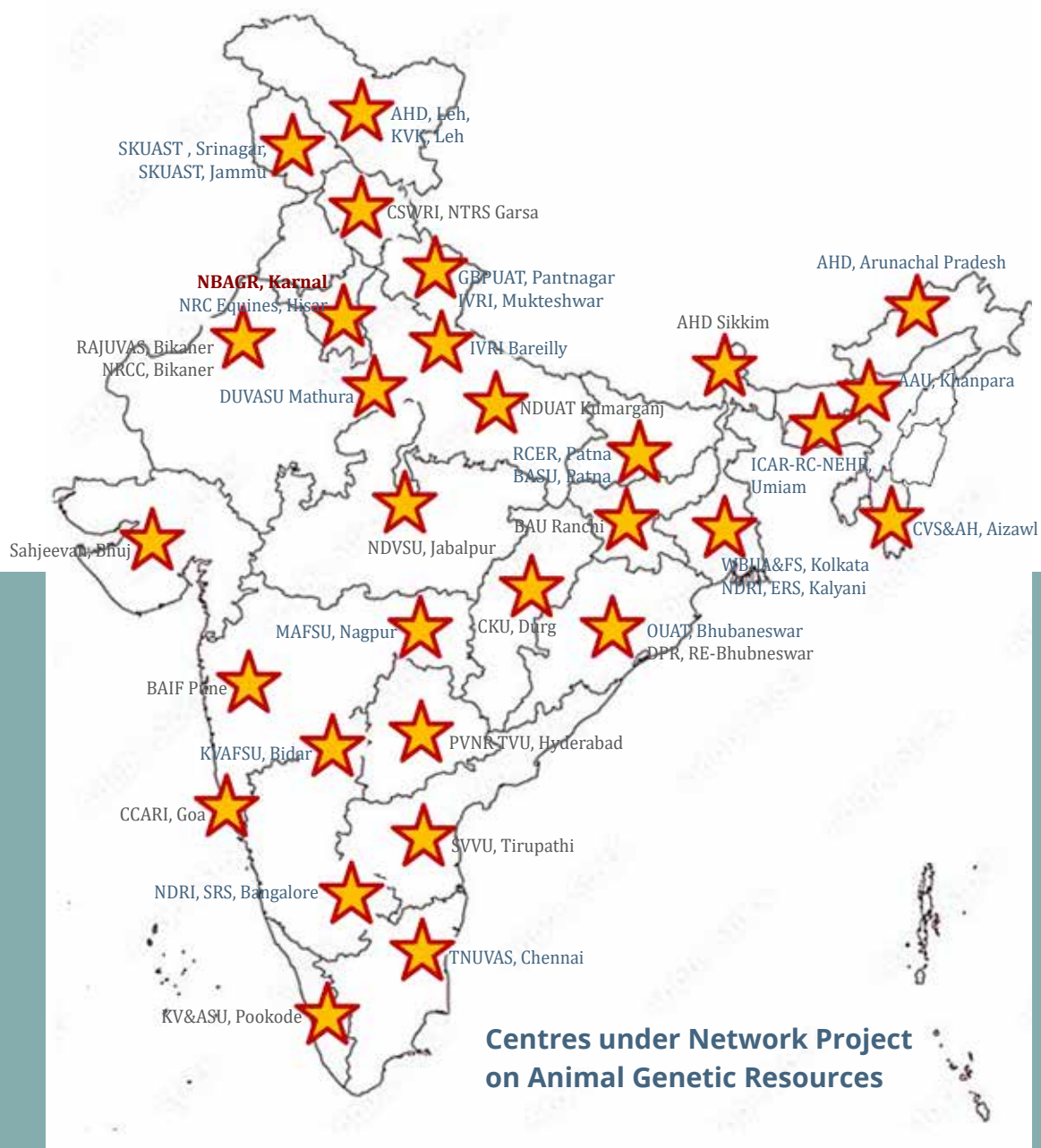
2. Gazette notification of 13 native breeds of livestock and poultry [No. 1420 (S.O.1583(E)) (May 22, 2020)],
3. Gazette notification of 2 lines of chicken [No. 1421 (S.O.1584(E)) (May 22, 2020)]
4. Gazette notification of 3 native breeds of dog [No. 3589 (S.O. 4086(E)) (November 13, 2020)].
5. Gazette notification of 2 indigenous livestock breeds [No. 3839 (S.O.4174(E)) (October 8, 2021)].
6. Gazette Notification of 10 indigenous breeds of livestock [No. 650 (S.O.680(E)) (Feb 13, 2023)]
7. Gazette Notification of 7 indigenous breeds of livestock and poultry and 1 synthetic cattle breed [No. 4906 (S.O.5301 (E), 5302 (E) (Dec 09, 2024)].
8. Gazette Notification of 10 indigenous breeds of livestock and poultry [No. 1689 (S.O.1720 (E), (April 15, 2025)].

Characterization and documentation of AnGR

Characterization under Network Project on Animal Genetic Resources

To achieve the objectives for AnGR management in the country, ICAR-NBAGR conceived an all-India Network Project to characterize and document indigenous livestock and poultry breeds of India in VIII plan (January 1996), funded by Indian Council of Agricultural Research. In the VIII plan phenotypic characterization

of eight breeds was undertaken, and distribution, utility, morphology, reproduction, growth and production of these breeds were documented. Subsequently genetic characterization and in situ and ex situ conservation programmes were added in the IX plan and further continued in next plans also. A paradigm shift in approach of AnGR characterization was happened in 2021, at the moment when Bureau initiated the survey and documentation of AnGR across the country under



the “Mission towards Zero Non-Descript AnGR of India’. 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 2022-23, three NWP centres were established in three states. Further, in 2023-24, 27 NWP centres and in

2024-25, total 32 NWP Centres in 26 states/UTs were established. In 2025, total 37 NWP Centres in almost all states were functional and involved in documentation of AnGR and characterization of new potential breeds in their respective regions. By 2025, phenotypic characterization of more than 60 potential populations of indigenous livestock and poultry was carried out.

List of Network Centers under NWP-AnGR and the populations under characterization (2025)

S. No.	Name of Centre	Name of population under characterization /conservation
1	ICAR-RCER, Patna	Charka Chicken, Chotanagpuri buffalo, Gandak buffalo, Palamu Sheep
2	MAFSU, Nagpur	Melghati cattle, Varhadi cattle
3	AHD, Arunachal Pradesh	Monbah cattle and Eki dog
4	ICAR RC for NEH region, Umiam, Meghalaya	SyiarMarkasa Chicken, local sheep of Meghalaya
5	CVS&AH, Aizawl	Shikhar, Meetei Yen Mrui chicken, Manipuri cattle, Mithun of Mizoram.
6	AAU, Khanpara	Daoaitha chicken, Aeye pig
7	BASU, Patna	Banka Cattle, Champaran goat and Surjapuri goat, Khagaria pony, Kisanganj chicken
8	OUAT, Bhubaneswar	Gola pig, Mayurjhar goat, Sambalpuri buffaloes
9	SKUAST Jammu	Jammu Hill cattle, Bhadarwahi Sheep and Bakerwal Dog.
10	WBUA&FS, Kolkata	Jhargrami pig
11	ICAR- IVRI Bareilly	Rohilkhandi Sheep, Rohilkhandi pony
12	DUVASU Mathura	Battisi goat and Braj donkey
13	GBPUAT Pantanagar	Tarai buffalo, Jaunsari Goat
14	KVA&FSU, Bidar	Koppal Cattle, Gudadheri cattle, Kakkera Chicken, Sira Sheep
15	TNUVAS, Chennai, Tamilnadu	Alambadi Cattle, Siruvidai chickens
16	SVVU, Tirupathi, AP	Macherla goat, Gaddabolli sheep
17	PVNR-TVU, Hyderabad	SingaraChilkula Godlu, Mayapuribuffalo, Telangana Black Goats
18	KV&ASU, Pookode, Kerala	Periyar/ Kuttampuzha cattle and Attappady Cattle
19	NDVSU, Jabalpur	Malvi sheep, Nimari buffalo, Vindhyanjali Buffalo, Vindhyanjali cattle
20	RAJUVAS, Bikaner	Rendi Cattle
21	CKU, Durg	Abujhumari pig, Bastar buffalo; Desi Kukri, Bastar cattle
22	ICAR-CCARI, Goa	Gomanchali buffalo, deshi chicken , deshi goat
23	BAU Ranchi	Dumka Sheep, Deshi chicken
24	CSWRI, NTRS Garsa (HP)	Shiwalik hill goat, Himachali yak
25	NDUAT Kumarganj	Awadhi sheep, Jaunpuri goat
26	ICAR-NDRI, ERS, Kalyani, West Bengal.	Sundarbani Cattle, Ruppur chicken, Muluk Buffalo, Bolsan Cattle
27	ICAR- DPR, RE-Bhubneswar	Moti duck, Kuzi duck
28	ICAR-NDRI, SRS, Bangalore	Hassan goat
29	BAIF Pune	Gavathi buffalo
30	IVRI Mukteswar	Mala sheep, Bhutia/ Himalayan Dog
31	KVK Leh	Purig Sheep
32	SKUAST Srinagar	Conservation of Karnah sheep, Gurez sheep, Characterization of Kashmir goat
33	AHD Sikkim	Conservation of Tibbetan sheep.
34	Animal Husbandry Department, Leh	Conservation of Zansakari pony
35	Sahjeevan, Bhuj, Gujarat	In – situ conservation of Halari donkey.
36	NRC Equines, Hisar	Conservation of Halari donkey (farm-based unit)
37	NRC on Camel	Conservation of Mewari, Malvi, and Mewati

AnGR of Bihar

Charka chicken: Charka chicken are distributed mainly in the Ranchi, Khunti, and West Singhbhum districts of Jharkhand. The geographical distribution of the breeding tract lies between 85.27°E and 85.44°E longitude and 22.36°N to 23.35°N latitude. The plumage colour of the birds is predominantly White or Black, with white being the most common. In some individuals, black plumage mixed with white is also observed. The comb is predominantly single and red in colour, while the wattles are mostly red. The shank colour is Yellow, and the ear lobes are Red. The mean flock size of Charka chicken was recorded as 9.18 birds, comprising 39.80% hens, 7.30% cocks, and 52.90% chicks within the breeding tract.

The pooled mean back length, head width, and wing span were 24.17 ± 0.07 cm, 2.36 ± 0.01 cm, and 29.65 ± 0.18 cm, respectively. The average body weight of male and female chicks at hatch



was 26.32 ± 0.11 g and 25.82 ± 0.11 g, respectively. Adult body weight was 1.81 ± 0.22 kg in males and 1.24 ± 0.21 kg in females. The age at first egg production was recorded as 6.18 ± 0.02 months, while annual egg production ranged from 30 to 115 eggs. Mortality was observed to be highest during the early stages of life, with 21.60% mortality recorded during the first week of age.

Egg production traits of Charkha chicken

S. No.	Egg production characteristics	Average	Range	N
1	Age at first egg (months)	6.18 ± 0.02	5.5 to 7.5	418
2	Annual egg production	61.58 ± 0.77	30 to 115	375
3	Clutch size (days)	15.55 ± 0.22	07 to 24	375
4	Clutch interval (days)	85.72 ± 0.37	70 to 104	375
5	Laying cycles (months)	9.88 ± 0.03	5.00 to 13.50	375

Chotanagpuri buffalo: Chotanagpuri buffaloes are distributed across the Chotanagpuri Plateau region of Jharkhand, extending from Ranchi and Khunti districts in the west to Dhanbad, Dumka, and Pakur districts in the east. These buffaloes are generally maintained



in small herds, with herd sizes ranging from 1 to 20 animals and an average herd size of 5.7. The animals are

of medium body size and predominantly black in coat colour. The face is narrow, and the body is

characteristically barrel-shaped. Chotanagpuri buffaloes appear relatively tall, with mean height at withers recorded as 136.26 ± 0.30 cm in adult males and 126.42 ± 0.31 cm in adult females. The estimated mean body weight of adult males and females was 475.13 ± 0.28 kg and 452.45 ± 0.24 kg, respectively. These buffaloes were observed to be low milk producers, with a standard lactation milk yield of 896.13 ± 0.56 kg and an average peak milk yield of 4.58 ± 0.22 kg. In addition to milk production, Chotanagpuri buffaloes are extensively used for agricultural and allied farm operations, demonstrating good draught ability and working for an average of 7.15 hours per day.

Dairy performance of Chotanagpuri buffalo

Parameter	Overall		
	Average	Range	N
Daily milk yield (kg)	2.98 ± 0.40	1.0 to 6.5	207
Peak milk yield (kg)	4.58 ± 0.22	2.5 to 6.5	207
Lactation length (days)	198.63 ± 0.54	120 to 330	207
Lactation milk yield (kg)	896.13 ± 0.56	600 to 1500	207
Fat %	8.3 ± 0.07	7.6 to 8.6	207
SNF %	9.1 ± 0.11	8.6 to 9.6	207

Gandak buffalo: Gandak buffaloes are found in West Champaran district of Bihar state with the breeding



tract lies between between 83°90' E and 84°60'E longitude and 27°00' N to 27°60' N latitude. These buffaloes

were found to be tall animals and medium in size. The coat colour of these animals were found to be mostly dark Grey. The muzzle and eyelids were mostly Black in colour. The tails switch had White hairs in almost 36% of animals. The horns were Grey in colour and sickle

shaped. The orientation of the horns was backward, upward and forward. Face was narrow and the forehead was not prominent. The birth weight of Gandak male and female calves were found to be 28.26 ± 0.09 kg, 27.52 ± 0.09 kg and they reached to 483.64 ± 1.36 kg, 435.61 ± 0.78 kg when they become adults. The chest girth, body length and height at withers of adult animals were found to be 204.12 ± 0.98 cm, 135.88 ± 0.76 cm and 139.47 ± 0.96 cm in males and 175.26 ± 0.46 cm, 119.33 ± 0.47 cm and 122.58 ± 0.46 cm in females, respectively. The daily milk yield was observed to be 2.98 ± 0.40 kg with the peak yield being 4.58 ± 0.22 kg. These buffaloes were primarily reared for milk and work purpose and the manure being used in sugarcane fields.

Dairy performance of Gandak buffalo

Parameter	Overall		
	Average	Range	N
Daily milk yield (kg)	2.56 ± 0.76	0.5 to 3.5	16
Peak milk yield (kg)	4.24 ± 0.58	2.0 to 5.5	16
Lactation length (days)	163.78 ± 9.65	120 to 240	16
Lactation milk yield (kg)	688.43 ± 11.40	400 to 1200	16

Chotanagpuri sheep: Chotanagpuri sheep was earlier reported to be found in the Chotanagpur terrain extending from Palamu in the West to Dumka and Pakur in the East. As days advanced and identification, characterization and registration of new germplasms, the breeding tract of Chotanagpuri sheep is redefined and the new habitat comprised of Ranchi, Khunti, Saraikela Kharsawan, West Singhbhum and East Singhbhum districts of Jharkhand state. The coat colour of the sheep was found to vary from light Brown to dark Brown in colour. Dark Brown coat colour was mostly found in the neck and head region. 12.5% animals had their head Black in colour. These animals are small sized animals with rough and coarse wool on the body. The head is small in size and the tail is medium to long in length. The body weights of Chotanagpuri lambs at birth, 3, 6, 9 and 12 months of age were found

to be 1.81 ± 0.11 kg, 6.56 ± 0.28 kg, 10.56 ± 0.30 kg, 13.87 ± 0.30 kg, 17.13 ± 0.28 kg and 23.83 ± 0.27 kg for males, and



1.79 ± 0.14 kg, 6.11 ± 0.22 kg, 9.48 ± 0.23 kg, 12.53 ± 0.21 kg, 16.86 ± 0.23 kg and 21.76 ± 0.22 kg for females, respectively. The pooled adult body weights of Chotanagpuri sheep were observed to be 23.83 ± 0.27 kg and 21.76 ± 0.22 kg, for males and females, respectively. These sheep twice in a year. Twinning was very rare in Chotanagpuri sheep. The age at 1st lambing was found to be 13.8 ± 0.23 months and lambing percentage was reported 72.50 per cent.

Body Weight (Kg) of Chotanagpuri sheep

Parameter	Male			Female		
	Average	Range	N	Average	Range	N
Birth weight	1.81 ± 0.11	1.5 to 2.5	35	1.79 ± 0.14	1.3 to 2.5	42
3 months	6.56 ± 0.28	4.5 to 8.0	115	6.11 ± 0.22	4.0 to 8.0	142
6 months	10.56 ± 0.30	8.0 to 12.8	108	9.48 ± 0.23	8 to 12.0	155
9 months	13.87 ± 0.30	11.0 to 16.0	105	12.53 ± 0.21	10.5 to 15.5	152
12 months	17.13 ± 0.28	15.5 to 20.5	104	16.86 ± 0.23	13.5 to 19.5	165

Palamu Sheep: These sheep are small to medium sized sheep with uniformly light brown coat colour. They are primarily distributed in Palamu district of Jharkhand state. Unique characteristics of these sheep is that



the tail length is medium, neither short nor long. Face is small and ears are pendulous. Initial study on Palamu

sheep showed that the average herd size of sheep was found to be 28.4 with 1.7 rams, 14.1 ewes and 12.6 lambs. Wool was coarse and was shorn twice in a year. Study on this population is being continued.

AnGR of Maharashtra

Melghati cattle: The “Melghati Cattle” is a local cattle germplasm found in Melghat region (Chikhaldara and Dharni Tahsil) of the Amravati district of Maharashtra. Melghat region is located on high plateau at an altitude of 1100 meters above mean sea level. It is also popular as “Pahadi cattle” and well known since British era (1911). It is reared primarily for drought purpose by the inhabitants.



Body Weight (kg) and Measurements (cm) of Melghati Cattle

Parameter	Male (n=1096)		Female (n=833)	
	Average	Range	Average	Range
Chest girth	154.24±0.41	115 - 184	144.89±0.53	102 - 185
Body length	126.34±0.27	101 - 154	117.92±0.24	88 - 147
Height at withers	123.47±0.22	100 - 148	115.34±0.26	83 - 140
Adult weight	232.66±1.99	123 - 389	232.66±1.99	123 - 389

Production Performance of Melghati Cattle

Parameter	Number of Observation	Average	Range
Daily milk yield (kg)	822	1.16±0.01	0.5 - 2.0
Peak milk yield (kg)	635	1.73±0.01	0.1 - 2.5
Lactation length (days)	635	198.41±1.87	90 - 295
Lactation milk yield (kg)	635	233.97±3.08	60 - 360
Fat %	285	4.56±0.08	2.67 - 8.22
SNF %	285	8.68±0.02	6.93 - 9.89

Gavathi buffalo: The buffalo population under study is predominantly found in extremely high-rainfall zones of western Maharashtra, particularly in and around Patharpunj village of Satara district. The buffaloes reared in this region have evolved under conditions of extreme rainfall, high humidity, rugged



terrain, and forest-based grazing systems, indicating strong ecological adaptation. Such environmental specialization

suggests that this buffalo population represents a unique genetic resource adapted to one of the highest rainfall ecosystems in the country. The animals are primarily reared for milk production under low-input, extensive management systems, which further highlights their importance as a climate-resilient genetic resource.

AnGR of Arunachal Pradesh

Ekki dog: The ‘Ekki’ are short to medium height stature, small to medium sized compact body with thick and hairy coat to protect themselves from severe cold climate of alpine zone. The ears are up-right or drooping,



strong limbs with smart look face. The body coat colour is predominantly black with golden brown face and

limbs or brownish black with tip of tail either black/ admixture of brown and black. Pure brown or white body coat colour and even admixture of Brown and white coat colour are also found. They are kept as the pet animal for guarding the owners' home. It is well, adapted in snow-capped areas of high mountains. The average litter size of bitches is 8. The adult average Body length, height and body weight are 80 cm, 59 cm and 20 Kg, respectively.

AnGR of Meghalaya

Syiar Markasa chicken: It is reared by Khasi Tribe since time immemorial. It is an indigenous chicken found in Eastern West Khasi Hills, West Khasi Hills and

Ri-Bhoi Districts of Meghalaya. The highest density of the populations of these poultry are distributed in Markasa, a small village in



Eastern West Khasi hills district of Meghalaya. It is situated between approximately 25 degrees 10' and 25 degrees 51' N latitude, and between 90 degrees 44' and 91 degrees 49' E longitude. Physical characters were recorded on 885 Syiar Markasa chicken. *Plumage colours* are Golden Reddish Brown, Golden Blackish Brown, Black and Multi-colour. *Plumage pattern* is mostly Solid. Single comb is present in almost all birds. Other characters include- red ear lobe, yellow shank and skin colour in most birds. Averages of egg weight, albumin, yolk and shell weights are 41.848 ± 1.084 , 24.78 ± 0.719 , 12.89 ± 0.334 and 4.173 ± 0.118 gm. Other egg traits were -17.37 ± 0.33 Albumin index, 20.39 ± 0.43 Yolk index and 93.52 ± 0.89 Haugh units.

Traits	Male (n= 287)	Female (n= 607)	Pooled (n= 885)
Shank length (cm)	8.550 ± 0.146	7.124 ± 0.094	7.990 ± 0.130
Wing span (cm)	68.876 ± 0.307	62.306 ± 0.416	66.076 ± 0.465
Comb length (cm)	6.617 ± 0.165	3.156 ± 0.097	5.466 ± 0.205
Body length (cm)	39.875 ± 0.627	34.605 ± 0.398	37.246 ± 0.443
Body weight (kg)	1.960 ± 0.052	1.656 ± 0.028	1.856 ± 0.039

AnGR of Tripura

Tripura Black chicken: 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. Plumage in majority



of birds were observed pure black shining colour but in some cases dull black and black with red on neck

were also found. Skin colour is light yellow (57.19%), whitish pink (31.23%), creamy (9.12%) and black (2.45%). Shank colour has been observed with Yellow (80.0%), Black (12.28%) and Grey (4.91%). Comb is mostly single type (99.7%)

AnGR of Mizoram

Mizo Mithun: The Mithun in Mizoram are locally known as "Sial", the word "Sial" means pride or something that makes others envious. Mithun holds a vital place in the material wealth, cultural identity, and traditional customs of the Zo people. Beyond its symbolic importance, it is also regarded as a representation of prosperity. For generations,



Mithun has played a significant role in Mizo society, not just as livestock but also as a key element in traditional ceremonies, economic sustenance, and ecological balance. Mithun also plays a crucial role in

traditional Mizo marriages. As part of the bride price (*Manpui*), Mithuns were given by the groom's family to the bride's family as a sign of honor and respect. Mithun has spiritual significance among the Mizo people, as it

was historically used in sacrificial offerings to appease deities and seek blessings for prosperity, protection, and well-being.

Biometrical traits in adult Mizo Mithun

Parameter	Sex	Districts				Overall	F value
		Serchhip	Khawzawl	Saitual	Champhai		
Body Length (cm)	Male	130.95± 0.72	129.28± 0.58	130.00± 0.47	130.68± 0.44	130.27 ±0.29	1.74 NS
	Female	128.33 ± 0.41	129.27 ± 0.56	129.55 a ± 0.61	129.71± 0.43	129.13 ± 0.2	2.01 NS
	Overall	129.17 ± 0.39**	129.28 ±0.40 NS	129.74 ±0.40 NS	130.09 ±0.32 NS	129.57 ±0.19NS	
Height at withers (cm)	Male	127.95± 0.60	128.22± 0.55	127.25± 0.41	128.05 ± 0.26	127.89 ±0.23	0.76NS
	Female	127.38± 0.40	127.41 ± 0.54	127.91 ± 0.48	128.35± 0.38	127.76 ±0.22	1.23NS
	Overall	127.56 ±0.33 NS	127.78 ±0.39 NS	127.63 ±0.33 NS	128.23 ±0.25 NS	127.81 ±0.16 NS	
Chest girth (cm)	Male	178.05 ± 1.67	174.61 ± 3.06	179.25 ± 1.87	181.68 ± 0.59	178.55 ±0.98	2.49 NS
	Female	178.50± 1.14	181.91± 2.04	176.95 ± 1.16	178.21± 0.72	178.76 ±0.63	2.24 NS
	Overall	178.36 ±0.93 NS	178.63 ±1.85 NS	177.92 ±1.04 NS	179.57 ± 0.54**	178.68 ±0.54 NS	

***Significantly different at $P<0.05$, $P<0.01$; ^{NS} Not significant

^{a,b,c}Mean bearing different superscripts differ significantly between columns

Shikhar Chicken: Distributed in Aizawl, Serchhip and Lunglei districts 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 in male

are Golden yellowish (53%); Reddish orange (27%); Whitish grey (13%); Golden yellowish (7%) and, in female Golden brownish (100%).

Egg production characteristics

	Average	Range	N
a) Age at first egg (months)	6.42.00±0.01	5.8-7.0	600
b) Annual egg production	37.85±0.10	31-47	600
c) Clutch size (days)	5.85±0.11	4 - 8	600
d) Clutch interval (days)	36.06±0.12	30-42	600
e) Age at culling (months)	14.02±0.08	12-18	600

Egg quality traits

	Average	Range	N
a) Egg weight (g)	31.27 ± 0.12	29.47-34.38	100
b) Shell weight (g)	2.87 ± 0.01	2.23-3.81	100
c) Albumen weight (g)	18.87 ± 0.12	16.67-23.23	100
d) Yolk weight (g)	8.99 ± 0.04	7.82-11.15	100
e) Shell thickness (μ)	0.24 ± 0.02	0.21-0.34	100
f) Specific gravity	1.02 ± 0.004	1.00-1.04	100
g) Albumen index	9.93 ± 0.07	8.14-11.84	100
h) Yolk index	34.23 ± 0.17	30.12-38.03	100
i) Haugh units	68.93 ± 0.21	64.87-72.12	100

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 'meitei'/ 'meetei' was taken from the community which was rearing



this breed and the term 'yen' means 'chicken' in Manipuri language. Estimated population is approximately 10

Lakh. The plumage colour is red, black, brown, white and grey. Utility of the breed (Eggs/meat/game/others): Eggs, meat and religious ceremony.

Egg production characteristics

	Average	Range	N
a) Age at first egg (months)	5.79±0.01	5.5-6.0	800
b) Annual egg production	47.83±0.10	43-53	800
c) Clutch size (days)	13.43±0.03	12-15	800
d) Clutch interval (days)	46.06±0.12	40-52	800
e) Laying cycle (months)	17.79±0.01	17.5-18	800
f) Age at culling (months)	14.81±0.08	12-18	800

Egg quality traits

	Average	Range	N
a) Egg weight (g)	33.67 ± 0.22	30.14-38.88	200
b) Shell weight (g)	3.40 ± 0.02	2.68-4.01	200
c) Albumen weight (g)	20.13 ± 0.15	17.68-24.0	200
d) Yolk weight (g)	9.98 ± 0.06	9.0-11.65	200
e) Shell thickness (μ)	0.29 ± 0.02	0.20-0.33	200
f) Specific gravity	1.03 ± 0.005	1.03-1.048	200
g) Albumen index	9.96 ± 0.08	8.12-11.88	200
h) Yolk index	34.17 ± 0.20	30.23-39.02	200
i) Haugh units	68.85 ± 0.21	64.81-73.05	200

Mruī Chicken: Distributed in Peren, Dimapur and Cummukidema districts of Nagaland. Estimated population is approximately 10 Lakh. Rearing by Jeliang Community. Plumage colour:



Golden brownish: 23% Gray white and black mixed 20%, Black: 18%, White:13, Brownish Black: 12%, golden white: 7 %, others (yellowish black, gray, yellowish white) 7%. Average egg weight, yolk weight are 32.02 and 10.69 gm, respectively. Average percentage of yolk index and Hauge unit are 64.40 and 67.94.

Egg production

Egg production characteristics	Average:	Range	N
Age at first egg (months)	4.5	4-5	100
Annual egg production	43	35- 54	100
Clutch size (days)	11.6	8-17	100
Clutch interval (days)	85	75-98	100

AnGR of Manipur

Manipuri cattle: 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 'meitei'/'meetei' was taken from the community which had starting rearing this breed and the term 'San' means 'cattle' in Manipuri language. The owners maintained the animal by supplementing procured green grass to the tethered animals 1-2 times daily. The owner usually supplied rice straw in the form of dry fodder. The local cattle thus were maintained by and large on zero input feeding system, depending almost solely on poor nutrients.



Biometric parameters of different age groups of indigenous cattle of Manipur

Parameters	Sex	Age groups		
		Upto 1yr	1 < 3yrs	Above 3yrs
Height	Male	91.70 ± 7.42	100.97 ± 10.24	112.60 ± 3.84
	Female	81.18 ± 5.02	100.76 ± 1.42	109.19 ± 5.69
	Overall	86.44 ± 6.22	100.86 ± 5.83	110.89 ± 4.76
Body length	Male	75.52 ± 1.70	105.57 ± 11.51	125.19 ± 5.71
	Female	71.37 ± 0.71	102.23 ± 5.88	119.74 ± 3.84
	Overall	73.44 ± 1.20	103.90 ± 8.69	122.46 ± 4.77
Hearth girth	Male	95.91 ± 5.95	134.62 ± 11.00	142.80 ± 9.12
	Female	93.29 ± 7.19	128.27 ± 12.31	137.37 ± 5.97
	Overall	94.60 ± 6.57	131.44 ± 11.50	140.08 ± 7.54
Paunch girth	Male	94.74 ± 7.87	134.54 ± 11.44	145.06 ± 7.09
	Female	93.09 ± 5.30	130.46 ± 5.92	135.36 ± 3.00
	Overall	93.91 ± 6.58	132.50 ± 8.68	140.21 ± 5.04
Tail length	Male	42.55 ± 12.55	49.38 ± 1.02	58.50 ± 0.56
	Female	36.53 ± 0.66	51.64 ± 0.84	51.77 ± 1.04
	Overall	39.54 ± 6.60	50.51 ± 0.93	55.13 ± 0.80

AnGR of Assam

Daoaitha chicken: Daoaitha is an indigenous dwarf poultry breed of Assam, predominantly distributed in



the Bodo-dominated districts of Kokrajhar, Chirang, Udalguri and Baksa. Maintained mainly by tribal farming communities under backyard and scavenging production systems, Daoaitha serves as a

dual-purpose breed for egg and meat. The birds exhibit barred plumage with reddish-brown to dark brown coloration in males and dull brown to blackish plumage in females, along with white skin and shanks, red comb and earlobes. Age at first egg averages 6.54 months with an annual egg production of about 45 eggs, while eggs show acceptable internal and shell quality. The breed is broody in nature with high fertility (80.30%) and hatchability on fertile egg basis (83.90%). Growth performance is moderate, with adult body weights of 1.61 kg in males and 1.29 kg in females. Carcass evaluation indicates satisfactory dressing percentage under traditional management.

Aege pig: is an indigenous pig breed of Assam, predominantly reared by the Mishing tribal community in Golaghat district. The animal is primarily maintained under low-input scavenging and semi-stall feeding systems for pork production. Aege pigs are medium-sized, dark black in colour without sexual dimorphism,

possessing a long snout, pendulous ears, coarse bristles, straight top line and full hoof placement, reflecting their primitive and wild-boar-like appearance and strong rooting behaviour. Adult males and females attain body weights of about 72.4 kg and 64.9 kg, respectively, under traditional management. The breed exhibits moderate growth, early



sexual maturity, and satisfactory reproductive efficiency, with age at first farrowing around 342 days, litter size at birth averaging about five piglets, and a productive life span exceeding four years. Well adapted to extensive systems with wallowing behaviour and natural mating, Aege pigs represent a hardy, resilient indigenous genetic resource well suited to smallholder production systems and deserving of systematic conservation and improvement efforts.

AnGR of Bihar

Champaran Goat: Distributed in East and West Champaran Districts. The body colour is Black, Brown & Black-Brown combination.

Medium legged animals, lustrous hair, aged animals have beard, slightly convex nose line is differentiating traits.



Reared mainly for mutton production.

Body weight (kg) of Champaran Goat

Weight at	Male			Female		
	Average	Range	N	Average	Range	N
Birth weight	2.34±0.36	0.4-4.0	08	2.33±0.17	1.8-3.0	6
Weaning weight / 3 M weight	4.96±0.49	1.2-11	24	3.78±0.37	2.0-7.0	16
6 M weight	8.89±0.39	6-17.5	42	7.38±0.31	4-10	24
12 M weight	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

Body measurements (cm) of Champaran Goat

Measurements	Male			Female		
	Average	Range	N	Average	Range	N
Chest-girth	50.77±0.48	26-73	345	55.39±0.38	29-86	607
Body length	41.00±0.37	20-58.4	345	45.27±0.31	15-66	607
Height at withers	47.24±0.43	25-68	345	50.17±0.30	27-74	607

Surjapuri Goat: Surjapuri is local language which is spoken in this area. Distributed in Kishanganj,



Araria and Purnea districts of Bihar. The body colour is Brown with black patches, brown with black and white patches and also Mixed

pattern. Ears are generally horizontal and tails are also generally horizontal. Reared mainly for mutton production.

Banka Cattle: Distributed in hilly regions of Banka, Munger and some part of Jamui districts of Bihar. Small in size and black, brown, white or combination of these in colour. Forehead flat or slightly convex. Few animals have white eye lashes and few others have pinkish muzzle and hoofs. Reared for milk, draught and manure purposes. Maintained mainly by poor livestock keepers

of Banka and Munger districts residing near hills. Cows are giving daily 2-3 litres milk per day. Animals

are reared on zero input system. In morning after milking animals are taken to the bottom of hills for grazing and are taken back to



their home at time of evening milking. One of the most distinctive features of these animals is their seasonal migration from hilly areas to the Ganges basin. Livestock keepers move their animals to the Gangetic plains, primarily in Bhagalpur district, in search of green fodder. Farmers in these plains invite livestock keepers to allow their animals to stay in their fields for a few nights, benefiting from natural fertigation. In return, they provide food, shelter, and monetary compensation to the livestock keepers.

Body measurements (cm) of Banka Cattle

Parameter	Male			Female		
	Average	Range	N	Average	Range	N
Chest girth	130.04±1.84	85-190	124	133.37±1.27	80-180	224
Body length	110.21±1.78	70-155	122	110.86±1.24	70-165	222
Height at withers	102.57±0.97	72-132	122	105.14±0.80	80-145	221

Khagaria pony: Distributed in plain and diara region of river Ganga in Khagaria, Madhepura, Sharsa, Supaul and Araria districts of Bihar. This horse population perform well in floods, marshy and dry land under locally available grass and agricultural waste products. Khagaria ponies are small in size and observed mostly in chestnut/bay/white colour. The body parts of Khagaria ponies are well proportioned. They have straight and strong back to carry heavy loads in adverse situations



of climate. The back side of both forelegs and hind legs (in lower area between knee joints to fetlock joints and between hock

joints to fetlock joints) possess vertical growth of long

hairs. The ears of horse are small in size and oriented vertically straight in upward direction and remain wide apart to each other. The forehead of this horse presents various types of stripes. These ponies mostly utilized for transportation of heavy loads on their back as pack animals in flood water which stays for longer period of time in the diara region.

Kishanganj Chicken: Mainly concentrated in Kishanganj district.

The colour noticed are Complete Black, Brown and Mixed pattern with Single and pea comb and tuft of hair on head. Reared mainly for Eggs and meat.



Egg production characteristics of Kishanganj Chicken

Trait	Average	Range	N
Age at first laying (months)	6.4±0.49	6-7	46
Annual egg production (nos.)	79.34±7.4	70-90	24
Clutch size (days)	11.13±1.18	10-13	10
Egg weight (g)	36.04	31.6-43.0	10

AnGR of Odisha

Sambalpuri Buffaloes: The survey done in Redhakhola area of Sambalpur district and areas of Bargarh district and morphological features were recorded on the Sambalpuri buffaloes. The animals were medium in size and coat colour was black or gray with black or brown hair. The head was wedge shaped with a distinct white patch on forehead in some animals. Horns were sickle shaped and the animal possessed medium sized ear generally controlled in parallel position with tail reaching down to hock joint ending with black or white switches. These animals had an average of 134.4 cm, 174.7 cm, 127.5 cm, 184.5 cm, 48.8 cm, 58.6 cm, 79.4



cm and 398.7 kg. These buffaloes yielded 2.0 to 4.0 litter of milk in an lactation period of 240 to 300 days.

Mayurjhar goat: Distributed in Mayurbhanj and Keonjhar district of Odisha. Mayurbhanj goats are predominantly black in colour; 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; 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 upward and backward orientation. The average wither height at birth in male and female is 25.23±0.47 and 22.66±0.49 cm, respectively. The average chest girth at birth in male and female is 25.38±0.62 and 22.91±0.64 cm, respectively. The average body length at three months of age in male and female is 30.62±0.65 and 29.69±0.62 cm, respectively. The average age at sexual maturity is 7.69-month, age at first kidding is 13.47 month and kidding interval is 7.47 month.



Body weight (kg) of Mayurjhar goat

Weight at	Male			Female		
	Average	Range	N	Average	Range	N
Birth weight	1.26±0.04	0.8-2.0	175	1.08±0.02	205	205
3 M weight	6.32±0.03	5.8-7.4	161	5.84±0.03	4.8-7.1	192
6 M weight	9.70±0.07	8.5-11.7	154	8.55±0.05	7.5-10.8	182
12 M weight	13.45±0.13	12.9-15.4	128	12.62±0.05	11.3-13.8	177
Adult B wt.	24.65±0.15	22.0-27.5	112	22.29±0.16	20.5-24.9	365

Golla Pig: The Golla community of the undivided Ganjam districts 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. 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 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. 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 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 as 112.29 days.

Moti Duck: This is an indigenous duck (synonymous Moti Hansa) mostly reared in western district (Koraput, Kalahandi, Nabarangpur and Malkangiri) of Odisha. The survey work was carried out in five blocks (Koraput, Lamtaput, Semiliguda, Nandapur and Potangi) of Koraput district. The data on morphological characteristics, production and reproduction performances have been recorded from 810 ducks comprising 240 farmers family. The data analysis is in progress. The preliminary information suggests, their



feather colour is a mixture of black, white, or brown (Fig 1). The prominent feature includes red caruncles in the head region (Fig 2). The adult body weight ranges from 1.75 kg to 2.75 kg. They are mostly reared for meat purposes. They are poor layers, with annual egg production below 40nos. But the ducks show good broodiness and mothering ability

Kuzi Duck: This is another indigenous duck (synonymous Gedi Hansa) mostly reared mostly in coastal district (Jagatsinghpur, Kendrapara, Khorda and Puri) of Odisha. The survey work was carried out in five blocks (Puri Sadar, Satyabadi, Pipli, Nimapara and Brahmagiri blocks) comprising 15 gram panchayats (Basudevpur, Sakhigopal, Balapur, Jopan, Saraswatipur, Praharaipur, Khellor, Dandamukundapur,



Nuagopalpur, Rench, Ambapada, Palanka, RebanaNuagoan, Niajapur and Chapamanik) and more than 30 villages. The preliminary information on morphological characteristics, production and reproduction performances suggests, their feather colour in duck is mostly brown or combination of brown and black, whereas drakes were having mixture of grey and black colour (Fig. 4 & Fig. 5). The adult body weight ranges from 1.10 kg to 1.80 kg. They are mostly reared for egg purposes. They are good layers having annual egg production around 180nos. Data collection in other districts are in progress.

AnGR of Jammu & Kashmir

Hill cattle of Jammu: Hill cattle of Jammu are generally known as desi cow and distributed hilly



terrain of Jammu division. The utility of the population is milk, draught and manure. The population of hill cattle is known since time immemorial. The population is very docile and average herd size is small (1-4). The body colour is generally light brown, black, white with dark shade with small body frame

and short legs. The replacement of the herd is very less about 1% only. Milk fat percent is about $4-5.811 \pm 0.276\%$ and SNF is 8.380 ± 0.145 . 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 ranged from 135 days to 260 days.

Body measurements (cm) of Hill cattle of Jammu

Parameters	Male			Female		
	Average	Range	N	Average	Range	N
Chest girth (cm)	151.20	140-175	32	125.07	95-175	154
Body length (cm)	105.29	96-140	32	99.31	80-140	154
Height at withers (cm)	113.57	102-147.50	32	104.53	75-140	154

Dairy performance of Hill cattle of Jammu

Parameter	Overall		
	Average	Range	N
Daily milk yield (kg)	2.09	1.0-4.0	135
Lactation length (days)	187.52	135-260	135
Lactation milk yield (kg)	257.49	180-520	135

Milk Sample Analysis of Jammu Hill Cattle

Particulars	Fat (%)	SNF (%)	Density	Specific Gravity
Mean $\pm$ SE	5.811 ± 0.276	8.380 ± 0.145	26.663 ± 1.086	1.028 ± 0.000673
Range	2.050 - 6.870	5.790 - 10.060	20.000 - 29.200	1.024 - 1.033

Badarwahi sheep: It is mainly found in the Bhadarwah, Doda, Kishtawar, Bani, Ramnagar of Jammu & Kashmir. The population is around 50-60 thousand. It is dual purpose (wool and meat) and mainly reared by tribal community. Bhaderwahi sheep is locally known as Pahari and Bakerwali sheep and mainly reared by nomadic community of Jammu & Kashmir districts namely Gujjar, Bakerwals and Pahari. This sheep population is semi-migratory in nature and migration takes place from April-May to September to highland pasture and towards downhill pasture from October to March-April. Shearing is mainly performed mostly



twice during March-April and September-October. White colour is predominant for the Bhaderwahi sheep. Rams are mostly horned and ewes are in general polled (8-10% found to be horned). Sheep population is medium in size. The ear is short and slightly pendulous. Horn is present in males and females. The body was covered with more coarse type of wool irrespective of sex and age. Animals are small to medium sized sheep mainly reared by Bhakarwal, Gujjar and other nomadic communities. Most of the farmers belong to the Muslim community, although very rare farmers are belong to Hindu, schedule tribes and Pahari communities. The farmers rearing Bhaderwahi sheep populations are landless to marginal farmers.

Body Weight (kg) of Badarwahi sheep

Weight at	Male			Female		
	Average	Range	N	Average	Range	N
Birth	2.19	2.00-2.70	35	2.17	2.0-3.20	56
6 months	12.23	11.0-14.0	85	12.10	11.0-14.0	210
9 months	20.27	18.0-22.0	105	20.32	17.0-22.0	190
1 year	28.15	26.0-37.0	56	27.47	23.0-29.0	241
Adult weight (18 months)	34.54	31.0-38.0	45	33.76	29.0-39.0	204

Body measurements (cm) of Badarwahi sheep

Body measurement (cm)	Male			Female		
	Average	Range	N	Average	Range	N
Chest-girth	92.21	88.0-96.0	56	91.91	62.0-98.0	204
Body length	113.80	107.0-119.0	56	112.98	107.0-119.0	204
Pouch Girth	88.54	85.0-96.0	56	88.43	81.0-96.0	204
Height at withers	63.41	60.0-66.0	56	63.75	60.0-69.0	204
Face length	25.54	21.0-30.0	56	25.89	21.0-33.0	204
Ear Length	12.40	10.0-16.0	56	12.16	10.0-15.0	204
Horn Length	18.63	12.0-25.0	32	6.63	6.0-8.0	18
Tail Length	45.29	40.0-75.0	56	44.04	40.0-54.0	260

Bakerwal Dog: This is an ancient dog breed and mainly reared by Bakerwal community. The dog population is decreasing. This dog population is very furious and aggressive and mainly used for guarding the flock of nomadic population from different wild animals. The average herd size is 1-4. The body

colour is mainly black (50.00), brown (16.67), red (22.22) and white (11.11).



Morphometric characteristics of Bakerwal Dog (N=52)

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

Purig/Purgi Sheep (Pot:Tibetan, Rig: lineage): Purgi is an indigenous, small-sized sheep breed of the Kargil and Turtuk area of Ladakh. It is mostly white with long pointed head, short and slightly tubular ears and horns which are curved downwards. Males and females attain



body weights of 17.64 and 18.52 kg at 2-tooth, 20.67 and 21.87 kg at 4-tooth, 23.51 and 24.81 kg at 6-tooth and

25.81 and 26.69 kg at full-mouth. Purgi is reared under range system in summers and semi-intensive system in winters. The Purgi breed is hardy, and is able to withstand harsh winters. He opinioned of present sheep breeds of Ladakh to descendants of earliest Purig sheep. The mutton of Purig Sheep is very tasty and greatly relished by locals esp on special family occasions. The wool seems to be very fine and used for making garments like socks, sweater and shawl by local artisans. The purig sheep are predominantly found in Sankoo, Shakar, Chiktan, Batalik areas of Kargil district and Turtuk, Tyakshi and Thang village of Leh District.

AnGR of West Bengal

Jhargrami Pig: Distributed in Purulia, Bankura, and Jhargram districts. These pigs exhibit moderate body weight, satisfactory growth and reproductive performance, strong adaptability, and high disease tolerance, making them highly suited to low-input scavenging and semi-scavenging systems. Phenotypically, sows demonstrate reproductive maturity and robust maternal traits, while boars show well-developed musculature and reproductive fitness. The combination of uniform black coat, compact low-set body, semi-drooping ears, thick pigmented skin, and strong legs constitutes a unique genetic and adaptive signature of this population. Boars (Male) are medium-sized, compact, muscular body; uniform jet-black coat; coarse short-to-medium hair; medium to broad head with strong, slightly elongated snout; semi-drooping ears; short, thick, sturdy legs adapted to uneven lateritic terrain; thick, darkly pigmented skin; well-developed, normally descended testes.



Sows (Female) are medium-sized, compact body; uniform black coat; coarse sparse to moderately dense hair; comparatively finer head; semi-drooping ears; well-developed pendulous abdomen; prominent, evenly spaced mammary teats.

Sundarbani cattle: Population is available in Sunderban region of 24PGS, West Bengal since long. Mostly utilized for draught, manure and milk purposes. The breed is well adapted to the saline, waterlogged and humid ecosystem of the Sundarbans. The animals are small to medium-sized, docile and dwarf in nature. Coat colour varies from white to fawn and blackish brown. Horns are straight and forward-oriented. Hooves, muzzle, eyelids and tail switch are black. The breed is primarily used for draught power, manure and milk production. Animals are used for ploughing and threshing, working about 5 hours per day. The average birth weight of male calves was 12.5 kg, while female calves weigh



slightly less, around 11.9 kg, indicating minimal sexual dimorphism at early age. The body dimensions of adult Sundarbani cattle further supports their compact conformation. Table 2 revealed that adult males having age of ≥ 5 yrs have average body length of about 99 cm, chest girth of 119 cm, and height at withers of nearly 97 cm. Corresponding measurements in adult females average approximately 96 cm in body length, 114 cm in chest girth, and 94 cm in height at withers.

Body Weight(kg) of Sundarbani cattle

Weight at	Male			Female		
	Average	Range	N	Average	Range	N
Birth (kg)	12.54	9.29- 15.23	8	11.87	8-20 -13.2	10
Pre-Weaning (6-7 month)	22	18-28	8	24.19	19-28	9
12 months	46.27	18.04 -72.2	52	44.50	17.45 -67.82	33
24 months	68.12	44.56 -105.6	48	70.54	43.79 -80.66	45

Dairy performance of Sundarbani cattle

Parameter	Overall		
	Average	Range	N
Daily milk yield (kg)	1.05	0.5-3.0	135
Peak milk yield (kg)	2.5	1.5-3.0	135
Lactation length (days)	260	240-280	105
Lactation milk yield (kg)	385	200-500	105
Fat %	3.15	0.41-6.41	46
SNF %	9.20	8.48-10.0	46
Protein	3.49	2.38-4.72	46

Ruppur chicken: Ruppur deshi chicken, an indigenous poultry bird of West Bengal, is distributed in Bolpur area of Birbhum district of West Bengal. It is a dual type bird but predominantly kept for meat purpose. This bird is small to medium in size with a compact and moderately upright body posture, well suited for scavenging-based systems. The head is small to medium with a predominantly single comb that is pink to red in colour, being more prominent in males,

while wattles are small and less developed, especially in females. Considerable variation is observed in plumage colour and pattern, including white with black or grey speckling, brown, blackish-grey, and mixed colours, reflecting a heterogeneous indigenous genetic background. Eyes are bright and alert, indicating good vigour. Legs are medium to long, strong and clean, with shank colour varying from yellow to grey or black, enabling efficient movement during free-range foraging. This bird is highly suited for backyard poultry farming due to its natural hardiness and disease



resistance, making it a valuable resource for rural livelihoods. The average body weight of adult Ruppur deshi male and female chickens was $1.10 \pm 0.02\text{kg}$ and $0.967 \pm 0.01\text{kg}$, respectively.

The egg production characteristic of Ruppur chicken

Egg Production Characteristics	Average	Range	N
Age at first egg (months)	6.5	6-7	104
Annual egg production	60	50-70	104
Clutch size (days): Clutch length	11	9-13	51
Clutch interval (days)/Pause period	60	50-70	160
Age at culling (months)	6	4-7	45

Muluk Buffalo: This buffalo is predominantly distributed in Birbhum district of West Bengal, particularly around Muluk and adjoining villages, with secondary populations extending into neighboring districts such as Purba, Bardhaman and Hooghly. The distribution is closely associated with riverine plains, wetland availability, and traditional low-input buffalo husbandry systems. The Muluk buffalo is a medium- to large-sized, sturdy riverine buffalo well adapted to the hot-humid agro-climatic conditions of eastern India. The coat colour is predominantly jet black to dark grey, with a smooth and shiny skin, sparsely covered with short hair. Eyes are prominent, alert, and dark in colour, imparting a calm but attentive expression. Ears are medium to large, broad, and laterally oriented, often drooping slightly, which is a characteristic feature of local buffaloes in this region. The horns are medium in length, thick at the base, and curve backward and upward in a crescent or sickle shape; in some animals, the horns show inward turning at the tips. The legs are short to medium in length, strong, and well placed, with black hooves, providing good support for draft and grazing activities. The tail is long, reaching below the hock, ending in a prominent black switch. Overall, the Muluk Local Buffalo exhibits robustness, hardiness,



and adaptability, making it suitable for low-input production systems, draught utility, and moderate milk production under rural conditions.

Dairy performance of Muluk buffalo

Parameter	Average Range N		
Daily milk yield (kg)	5.65	1.5-9.0	15
Peak milk yield (kg)	7.0	6.0-9.0	15
Days to reach peak yield	28	22-40	15
Lactation length (days)	228	180-320	15
Lactation milk yield (kg)	1280	750-1900	15

Bolsan cattle: Distributed in Birbhum district of West Bengal, particularly around Raipur, Supur, Mirzapur, and Chandanpur villages of Bolpur-Sriniketan block & Khasbazar, Ghazipara, Bailypara, Arali & Gouribagan villages of Rajnagar block in Birbhum district of West Bengal. Bolsan cattle are small to medium in size with a compact, hardy body conformation typical of indigenous animals adapted to low-input production systems. The coat colour of the animal is predominantly white to light grey, with variable greyish or brownish shading over the neck, hump, shoulders and hindquarters. The skin is loose and pliable, particularly around the neck and dewlap, while the hair coat is short and smooth, aiding heat tolerance. Head is medium-sized with a straight to slightly concave forehead, dark muzzle and alert eyes; ears are short to medium in length and moderately drooping. Horns are short to medium, slender and directed upward and outward, becoming thicker at the base in males. Hump is small to moderately developed in females and more prominent in males, reflecting zebu characteristics. Limbs are long, slender and strong with hard, dark hooves suitable for field work and long-distance movement. The udder is small to moderately developed with small, uniformly placed teats, indicating low to moderate milk potential.



Dairy performance of Bolsan cattle

Parameter	Average Range N		
Daily milk yield (kg)	2.01	1.0 – 4.0	115
Peak milk yield (kg)	3.5	2.5 – 5.0	60
Days to reach peak yield	36	30-42	135
Lactation length (days)	285	185-305	105
Lactation milk yield (kg)	560	500-625	105
Fat %	3.01±0.21	0.79-5.30	35
SNF %	9.03±0.06	7.92-9.82	35
Protein%	3.45±0.07	2.54-4.32	35

AnGR of Uttar Pradesh

Rohilkhandi sheep: Distributed in Rohilkhand region of Uttar Pradesh specially in Bareilly districts. The white and black coat colours are predominant with occasional combinations of white/black, and white/brown. The ears are small and tubular in structure. It is a large sized breed with coarse wool all over the body except head, face, belly and legs. The animals are polled with slightly convex face, pink muzzle and black hooves. The animals have long tail extending till hock. They have pink muzzle and black hooves. Animals are large and heavy-bodied with a slightly convex face and small tubular ears. The average body length, height at withers, chest girth, and paunch girth are 77.16±0.65, 78.27±0.63, 86.77±0.45, and 89.06±0.58 cm in males, and 72.42±0.19, 70.50±0.15, 78.40±0.21, and 80.67±0.29 cm in females, respectively. The average age at first oestrus, age at first mating, age at first lambing, and lambing interval are 328.02±2.31 days, 346.81±1.63 days 495.33±1.68 days, and 226.08±0.37 days respectively. The litter size and

lifetime lamb production are 1.04±0.01 and 8.57±0.04, respectively. The average age at slaughter, weight at slaughter, carcass weight, and dressing percentage are 195.41±6.23 days, 21.32±0.56 kg, 9.89±0.23 kg, and 46.54±0.40% in males, and 229.50±6.43 days, 20.92±0.36 kg, 9.72±0.19 kg, and 46.46±0.34% in females, respectively. The average greasy fleece weight and clean fleece weight are 1.53±0.02 kg and 1.32±0.01 kg, respectively

Rohelkhandi Horse/Pony: A native horse/ pony germplasm has been identified in Rohilkhandi region and characterization work has been initiated. It is distributed in Bareilly, Rampur and Lakimpur Kheri districts of UP. Most of the individuals were found to be of chestnut in colour with hairy mane and small erect ears. However, animals with bay and grey colours were also identified during the survey. A white strip marking was also present in many individuals. Survey revealed that these animals are mainly reared for transportation of goods in the city and villages. The mean body length of male ponies is 125.34 cm, with a range of 102–152 cm, while females averaged 123.49 cm, with a range of 107–151 cm. The mean chest girth is 135.13 cm (123–170 cm) in males and 132.91 cm (117–155 cm) in females. The average height at withers is 123.02 cm (106–140 cm) for males and 122.31 cm (110–138 cm) for females. The mean height at the knee is 37.24 cm (30–45 cm) in males and 35.60 cm (25–45 cm) in females. Shank length is 23.99 cm (20–36 cm) for males and 22.72 cm (14–29 cm) for females. The average chest width is 27.19 cm (20–37 cm) for males and 26.64 cm (18–40 cm) for females. Face length is 47.34 cm (38–57 cm) in males and 45.36 cm (36–57 cm) in



females. Face width averages 18.13 cm (15–24 cm) in males and 18.80 cm (15–23 cm) in females. Other key measurements include an average ear length of 13.85 cm (10–17 cm) for males and 13.61 cm (10–17 cm) for females. Ear width is 7.46 cm (6–12 cm) for males and 7.79 cm (6–11 cm) for females. Pole-to-withers length is 64.84 ± 0.45 cm (60–90 cm) for males and 65.02 ± 1.11 cm (56–83 cm) for females. Tail length averaged 50.47 ± 0.15 cm (33–56 cm) for males and 51.21 ± 0.45 cm (40–58 cm) for females. The mean height at the croup is 120.38 ± 0.31 cm (110–139 cm) for males and 118.80 ± 1.121 cm (105–136 cm) for females. The height at hock in males is 48.50 ± 0.16 cm (34–59 cm) and in females is 46.91 ± 0.49 cm (37–55 cm). Adult body weight averaged 206.45 kg, with steady growth from birth (21.5 kg) to one year (163 kg). Reproductive evaluation revealed puberty at 20–24 months, estrous cycle length of 21 days, and a foaling interval of 583.23 days.

Battisi goat:

Battisi is a dual type goat population inhabiting Mathura district of UP and bordering area of



Rajasthan and Haryana. Battisi animals are medium to large in size. The white coat color with black or brown patches on face, chest, abdomen and legs are the important characteristics of Battisi goat. The nose line is typical Roman type. Ears are medium to large in size. The goats are primarily maintained on grazing (extensive system) with zero input. Goat rearing constituted a vital component of 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.

Table. Body weight of Battisi goat(kg)

Weight at	Male			Female		
	Average	Range	N	Average	Range	N
Birth	2.72 $\pm$ 0.01	2.60-2.85	54	2.27 $\pm$ 0.02	2.05-2.5	60
Weaning/3month	9.59 $\pm$ 0.39	5.1-15.9	88	9.14 $\pm$ 0.23	4.5-14.7	146
6months	15.87 $\pm$ 0.29	11.6-20.8	90	14.65 $\pm$ 0.24	9.6-18.7	167
1 year	37.15 $\pm$ 0.67	29.2-43.2	55	22.77 $\pm$ 0.32	17.8-34.5	142
First Kidding	-	-	-	24.55 $\pm$ 0.35	18.1-31.5	72
6Teeth(Adult)	52.65 $\pm$ 1.16	35.5-72.7	112	35.20 $\pm$ 0.17	27.5-47.4	1175

Body measurements (cm)

Body Measurement	Male			Female		
	Average	Range	N	Average	Range	N
Chest-girth	84.16 $\pm$ 0.98	65-106	112	76.77 $\pm$ 0.16	57-95	192
Body length	82.07 $\pm$ 0.87	67-101	112	74.22 $\pm$ 0.15	57-89	192
Height at withers	86.19 $\pm$ 0.91	68-103	112	77.03 $\pm$ 0.13	60-89	192

Braj Donkey: Background for such a name: reared in Braj Area (Mathura, Agra, Hathras, Aligarh in UP and adjoining region in Rajasthan). Donkeys are being utilized in brick kilns and construction in urban areas where motor vehicles cannot reach. The donkey population is on a declining trend due to increasing mechanization. They are primarily reared by nomadic

farmers who migrate to workplaces, such as brick kilns, during the working season.



Body Weights (Kg) of Braj donkey

Weight at	Male			Female		
	Average	Range	N	Average	Range	N
Birth	13.45±3.25	10-18	53	13.18±2.57	10-18	52
12 months	85.82±3.64	72-102	56	88.59±3.05	76-102	136
24 months	92.15±3.65	77-108	55	96.59±3.45	80-110	222
Adult weight (above 3years)	112.65±1.41	87-128	111	121.85±0.52	89-131	682

Body measurements (cm)

Parameter	Male (Above 3 year)			Female (Above 3 year)		
	Average	Range	N	Average	Range	N
Face length	51.28±0.73	41-58	111	50.76±0.58	40-56	682
Face width	20.28±0.67	15-25	111	20.76±0.58	16-25	682
Ear length	22.28±0.84	19-28	111	23.85±0.68	18-30	682
Ear width	12.18±0.65	8-13	111	12.53±0.36	7-13	682
Neck length	30.48±0.74	24-36	111	31.23±0.44	25-38	682
Chest width	24.15±0.55	18-30	111	24.85±0.28	17-32	682
Height at Withers	100.88±1.25	82-124	111	102.68±0.85	85-133	682
Body length	98.65±1.41	82-118	111	100.85±0.72	84-121	682
Heart girth	106.41±1.33	88-128	111	108.78±0.93	89-131	682
Paunch girth	107.21±1.08	90-132	111	109.78±0.83	89-135	682
Tail length	50.65±1.21	30-63	111	50.15±0.42	31-64	682
Tail Length uptoSwitch	54.25±1.15	32-66	111	53.45±0.88	34-64	682

Awadhi sheep: Distributed in Ayodhya, Sultanpur, Ambedkar Nagar and adjoining districts of Uttar Pradesh. Famous for Meat, wool and manure production. Coat color is white to creamy with brown coloration in head and face. Forehead is slightly convex and ears are small or rudimentary in majority of population. Medium sized Sheep with small sized rudimentary ears. Horn is present in ram while females are polled. Forehead is slightly convex. Fleece is coarse.

**Body Weight (kg) of Awadhi sheep**

Weight at	Male			Female		
	Average	Range	N	Average	Range	N
Birth						
Weaning/ 3 months	13.03	10-16	100	12.30	8-14	100
6 months	20.50	17-25	120	18.60	15-20	120
1 year	29.75	25-35	85	23.50	21-27	100
First Lambing						
Adult weight	35.85	29-40	50	29.13	25-33	250

Body measurements (cm)

Body measurement	Male			Female		
	Average	Range	N	Average	Range	N
Chest-girth	75.41	69-85	50	69.65	64-75	250
Body length	72.07	65-80		67.05	60-75	
Height at withers	70.07	64-75		65.56	60-70	



Jaunpuri goat: Distribution: Jaunpur, Ghazipur, Mau, Varanasi, Azamgarh and adjoining districts of Uttar Pradesh. Coat Colour: Black, Brown, white and white with black & brown patches. It is dual purpose breed.

Body weight (kg) of Jaunpuri goat

Weight at	Male			Female		
	Average	Range	N	Average	Range	N
Birth weight	2.60	2.2-2.8	6	2.20	2.0-2.5	6
3month weight	6.10	3.50-8.50	38	5.60	3.0-7.5	22
6 months weight	12.10	7.0-17.5	42	10.50	6-17.5	28
12 months weight	19.80	13.5-25.5	40	18.70	11.5-22.5	60
Adult (6 teeth)	28.60	15-41	65	25.50	14-38	235

Body measurements (cm) (In addition to last year submitted)

Measurements	Male			Female		
	Average	Range	N	Average	Range	N
Chest-girth	65.20	40-76	65	60.30	38-70	235
Body length	58.00	35-68	65	51.20	35-66	235
Height at withers	60.20	40-72	65	57.10	38-68	235

AnGR of Uttarakhand

Tarai buffalo: Found in the tarai region of Uttarkhand and adjoining tarai area of Uttar Pradesh namely U. S. Tharu and *Buksatribes*, *Vangujars*, and other farmer of the area have been rearing these buffaloes since many generations. Medium body size with a compact, sturdy frame; Short head with convex/flat profile and tight navel with non-pendulous sheath. The colour is greyish-brown to black coat; eyelids, hooves, nose ridge,



face, and pastern joints are predominantly black. Ears small in size and oriented backward, Horens are black slightly curved, sickle-shaped horns, and smaller in females than males. Tail slightly below the hock joint with a mostly white tail switch. The Tarai buffalo is known for its existence in the hot and humid climatic conditions of its habitat. This breed thrives well on poor quality forage under low input system.

Jaunsari goat: Found in Jaunsar region Dehradun district of Uttarakhand. Jaunsari tribal communities of the area have been rearing this goat since many generations/centuries. Jaunsari goat are medium in size, and white coloured hairy coat with compact body. The face is straight, forehead having white hair. The head possesses tapering muzzle, alert eyes. The ears are pendulous. The orientation of the horns in majority of the goats are upward, backward and pointed at the tip. Horns are present in both sexes which are dark grey coloured and the shape of the horns is flat. Wattles & beard are absent. The average adult body weights in males and females are as 33.16 ± 0.64 kg and 29.79 ± 0.33 kg, respectively.



Mala Sheep: Mala sheep are a distinct indigenous breed found in the high-altitude regions of Uttarakashi, Chamoli, Bageshwar, and Pithoragarh districts of



Uttarakhand, an area that geographically represents the trijunction of India, Nepal, and Tibet. Their population is estimated to

range between 80,000 and 100,000, indicating a moderately large genetic pool adapted to harsh mountainous environments. Morphologically, the coat color varies from whitish to creamy, with occasional black patches observed around the head, a trait that adds to their breed identity. They are primarily reared for meat production, which forms the main economic utility for local pastoralists, though their wool also shows promising qualities that warrant further scientific research and validation for commercial exploitation. The husbandry practices associated with Mala sheep are characterized by migratory, nomadic grazing patterns, wherein shepherds move flocks across seasonal alpine pastures, a system that not only sustains the breed but also reflects traditional ecological knowledge and cultural heritage of the Himalayan pastoral communities.

AnGR of Karnataka

Koppal Cattle: *Koppal* cattle are an unrecognized draught-type population native to the Koppal district of Karnataka, with seasonal migratory patterns extending into the adjoining districts of Vijayanagara and Ballari, particularly during summer. The population is traditionally managed in large herds under extensive



and nomadic conditions, reflecting centuries-old community-based herding practices. These cattle are of

medium size, predominantly white in colour, and are known for their strength, endurance, and adaptability to the semi-arid environment. They are generally docile in temperament, making them suitable for fieldwork and transportation. Morphologically, Koppal cattle display distinct features such as a long, straight head with a furrowed forehead, a pinkish muzzle, laterally oriented ears, and characteristic curved horns—traits that contribute to their phenotypic identity. The temperament differed between sexes, with all males being alert, whereas most females (95.6%) were docile and only 4.4% were alert. Coat colour in females was predominantly white (95.8%), with a small proportion (2.0%) showing brown coat colour, similarly in males 70.0% were white and 30.0% were blackish or brownish. Skin colour was uniformly white in both sexes. Most males (80.0%) and females (87.6%) had a pinkish muzzle, while the remaining males (20.0%) and females (12.4%) exhibited brown or black muzzle pigmentation. Eyelid and hoof colours were consistently black in all animals. Tail switch colour showed marked sex-related variation: 80.0% of males had a black tail switch and 20.0% had a brown and black switch, whereas 95.2% of females had a brown and black tail switch and only 4.8% had a black switch. Hump size in males was predominantly large (90.0%), with 10.0% showing a medium hump, while all females had a medium hump. Dewlap and navel flap were uniformly of medium size in both sexes, and the penis sheath flap in males was also medium. Head and forehead were straight in all animals, and ear orientation was consistently horizontal. Horn characteristics were largely uniform: most males (80.0%) and females (84.8%) had large horns, with the remainder having medium-sized horns. Horn shape exhibited sexual dimorphism, with all males having straight horns and all females having curved horns. Horn colour was black and white in all males and in 86.8% of females, while 13.2% of females had brown horns; horn orientation was uniformly upward and outward. Among functional traits in females, udders were small and bowl-shaped with small cylindrical teats, and the milk vein was not prominent. Adult males showed markedly higher body weight (368.71 ± 7.69 kg) than females (238.88 ± 5.31 kg), indicating pronounced sexual dimorphism

in overall body size. Cranial measurements were also greater in males, with mean face length of 47.88 ± 0.46 cm versus 38.64 ± 0.10 cm in females, and face width of 20.12 ± 0.25 cm in males compared to 16.46 ± 0.14 cm in females. The average daily milk yield was 2.07 ± 0.14 kg, ranging from 1.5 to 2.5 kg. Total lactation yield varied between 376 and 426 kg, averaging 401.56 ± 1.77 kg over a lactation length of 140–170 days (mean 155.50 ± 1.06 days). These results confirm that Koppal cattle are low milk yielders, with production primarily serving household consumption and calf rearing. Their primary utility remains as draught animals rather than commercial dairy animals, consistent with their adaptation to extensive management systems.

Gudadheri Cattle: Gudadheri cattle, also known as Guddada Dana or Kaager Dana. *Gudadheri* cattle are predominantly found in the Hukkeri, Gokak, Belagavi, and Saundatti talukas of Belagavi district, with an estimated population of around 30,000 animals.

These cattle are well adapted to the hilly terrain of this region, which provides sufficient grazing areas. Farmers in this area maintain



these cattle on a zero-input system, relying solely on natural grazing without additional feed or supplements, making their upkeep highly economical. The primary sources of income for these farmers are the sale of bull calves, and the sale of dung, which is widely used as organic manure, supporting sustainable agriculture in the region. They are primarily kept for their manure, occasionally for bull calves and the estimated population is about 30,000. Most of the cattle exhibit a black coat color, small to medium-sized horns, and a short stature.

Biometric Measurements of Adult (>3 Years Old) Gudadheri Bulls and Cows

Body measurements	>3 years (Adults) (480)	
	M (80)	F (400)
Body weight (kg)	181.30 ± 3.61	160.07 ± 1.89
Face length (cm)	38.91 ± 0.36	36.12 ± 0.17
Face width (cm)	19.52 ± 0.25	17.57 ± 0.14
Ears Length (cm)	19.55 ± 0.197	16.09 ± 0.21
Ears width (cm)	11.85 ± 0.20	10.94 ± 0.132
Horn Length (cm)	20.73 ± 0.61	17.72 ± 0.36
Height at withers (cm)	104.33 ± 0.44	98.99 ± 0.34
Body Length (cm)	98.65 ± 1.11	94.88 ± 0.97
Chest Girth (cm)	139.57 ± 0.71	129.73 ± 0.294
Pouch Girth (cm)	144.82 ± 0.76	132.92 ± 0.36
Tail length (cm)	93.75 ± 0.59	87.79 ± 0.45

The dairy performance of *Gudadheri* cattle indicated that the animals possess a relatively low milk production potential, characteristic of indigenous non-descript breeds reared under extensive management systems. The daily milk yield ranged from 1 to 2 litres, with an average of 1.29 ± 0.05 litres per day. This modest yield reflects the breed's adaptation to low-input systems, where nutritional supplementation and selective breeding for higher milk output are minimal. The total lactation yield varied between 160

and 320 litres, averaging 240 ± 2.08 litres per lactation, which is considerably lower compared to improved or crossbred cattle maintained under organized management. The lactation length ranged from 160 to 210 days, with a mean duration of 188.8 ± 2.04 days, indicating shorter lactation periods typical of native cattle adapted to challenging agro-climatic conditions. Despite their limited yield, *Gudadheri* cattle are valued by farmers for their hardiness, resistance to diseases, and low maintenance requirements. Their milk, though

produced in small quantities, is primarily utilized for household consumption and calf nourishment, underscoring the breed's role in subsistence-level livestock systems rather than commercial dairying.

Sira Sheep: Sira sheep, a relatively lesser-known breed, are primarily found in Sira taluka of Tumkuru district and adjacent areas, holds a special place in the realm of livestock. Known for their robust characteristics and adaptability to diverse environments, these sheep have been an integral part of the agricultural landscape in the region. Sira sheep are medium-sized animals with a well-proportioned body. These are predominantly raised by the Golla community, with an average flock size ranging from 60 to 90. These flocks migrate to areas including Hassan, Mandya, and Kollegala. These sheep exhibit a variety of coat colors, including white,



black, greyish-black, and brown. Most have long, droopy ears, while some possess tubular ears. They feature a convex forehead, a Roman nose, and approximately 20 per cent of the animals have wattles. The horns curve backwards and downwards and are of medium size. Their tails are short. The fleece is dense. The fleece is dense and provides effective insulation against harsh weather conditions, making them well-suited for both hot and cold climates. The breed's resilience to local environmental conditions also reduces the need for extensive management inputs, contributing to a more sustainable and eco-friendly agricultural system.

Kakkera Chicken: The name Kakkera came based on its place of origin. It is dual type bird and predominantly kept for meat and entertainment purpose and are renowned for their sturdy nature. Found primarily in Surpur and Hunsagi talukas of Yadgir district in

northern Karnataka. Kakkera birds have been traditionally nurtured in Tandas of the region since ancient times and are renowned for their sturdy nature. Found primarily in Surpur and Hunsagi



talukas of Yadgir district in northern Karnataka. The average flock size of the Kakkera breed ranges from 15 to 20 birds. Initial phenotypic studies were conducted on 200 birds, revealing their impressive height, majestic stride, and diverse plumage colors. Primarily utilized for cockfighting, their population is estimated to exceed 30,000 in Surpur and Hunsagi talukas. These are primarily utilized for cockfighting and meat. Their dense, multi-colored plumage helps them adapt to the harsh local climate. Both sexes have pea-shaped, uniformly red combs and yellow shanks, with males distinguished by the presence of spurs. The strong and long legs of Kakkera chickens facilitate effective foraging in rough terrain and in animal sports. Hens are valued for their broodiness and excellent mothering abilities. The meat of Kakkera chickens is highly prized locally for its flavor and lean texture, offering a healthier alternative to commercial broiler chicken. No specific plumage colour was found in Kakkera, in females majority of them were light brown colour followed by black plumage colour. Among adult birds, the mean body weight of females was recorded as 1656.67 ± 11.58 g, whereas the mean body weight of adult males was 2084.63 ± 18.93 g. The mean beak length of adult females showed a mean value of 36.66 ± 0.26 mm, while males recorded a slightly lower mean of 35.55 ± 0.22 mm, resulting in a combined mean beak length of 36.10 ± 0.17 mm. The mean shank thickness in adult females was 20.28 ± 0.21 mm and in males was 21.97 ± 0.17 mm, with an overall mean of 21.63 ± 0.13 mm. Similarly, shank length was greater in males was 12.92 ± 0.18 cm and in females was 11.37 ± 0.11 cm). The pooled mean shank length for adult birds was 11.60 ± 0.07 cm. The mean body weight of grower females was 638.43 ± 6.45 g, whereas that of males was 946.52

± 7.35 g. The combined mean body weight of grower birds was 768.61 ± 8.24 g. The mean beak length in grower females and males was 17.36 ± 0.15 mm and 18.50 ± 0.17 mm, respectively, and the pooled mean beak length was 17.84 ± 0.11 mm. Shank thickness of grower females recorded was 17.12 ± 0.15 mm and grower males 18.49 ± 0.13 mm, resulting in a combined mean of 17.70 ± 0.11 mm. The shank length in grower females was 09.12 ± 0.19 cm, while the mean shank length of grower male birds was 10.83 ± 0.09 cm, with an overall mean value of 9.97 ± 0.15 cm. The mean egg production recorded was 42.75 ± 0.45 eggs. The average number of eggs per laying cycle was 14.25 ± 0.15 eggs. The number of eggs kept for natural incubation was 11.62 ± 0.09 eggs, while the mean hatchability was 9.38 ± 0.11 chicks. The hatchability percentage recorded was 80.85 ± 0.81 per cent. The mean age at sexual maturity of Indigenous Kakkera chicken was 8.93 ± 0.10 months.

AnGR of Tamil Nadu

Alambadi cattle: The provenance of the Alambadi cattle population was traced from a village called Alambadi (in Chamrajanagar district of Karnataka state) which is on the other side of river Cauvery from Hogenakkal in Tamil Nadu. The breeding tract of Alambadi cattle comprised of hilly tract with deciduous forests of Pennagaram taluk of Dharmapuridistrict, Denkanikottai taluk of Krishnagiri districts and adjoining area of Karnataka. The tracts are stony in elevation and humous in the valleys. The forest growth being all deciduous with pasture lands. The cattle which are found here are all the same type, viz., Malai- Madu or hill cattle, though certain variations are recognized, which are largely due to environment and different conditions of breeding and rearing. Formerly the cattle



of these hills wandered throughout the tract, at the will of the graziers, where ever most suitable pasture was found and there was frequent interchange of breeding bulls. The animals are medium size, Head is moderately long and is characterized by a fairly prominent forehead, horns slope backwards with a forward slope towards the upper half and about 10 to 15 inches in length, close at the roots and gently spreading out above with black muzzle. Long and generally erect ears, short and thick neck. The hump is well developed and fairly large. Fairly thin dewlap, extending to sternum or just beyond. The body of the animal is deep and compact with well sprung ribs and good girth and heavy shoulders. Tail appears long and tapering, legs were short, strong and of good bone. Large and hard feet with prominent coronary band. The colour of the animal vary with Iron grey, grey, white and fawn with dark brown skin. The milk yield of Alambadi cow is ranging from 0.5 to 2.0 liters with an average of 1.2 liters. Majority of the milk is utilized for household consumption only. The young bull calves were sold for bull baiting (Jellicut), and Erudhattam (making the bulls roped on either side and allowing to run and being tamed) nearby districts. Mostly the Alambadi animals were sold during the month of January every year soon after returning from the forest for their habitat. The farmers selling animals in group which comprises of heifers, cow with calf, bull to other farmers. Heifers sold with a price ranging from Rs.10,000 to 15,000; Cow with calf at a price of Rs.15,000 to 20,000. The young bull for baiting will be sold for Rs.20,000 to 30,000 depending upon its speed and endurance. The other income for the farmers is through sale of manure (Rs.2000 to 2500 per tone of manure). Alambadi cattle played an important role in the socio-cultural activities of farmers. These animals were also given to the bridegroom, as a gift at the time of marriage of their daughters. The whole herd of Alambadi cattle were separated and passed on to the legal heir apparent. During the Pongal festival (a famous festival for Tamilians) in the month of January, these indigenous animals were worshiped and few cultural events, viz. bull baiting (Jellicut), and Erudhattam (making the bulls roped on either side and allowing to run and being tamed) were organized in the villages.

Siruvidai chicken: Siruvidai chickens have been reared in rural areas of Tamil Nadu since ancient times. They are known for their excellent scavenging abilities, adaptability to tropical climates, resistance to diseases, and agility in evading predators. Siruvidai chickens are characterized by their slender bodies and upright tails. Although Siruvidai birds are predominantly found in the north-eastern districts of Tamil Nadu, such as Ariyalur, Perambalur, Thanjavur, Tiruvarur, Nagapattinam, Pudukottai, Mayiladudurai, Cuddalore, Villupuram, and Thiruvannamalai, pure germplasm is concentrated in Ariyalur district. Apart from being maintained as backyard chicken, integrated Siruvidai chicken farming in cashew gardens is very popular in Jayankondam area of Ariyalur district. Many farmers in this area rear 50 to 500 female parents at the sex ratio of one male to 8-10 females in cashew gardens. For profitable integrated Siruvidai farming, the optimum stocking density is 100 female parent birds in 1.5 acres of cashew garden. The birds are left for scavenging during day time, while they are kept indoors during night. They benefit from readily available scavengable feed resources such as insects, worms, foliage, and fallen cashew fruits in the gardens. Although, multicolour plumage is very common in Siruvidai chicken in many parts of the state, the Siruvidai birds of Ariyalur district possess wild type plumage predominantly with red and black feathers in males and admixture of yellow, dull brown and black in females. The males have golden-yellow hackles, black breast, abdomen, tail, and wing primaries and red body. The females possess lustrous brown feathers intricately laced with golden-yellow colour in neck, vibrant brown feathers on the breast and abdomen, dark brown feathers on the back and blackish tail. The skin colour is predominantly white, while the shank colour is predominantly yellow. The ear lobes are predominantly white and sometimes red, while their comb and wattles are red. The eye is predominantly yellow and rarely



orange in colour. The beak colour is brownish yellow. Only adult males grow spurs. Phenotypically, Siruvidai chicken in Ariyalur district resembles Red Jungle Fowl.

At 20 weeks of age, Siruvidai chickens reared in a cage system attained an average body weight of 1,200g in males and 975g in females, with a feed conversion ratio (FCR) of 5.0 (combined for males and females). In a deep litter system, females weighed 875g at 20 weeks but reached approximately 1.35 kg at 40 weeks. Under a cage system, Siruvidai hens reached 1.10 kg at 40 weeks and 1.30 kg at 72 weeks, while males reached 1.40 kg and 1.70 kg, respectively. The age at first egg, 5% production, and 25% production were 149, 151, and 179 days, respectively. The annual egg production (up to 72 weeks) under a cage system was 125 eggs per hen.

AnGR of Andhra Pradesh

Macherla or Palnadu goat: These goats are called as “Chukka Meka” and “Poda meka” by the locals. These goats are predominantly found in Vinukonda, Narasaraopeta, Bollapalli, Veldurthi, Macherla, Gurazala and Rentachintala, Ipur, Durgi madals of Palnadu district and Phirnaipuram mandal in Guntur districts. The home tract of this goats is situated in Palnadu district between 16° -03' to 16° - 37' or the Northern Latitude and 79° -22' - 800.21" of the Eastern Longitude. More than 80% of the flocks surveyed have one castrated male animal (wither) and a breeding buck. The Macherla goat is having very high twinning rate (30% in observed flocks) and triplets (about 10%) triplets. The Body length, Height at withers, Chest girth in adult males was 79.6±0.2 (76-82), 88.6±0.4 (80-97), 83.5±0.5 (78-97) cm respectively. The corresponding measurements in females were 77.3±0.1(67-89), 84.9±0.3 (75-93) and 80.2±1.1(73-89). The adult body weights were 46.4±0.2



(31-55) and 41.1(31-50) kg, respectively in males and females. Male kids are sold at an age of 6-7 months at Rs 6000 to 10,000 per pair and female kids at the same age are sold at a price of Rs 5000 per animal. Owing to

the distribution of this goat genetic group and historical significance of the region these goats may be named as “PALNADU” goat.

Body weight (kg) of Macherla or Palnadu goat

Weight at	Male			Female		
	Average	Range	N	Average	Range	N
Birth weight	2.25	2.0-2.5	6	2.1	2.0-2.4	8
Weaning weight	10.2	8.0-11.0	16	8.1	7.8-9.0	24
6 months weight	15.8	14.0-17.0	14	15.0	13.0-14.0	21
12 months weight	30.5	25.0-34.0	39	28.1	23.0-30.0	41
Adult (6 teeth)	46.5	43.0-49.0	41	39.5	32.0-44.0	187

Body measurements (cm)

Age : 25-36 months

Measurements	Male			Female		
	Average	Range	N	Average	Range	N
Chest-girth	85.5 ± 5.0	80.0-91.0	12	77.9 ± 3.0	68.0-85.3	227
Body length	83.2 ± 4.8	79.0-92.0	12	74.2 ± 3.6	65.5-85.0	227
Height at withers	93.5 ± 3.15	90.0-97.5	12	83.6 ± 3.5	75.6-91.0	227

Gaddabolli sheep: Its name reflects its natural habitat and physical appearance, derived from the local words for dry/hilly areas (“Gadda”) and vitiligo-like patches (“bolli”). The Gaddabolli sheep is an indigenous genetic group from Andhra Pradesh, primarily found in the dry, hilly terrains of the Prakasam, Bapatla, Guntur, and Palnadu districts. These sheep were medium to large in size with two different coat colour patterns, predominantly patchy (75.4 %) and other were plain white (24.6 %). The body hair coat colour type was white, with brown patches around the orbital region of eye, neck and shoulder region, back, knee, hock and pastern region and very few sheep were with black patches. Morphologically, they possess a convex head profile and a straight, cylindrical tail. Among adult

ewes with horns, 92.1 % of them were processing rudimentary horns and the rest were with scurs. Majority of these sheep were having tubular (44.85%) or rudimentary (44.85 %) ears, and only few (10.23%) were with pendulous ears. In terms of performance and body measurements, adult males and females reach average body weights of 40.9 ± 0.3 kg and 40.1 ± 0.1 kg, respectively. Key morphometric indicators for adult males include a body length of 76.8 ± 0.3 cm, height at withers of 80.4 ± 0.3 cm, and chest girth of 83.2 ± 0.4 cm, while females measure 75.6 ± 0.1 cm, 76.9 ± 0.1 cm, and 81.3 ± 0.1 cm for the same traits. The breed is most notable for its exceptional prolificacy, exhibiting a high twinning rate of 20% to 25%, which is significantly greater than most other Indian sheep breeds.

Body Weight (kg) of Gaddabolli sheep

Weight at	Male			Female		
	Average	Range	N	Average	Range	N
Birth	2.9	2.4 – 3.2	11	2.7	2.4 – 3.0	102
Weaning/ 3 months	14.2	12.7 – 15.1	33	13.0	11.2 – 15.1	152
6 months	18.0	16.1 – 20.4	17	16.7	15.2 – 17.9	126
1 year	25.5	22.7 – 27.1	32	23.7	21.0 – 26.4	312
First Lambing	35.4	31.1 – 36.2	6	33.2	30.1 – 34.8	292
Adult weight	42.2	39.6 – 43.0	17	40.3	37.4 – 41.2	312



Gaddabolli ram



Gaddabolli ewe

Body measurements of adult sheep (cm)

Body measurement	Male			Female		
	Average	Range	N	Average	Range	N
Chest-girth	81.1	79.2 – 82.3	13	79.2	77.2 – 81.1	172
Body length	72.4	70.1 – 72.6	13	71.0	69.3 – 72.4	172
Height at withers	79.1	78.2 – 79.8	13	78.3	76.3 – 75.7	172

AnGR of Telangana

Sinagara/ChelukaGodlu Cattle: Distributed in Mulugu, Mahabubabad and Bhupalpally Districts of Telangana. The coat colour were observed to be white/ grey/red, while the tail switch, hooves, eyelids and muzzle were black in colour. The cattle population under study has the history of being used for ploughing in fields (called as Chenu inTelanganadialet) and also for carting to attend religious gatherings of Medaram.

Thus, deriving its name from the above reasons. Fore-head was observed to be convex shaped, while the shape of udder was bowl with cylindrical shaped teats having pointed tips.



Body measurements (cm) of Sinagara/ChelukaGodlu cattle

Parameter	Male			Female		
	Average	Range	N	Average	Range	N
Chest girth	125.34 ± 1.42	58-176.3	312	123.87 ± 0.93	60 - 170	468
Body length	101.86 ± 1.29	48-147	319	100.73 ± 0.83	45 - 147	467
Height at withers	104.34 ± 1.16	50-150	317	100.86 ± 0.86	45 - 150	463

Dairy performance of Sinagara/ChelukaGodlu cattle

Parameter	Overall		
	Average	Range	N
Daily milk yield (kg)	1.18 ± 0.02	0.5 - 3.0	744
Peak milk yield (kg)	1.54 ± 0.02	0.5 - 3.0	742
Lactation length (days)	199.41 ± 0.96	90 - 280	744
Lactation milk yield (kg)	251.90 ± 3.50	80 - 540	739
Fat %	2.1 ± 0.07	0.8 – 3.8	102
SNF %	8.4 ± 0.07	5.8 - 9.72	102
Dry period (days)	128.16 ± 0.88	50 - 160	627

Telangana Black Goat: Distributed in Mulugu, Mahabubabad, Bhupalpally, Badradri Kothagudem and Suryapet districts of Telangana. The average body weight at three months of age was 6.6 kg (05) and ranged between 5-10 kg among males while the same in females were observed to be 8.4 kg (05) and ranged between 6-11 kg. Similarly, the mean body weight at twelve months of age was 23.8 kg (05) and ranged between 18-30 kg for males and among females the mean body weight was 20.6 kg (03) and ranged between 19-23 kg. The body weight of adult (6 teeth) among males was 40 kg (03) and ranged between 38-42 kg, while the same in females was 37.8 kg (12) and ranged between 28-45 kg. The average chest girth, body length and height at withers were 63.36 (25), 57.15



(25) and 65.42 (25) cm, respectively. While the same in females was observed to be 71.84, 61.92 and 69.36, cm respectively. The coat colour was black in 70.3 % of the population studied, brown (10.7%), black with white patches (10.7%) and Brown and Black (8.3%).

Body measurements (CM) of Telangana black goat

Parameter	Male			Female		
	Average	Range	N	Average	Range	N
Chest girth	63.36	40-83	19	71.84	42-98	25
Body length	57.15	36-82	19	61.92	32-84	25
Height	65.42	41-89	19	69.36	39-92	25

AnGR of Kerala

Periyar cattle: Periyar cattle had their origin in the banks of Periyar river of Ernakulam district of Kerala Distributed in the Angamaly, Koovapady and Kothamangalam blocks. Animals are small in size with short legs. Four coat color variations were observed, predominantly brown followed by black, red and grey. Mixed colors and combination with specific markings are also noticed. Tail is long and almost touches the ground. Horn pattern of this particular breed is very specific with three main patterns. Males have straight horns which are laterally upward and pointed or curved inwards. Females have straight horns (laterally upward) or curved horns with two patterns either pointed inwards or pointed outwards. Hump is prominent in males and small in females. Adult body weight of the cattle ranged from 140 to 200 kg, with an average of 165.50±17.40 kg. Birth weight of calves ranged from 9 to 14kg. The recorded body length, height at withers,



chest girth and paunch girth were 98.80±6.35cm, 101.12±4.72cm, 132.22±5.53cm and 139.15±6.06cm, respectively. Milk yield ranged from 1.5- 3.5 litres per day with peak yield of 3.25 litres during the lactation. The lactation length ranged from 160-200 days. The fat, SNF, protein, lactose and minerals of milk was 4.50, 9.10, 3.50, 4.90 and 0.70 percent, respectively. The ethno- veterinary practices (32nos) were also documented.

Body measurements (cm) of Periyar cattle

Parameter	Male			Female		
	Average	Range	N	Average	Range	N
Chest girth (cm)	138±12.0	126-150	39	132.58 ± 5.07	117-145	332
Body length (cm)	108±10.8	98 - 119	39	98.44 ± 5.39	86-116	332
Height at withers (cm)	112±11.10	101 -122	39	100.19 ± 4.07	86-112	332

Dairy performance

Parameter	First Lactation		
	Average	Range	N
Daily milk yield (kg)	1.95 ± 0.39	1.50-3.50	129
Peak milk yield (kg)	3.25 ± 0.53	2.50-5.0	129
Lactation length (days)	180 ± 10.00	160 - 200	129
Lactation milk yield (kg)	351 ± 39.00	310 - 390	129
Fat %	4.52 ± 0.81	3-6	45
SNF %	9.11 ± 5.10	7-10	45
Dry period (days)	185 ± 4.0	178 - 188	185

Attapady cattle: Attappadi cattle had their origin in the hilly areas of Attappadi, Palakkad district of Kerala. Distributed in the Sholayoor and pudhur blocks. Animals are medium sized with strong legs,



predominantly brown, black, white, black & brown. Mixed colours and combination with markings are also noticed.

Tail is long and almost touches the ground, tail switch is black in colour. Males have large curved horns, which are curved inwards. Females have medium sized straight and curved horns. Hump is prominent in males and small in females. Adult body weight of male ranged from 280-320 kg and female body weight ranges between 200-250 kg. Milk yield ranged from 1.5 -2.0 litres per day with peak yield of 3.0 litres during the lactation.

AnGR of Madhya Pradesh

Nimari buffalo: Nimari buffalo is distributed in the Nimar tract of Madhya Pradesh, mainly in districts such as Khargone, Khandwa and Barwani, with an estimated population of about 50,000–60,000 animals (2024–25). The breed is predominantly black in coat colour, with

black to dark grey muzzle and a characteristic white or whitish-brown tail switch. Adult body weight averages about 575 kg in males and 450 kg in females, with heart girth around 187.5 cm (males) and 182.5 cm (females).

The average daily milk yield is about 6.25 kg, with peak yield around 7.0 kg, lactation



length approximately 255 days, lactation yield about 1625 kg, and fat percentage around 6.5%. Females attain first calving at about 44 months, with a calving interval of around 530 days. The breed is noted for docile temperament, adaptability to hot climates, and dual utility for milk and light draught work.

Vindhyachali cattle: Vindhyanchali cattle are native to the Vindhyanchal region of Madhya Pradesh, particularly in districts such as Sidhi, Rewa and Singrauli, with an estimated population of about 7–8 lakh as per Livestock

C e n s u s 2019. The animals exhibit white, light grey or



reddish coat colour, small to medium upward-curved horns, and a mostly concave forehead. Average body length is about 110.25 cm in males and 104.7 cm in females, while heart girth averages 170.05 cm (males) and 161.8 cm (females). The average milk yield is around 2.22 kg/day. Females attain first calving at approximately 44.28 months, with a calving interval of about 542.62 days. The breed is primarily valued for draught power, endurance, heat tolerance, and ability to thrive under extensive grazing conditions in the Vindhyan plateau.

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, slightly convex head profile, slightly curved pendulous ears, and a few male sheep with medium-curved horns. The estimated population are ranged from 85,000 to 90,000. Famous for carpet wool, meat, milk, lamb skins, pelts and manure.

Body Weight (kg) of Malvi sheep

Weight at	Male			Female		
	Average	Range	N	Average	Range	N
Birth	3.5	2-5	180	2.5	1.5-4	300
Weaning/ 3 months	11	9-12	180	9	8-10	300
6 months	14	12-16	180	11.5	10-14	300
1 year	31	25-30	190	28	20-25	310
Adult weight	39	38-48	180	33.5	32-42	300

Body measurements (cm) of Malvi sheep

Body measurement	Male			Female		
	Average	Range	N	Average	Range	N
Chest-girth	88.6	80-95	260	81.5	75-85	370
Body length	91.4	85-95	260	86.36	80-90	370
Height at withers	73.5	65-75	260	68.5	65-72	370

AnGR of Rajasthan

Rendi Cattle: Rendi cattle predominantly found in Ajmer district and its bordering districts such as Beawar, Bhilwara and Tonk. Rendi cattle have evolved under the semi-arid to sub-humid agro-climatic

conditions of central Rajasthan, characterized by erratic rainfall, scarce fodder availability, and harsh summer temperatures. Over time, farmers have selectively retained animals that are hardy, adaptable, disease tolerant, and economically viable under



low-input management systems. As a result, Rendi cattle have developed a set of distinct phenotypic, productive, reproductive, and behavioral traits, making them clearly distinguishable as a unique local cattle population. Phenotypically, Rendi cattle closely resemble Gir cattle, particularly in terms of coat colour pattern, convex forehead, pendulous ears, and overall body conformation. However, despite this resemblance, Rendi cattle differ significantly from Gir cattle in several important aspects. Their calm temperament makes them especially preferred by women, elderly farmers, and households managing animals with limited infrastructure. In terms of production, Rendi cattle are moderate milk producers, but they exhibit remarkable persistency, better performance under feed scarcity, and lower maintenance requirements. The overall LS mean 305-day milk yield of Rendi cattle was 3317.73 litres, indicating a moderate to high milk production potential under farmer-managed field

conditions. These traits significantly enhance their suitability for resource-poor farmers and contribute to herd sustainability.

AnGR of Chhattisgarh

Bastar Cattle: Population mostly found in Bastar region. Coat colour is mostly white (50.3%) with horns are straight (85.8%) and trout. These local cattle are hardy and larger than the Kosali cattle. The people do not milk the animal, produces very less quantity of milk which is generally kept for their calves.



Body measurements (cm) of Bastar cattle

Parameter	Male		Female	
	Average	N	Average	N
Chest girth	161.22±0.9	120	145.62±0.5	132
Body length	129.22±0.4	120	119.15±0.5	132
Height at withers	111.19±0.3	120	106.89±0.3	132

Dairy performance of Bastar cattle

Parameter	Overall		
	Average	Range	N
Daily milk yield (kg)	0.63±0.01		59
Peak milk yield (kg)	0.73±0.01		59
Lactation length (days)	156.23±2.5		59
Lactation milk yield (kg)	97.21±3.3		59

Bastar Buffalo: Distributed in Narayanpur, Jagdalpur, Dantewara and Bastar districts of Chhattisgarh. Predominant colour is black with white or brown

hairs. Horns are banana shaped which look like wild buffalo. Male and female both are also used for drought purpose.

Body measurements (cm) of Bastar Buffalo

Parameter	Male			Female		
	Average	Range	N	Average	Range	N
Chest girth	184.95±1.64	161-210	150	173.06±1.19	141-195	300
Body length	134.22±0.76	101-190	150	132.57±0.52	111-178	300
Height at withers	123.28±0.43	106-134	150	118.45±0.45	102-145	300

Dairy performance of Bastar Buffalo

Parameter	Overall		
	Average	Range	N
Daily milk yield (kg)	2.48±0.06		450
Peak milk yield (kg)	4.5±0.9	2.9-8.1	100
Days to reach peak yield	35.4±0.96		
Lactation length (days)	200.74±1.65		450
Fat %	6.9±0.23		95
SNF %	8.8±0.06		95

Abujhmari pig: Distributed in Abhujhmad area of Narayanpur district of Bastar region. Having black coat color (81%), followed by black with white patches. Snout is long and straight and dense bristle at back with pot belly makes these local pigs an unique pig. Average litter size is 7 which ranges from 4 to 10.



Body weight (kg) of Abujhmari pig

Weight at	Male			Female		
	Average	Range	N	Average	Range	N
Birth	0.44±0.06	0.40 – 0.48	10	0.35±0.03	0.30 – 0.41	12
3 months	6.77±0.17	6.3 – 7.2	15	6.65±0.22	5.8 – 7.2	19
6 months	12.02±0.37	11.5 – 12.8	14	11.95±0.36	10.3 – 13.1	30
1 year	24.49±0.44	22.4 – 25.5	11	24.32±0.67	22.4 – 25.7	24
First furrowing	--		-	27.36±0.42	25.4 – 29.2	24
Adult weight	43.53±1.04	40.6 – 45.8	18	43.46±1.42	40.2 – 44.7	24

Body measurements (cm) of Abujhmari pig

Body measurement	Male			Female		
	Average	Range	N	Average	Range	N
Chest-girth	81.46±1.53	78 – 85	54	77.02±1.7	74 -80	75
Body length	74.1±1.5	70 –78	54	74.38±1.28	72 -76	75
Height at withers	51.88±0.65	46 - 54	54	51.81±0.83	47 – 53	75
Neck girth	57.7±1.25	52 - 59	54	54.28±1.17	52 - 54	75

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



Egg production Desi Kukri (Chicken)

Egg production characteristics	Average	Range	N
Age at first egg (days)	205.8 ± 4.2	205 - 206	132
Annual egg production	40.2±07	35-43	132
Clutch size (days): Clutch length:	12.61 ± 0.43	10 - 15	132
Egg weight (g)	38.53 ± 0.56	34-44	100

AnGR of Goa

Deshi goat: The indigenous goat population of Goa comprises two predominant phenotypic groups, namely the Black Face with White Body (BFWB) type and the Black Spots on White Coat (BSWC) type, accounting for 30.32% and 29.27% of the surveyed population, respectively. Both types are well adapted to the hot and humid coastal agro-climatic conditions of Goa and thrive efficiently under traditional management systems with minimal to near-zero feeding cost. The goats are medium-sized animals characterized by a distinct black-coloured face and predominantly white body with irregular black patches, short hair coat, straight facial profile, slightly drooping ears, and medium-length backward-curved horns. In contrast, the BSWC goats are medium to large-sized with a white coat bearing clearly defined black spots distributed over the body, short glossy hair coat, straight to slightly convex head profile, pendulous ears, and comparatively longer horns. The BSWC type generally exhibits deeper body conformation and higher body weight, indicating superior growth potential, whereas the BFWB type

shows compact body structure suited for low-input systems. Both phenotypes possess strong legs, short upward tail, and high adaptability to extensive and semi-intensive rearing systems, indicating their suitability for sustainable meat production under coastal goan conditions.

AnGR of Jharkhand

Dumka Sheep: Distributed in Dumka, Deoghar and Jamtara district of Jharkhand. The coat colour is white. Famous for carpet type wool production. Average birth weight of lamb is 1.30 kg and average adult male and female body weight is 18.62 and 17.63 kg, respectively.



Body Weight (kg) of Dumka Sheep

Weight at	Male			Female		
	Average	Range	N	Average	Range	N
Birth	1.71±0.025	1.4 - 1.90	50	1.64±0.021	1.3 - 1.80	60
Weaning/ 3 months	5.06±0.077	4.2 - 6.2	50	5.07±0.036	4.00 - 5.90	160
6 months	8.89±0.094	7.50 -10.3	60	8.01±0.057	6.50 - 9.50	240
1 year	16.12±0.112	12.2 - 17.2	60	15.10±0.068	12.00 - 16.30	206
Adult weight	20.16±0.126	16.4 - 23.1	150	19.8±0.095	15.00-23.00	659

Body measurements (cm) of Dumka sheep

Body Measurement	Male			Female		
	Average	Range	N	Average	Range	N
Chest-girth	56.45±0.21	50.00 - 63.00	150	56.83±0.14	44.00 - 70.00	659
Body length	48.09±0.13	44.00 - 52.00	150	46.08±0.10	42.00 - 57.00	659
Height	49.86±0.16	45.00 - 57.00	150	48.98±0.11	44.00 - 63.00	659

Deshi chicken: This chicken is found in Bandu, Tamar, Sonahatu, Rahe and adjacent area of Ranchi district. The Chicken has been known to farmers since 70 to 80 years. Local farmers are rearing it for game and meat purposes. Chicken was generally reared at backyard farming. Average Flock Size varies from 15 to 20. Both



males and females have a pea comb. Males have long sickle feathers tail and females have long tail feathers. Both male and female chickens have red colour ear lobes. Both male and female have yellow colour shanks. Spurs

are present in males only. Plumage Colour in male is white with black spots and red with black sport. Plumage colour in female is Brown, grey, and brown with white and black spots. Adult body weight in male is 3 to 3.5 kg and female is 2.0 to 2.5 kg.

AnGR of Himachal Pradesh

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. The morphometric measurements of male and female Shiwalik Hill Goats show distinct differences in body



structure and size. Body weight observations indicated average birth weights of 3.27 ± 0.22 kg in males and 2.94 ± 0.12 kg in females. At three months, weights were 12.85 ± 0.28 kg in males and 11.79 ± 0.15 kg in females, increasing to 22.28 ± 0.80 kg and 20.24 ± 0.67 kg at six months, respectively. At twelve months, males weighed 35.44 ± 0.48 kg while females weighed 29.12 ± 0.28 kg. Adult body weights averaged 40.28 ± 0.94 kg in males and 34.95 ± 0.22 kg in females. Adult males showed an average body length of 71.02 cm, height at withers of 74.40 cm, and heart girth of 72.64 cm, while corresponding values in females were 70.13 cm, 73.59 cm, and 69.67 cm, respectively. Reproductive performance parameters revealed that the average age at first mating in males was 193.43 ± 2.30 days, while females attained first oestrus at 189.21 ± 3.17 days and first mating at 214.88 ± 2.07 days. The average age at first kidding was 407.00 ± 4.05 days, with a mean kidding interval of 239.11 ± 5.06 days and a service period of 56.50 ± 0.81 days.

Body weight (kg) of Shiwalik hill goat

Weight at	Male			Female		
	Average	Range	N	Average	Range	N
Birth weight	3.27 ± 0.22	2.50-5.00	103	2.94 ± 0.12	2.50-3.20	115
Weaning weight / 3 months weight	12.85 ± 0.28	5.00-23.00	106	11.79 ± 0.15	6.00-19.00	145
6 months weight	22.28 ± 0.80	10.00-35.00	157	20.24 ± 0.67	8.00-30.00	108
12 months weight	35.44 ± 0.48	18.00-57.00	222	29.12 ± 0.28	12.00-41.00	265
First Kidding	-			30.08 ± 0.26	18.00-41.00	316
Adult (6 teeth)	40.28 ± 0.94	24.00-60.00	167	34.95 ± 0.22	14.00-53.00	640

Body measurements (cm) of Shiwalik hill goat

Measurements	Male			Female		
	Average	Range	N	Average	Range	N
Chest-girth	72.64 ± 0.68	35.00-90.00	167	69.67 ± 0.14	20.00-74.00	640
Body length	71.02 ± 0.98	37.00-90.00	167	70.13 ± 0.27	21.00-91.00	640
Height at withers	74.40 ± 1.05	34.00-93.00	167	73.59 ± 0.30	27.00-94.00	640

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

Morphometric measurements of Himachali Yak

Sex	BL	WH	HG	HL	TL	EL
Male	129.54 ± 11.96	117.46 ± 9.11	167.23 ± 15.89	45.6 ± 10.13	42.54 ± 6.06	14.00 ± 1.22
Female	114.89 ± 8.67	101.61 ± 7.08	147.68 ± 10.36	32.32 ± 5.23	35.94 ± 3.86	13.34 ± 1.17

AnGR of Karnataka

Hassan goat: It is native of Hassan district. The body colour is majorly brownish, some sheep with white and black patches also seen, horn pattern backward bending, milk production 750ml to 1 lt documented per animal during early lactations. Known for given triplets and even quadruplets are common. The average adult body weight of males is 30kg and females is of about 20-25kg.



AnGR of Jammu & Kashmir (UT)

Kashir goat: Nondescript local Kashmiri goat is a medium sized goat distributed in hilly tracts of Shopian, Kulgam, Tral, Budgam, Baramullah and Kupwara but predominantly in Budgam. This goat serves as a good source of livelihood generation, family support, milk consumption. This important genetic resource possesses unique traits of adaptability, fecundity, prolificacy and disease resistance. It has promising potential for both milk and meat, and is well adapted

to agro-climatic conditions of the region. No reports of disease outbreaks have been seen in these native goats. The average adult weight is 34.73 ± 0.80 in males and 36.55 ± 0.27 in females. The doe produces twins mostly and sometimes triplets. The farmers maintain small herds (1-7 nos). The females have well developed udder with long conical teats and Milk yield (MY/D) and lactation length (LL) of these goats ranges 0.50-2.25 kg/day and 6-8 months, respectively.

Body measurements (cm) of adult Kashir goat

Measurements	Male (cm)			Female (cm)		
	Average	Range	N	Average	Range	N
Chest-girth	75.05 ± 0.39	67-88	31	78.54 ± 1.14	66-86	252
Body length	56.93 ± 0.90	41-75	31	57.14 ± 0.31	46-71	252
Height at withers	68.38 ± 1.29	55-84	31	71.21 ± 0.44	55-84	252

Conservation of AnGR

Conservation of Tibetan sheep

Tibetan sheep of Sikkim under threat is being conserved *in situ* by AHD, Sikkim under Network Project on AnGR. The objective of the project is to revive the declining population of Tibetan Sheep and to generate a baseline data of Tibetan Sheep population. The Tibetan sheep populations in the region increase from 202 (2023-24) numbers to 357 (151 Male and 206 ewes). Distributed Tibetan Sheep Ram and Ewes @ 1:2 to seven beneficiaries. Total 14 Tibetan sheep farmers are active in *in situ* conservation program. Incentive to beneficiaries for maintenance of shed along with distribution of GCI sheets, Compact feed block and supplements were provided in project area. Conducted 10 number of awareness camp in different project areas. The number of Tibetan sheep rearing households has also increased considerably from 5 Nos. (2023-24) to 14 Nos. A nucleus Tibetan sheep breeding farm was



also established at Rabum, North Sikkim.

Conservation of Tibetan sheep was also started at “State of Art Building” at Govt RSBF, Sangti, West Kameng district Arunachal Pradesh on 22 May 2024. Where 11 numbers of Sheep (1M +10F) were procured from Pangma village. Two ewes are expected to be give birth of lambs upto Feb 2026.

Conservation of Zanskari pony

Zanskari pony of Ladakh (UT) is being conserved in its native tract by AHD Leh under Network Project on AnGR. The objective is to revive the declining population of Zanskari Pony. Zanskari pony is small



breed of mountain horse but better adapted towards higher altitude. Its have higher endurance and energetic and Resistance to cold, diseases and high conception rate. Used for the purpose of Ploughing, Threshing/ Harvesting, Trekking, Horse riding, Traditional game Horse Polo and Potter in Defense at border and high terrains areas. But now days Zanskari Horse decline in their population because of better road connectivity, Mechanized (Ploughing /Harvesting etc), Wild /stray dogs attacks, Scarcity of fodder and decline in grazing pasture lands. For conservation of Germplasm of Zanskari Equine Breeding farm Chouchod and Zanskar has been set up. This year we have purchased 5 Nos of Zanskari Pony from Zanskar Valley. 04 Nos of Zanskari pony supplied/sold to ITBP and 12 Nos of Polo pony are distributed to interested polo player of Leh district.

Conservation of Halari donkey

Halari donkey of Gujarat is being conserved in situ by the sahjeevan Gujarat under Network Project on AnGR. During the reporting period, a revised population assessment of the Halari donkey breed was conducted in the project area. Earlier, the recorded population was



511 animals. As per the latest survey, the population has increased to 540 animals, showing a positive growth trend under the conservation efforts. Additionally, 145 Halari donkey breeders have been registered under the Network Project. The breeder registration process has strengthened community participation and created a structured database for systematic monitoring, breed improvement planning, and long-term conservation of the Halari donkey population in the Saurashtra region under the guidance of ICAR-National Bureau of Animal Genetic Resources. Breed conservation activities were actively undertaken during the reporting period. Ten (10) village-level meetings were organized to increase membership, particularly encouraging participation of individuals above 18 years of age along with their family members. Three (3) taluka-level meetings were planned, out of which initial coordination activities were initiated during the reporting period.

Conservation of Halari donkey as Farm based unit is also being carried out under Network Project on AnGR at Bikarer Station of ICAR-NRC on Equines. The Institute herd of Halari donkey has been strengthened. The current strength is 42. The purchase of six Halari females of breedable age is in progress. A total of 1522 straws (152 doses) of cryopreserved semen of 8 Halari Jacks have been prepared. Milk recording is being done. With 2 ½ hours of isolation, the daily milk yield ranged from 100 to 400 ml. The milk quality parameters have been estimated for early, mid and late lactation. Mineral profile of donkey milk has been worked out. Cosmetic products such as Sun Screen Cream, Body Lotion and Hand Wash have been prepared.

Conservation of Karnah and Gurez sheep

Karnah and Gurez sheep of Kashmir is under risk and being conserved in its home tract by SKAUST, Kashmir under Network Project on AnGR. The sheep are maintained and multiplication process is going on in university farm and a total of 32 Karnah sheep were present out of which 13 animals are pregnant. The unit organized various awareness camps and interaction sessions in collaboration with officers of the department of Sheep Husbandry wherein the farmers / sheep rearers were made aware of the importance of this important native genetic resource. Four units

were established in Jabdekarnah and Batlan areas of Tangdhar Karnah for *In-situ* conservation. Jabde region is the only region an army area with “No Mans” land where three breeders are having pure Karnah. Four ewe units were established in Jabde, Karnah, District Kupwara wherein one unemployed youth belonging to tribal community was given incentives of feed medicine etc and was motivated to rear the native sheep. One female breeder was also given a unit of four ewes. They were advised to rear the animals using community rearing method in which only Karnah animals and pure Rams were present. One awareness camp was conducted on the spot for conservation benefits of rearing the native sheep. Free medicine university developed feed was given to beneficiaries.

Five units of Gurez sheep with one male and four females were established in Baduaab, Tulail areas of breeding tracts of this threatened sheep in 2024 and five units of 1: 3 ratio of rams and ewes of Genetically improved Gurez sheep in the university farm were introduced in the breeding tract for In-situ conservation and were distributed in the baduaab areas of Gurez area in the month of October 2025. The local germplasm was distributed among Dardi tribals of the areas rearing the sheep. The process of distribution was carried in collaboration with KVK and Department of Sheep Husbandry Gurez. SKUAST-K. Awareness camps were organized for conservation of Gurez sheep in collaboration with the Sheep Husbandry Dept. The stakeholders were motivated to maintain and conserve this largest native threatened sheep genetic resource of valley.

Conservation of Mewari, Malvi, and Mewati camel

In situ conservation of threatened camel breeds is being carried out by ICAR-NRC on Camel under Network Project on AnGR. The survey was conducted to assess the status of three critically endangered camel breeds—Mewari, Malvi, and Mewati. Follow-up visits of identified and registered camel breeders under the project were also undertaken. For the Malvi camel, surveys and follow-ups were conducted in the districts of Jhalawar, Baran, Kota, and Bundi in Rajasthan, and Mandasaur, Neemach, Gwalior, and Ratlam in Madhya Pradesh. A total of 31 farmers from 23 villages across 14 tehsils were surveyed. Most animals in herds from



Jhalawar, Baran, Kota, and Bundi showed phenotypic similarity to camels from the core Malvi breeding tract of Mandsaur and Neemach; hence, camels from these districts were also classified as Malvi. Herd size ranged from 5 to 250 animals, with an average herd size of 47.

For the Mewati camel, surveys and follow-ups were conducted in Alwar, Bharatpur, Deeg, Dausa, Sawai Madhopur, and Jaipur districts of Rajasthan. A total of 47 farmers from 19 villages spread over 12 tehsils were surveyed. Herd size ranged from 6 to 165 animals, with an average herd size of approximately 35.

For the Mewari camel, surveys and follow-ups were conducted in Bhilwara, Chittorgarh, Dungarpur, Rajsamand, Salumber, and Udaipur districts of Rajasthan. A total of 81 farmers from 33 villages across 15 tehsils were surveyed. Herd size varied from 1 to 150 animals, with an average herd size of about 23.

Information on socio-economic status, breeding, feeding, and rearing practices was collected. Treatment of sick animals was undertaken, and prophylactic medicines for Surra and mange were distributed to camel farmers. Mineral mixture was also provided. Data on migration patterns and challenges faced by farmers were collected.

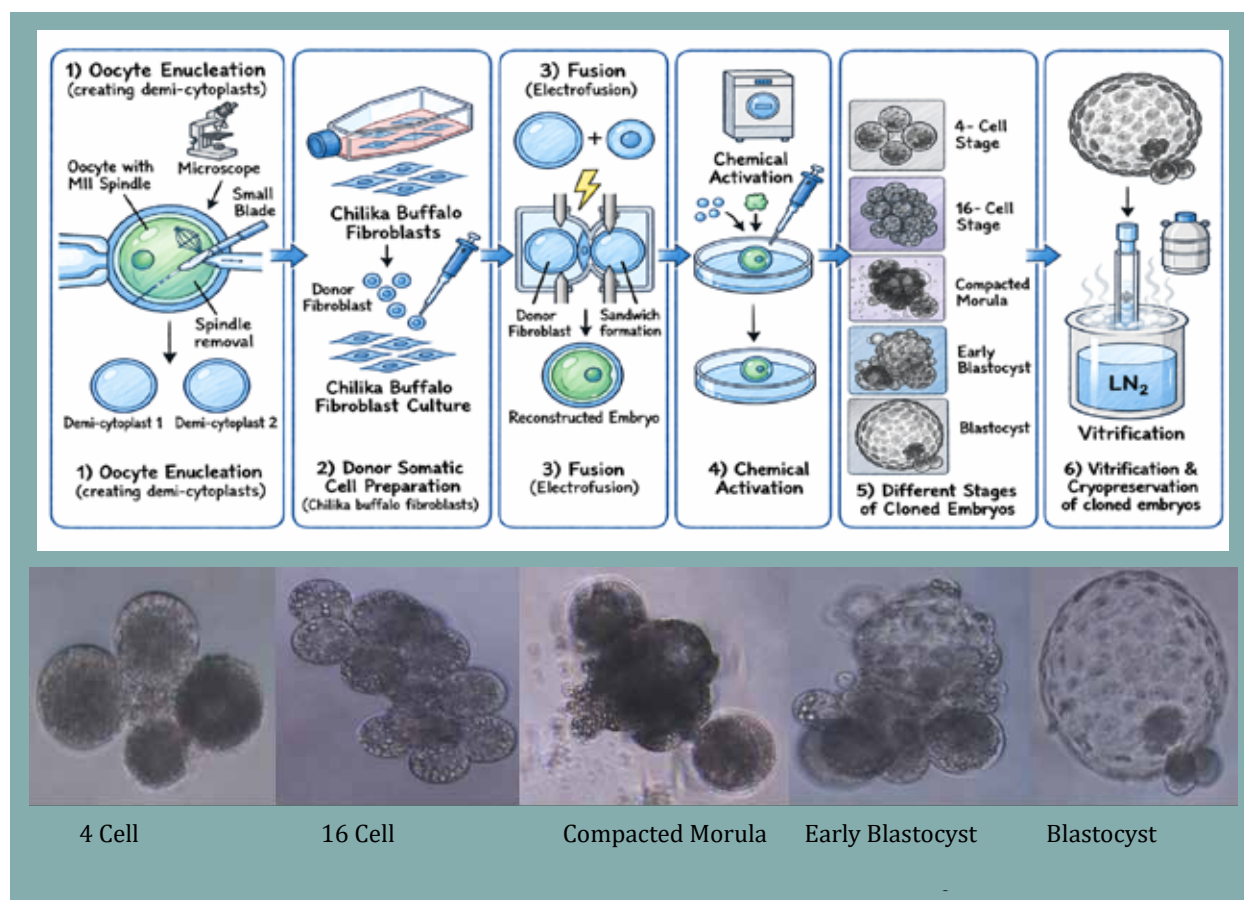
Development of protocols for conservation of Buffalo Genetic Resources via SCNT and Embryo Vitrification

This project aims to develop and optimize somatic cell nuclear transfer (SCNT) protocols for efficient embryo production from low population indigenous buffalo (*Bubalus bubalis*) breeds, with the objective

of supporting long term genetic conservation and ex situ germplasm banking. The study focuses on standardization of handmade cloning (HMC) techniques, including zona pellucida removal and enucleation of oocytes using a microblade under a stereomicroscope, followed by donor somatic cell reconstruction. Subsequent steps involve electrofusion, chemical activation, and in vitro culture under controlled conditions (5% CO₂, 38.5 °C) in a humidified incubator. The resulting cloned embryos are cultured to the blastocyst stage and subjected to vitrification using optimized cryoprotectant loading, rapid plunging into liquid nitrogen (LN₂), and stepwise warming protocols. Post thaw survival and developmental competence are evaluated to assess cryotolerance. Preliminary experiments have been successfully initiated using embryos derived from Chilika buffalo, demonstrating the feasibility of the approach.

Conservation of Chilika Buffalo using Handmade Cloning and Embryo Cryopreservation:

The Chilika buffalo is a unique indigenous breed native to the Chilika lagoon region of Odisha, well adapted to brackish water conditions and marshy ecosystems. It is known for its resilience, ability to thrive on sparse feed resources, and production of milk with high fat content. This breed represents a valuable genetic resource for climate resilient livestock production and conservation of biodiversity. Facing threats from crossbreeding, habitat loss, and declining population, cryopreservation of embryos is essential to preserve its irreplaceable genetic diversity. In a pioneering effort



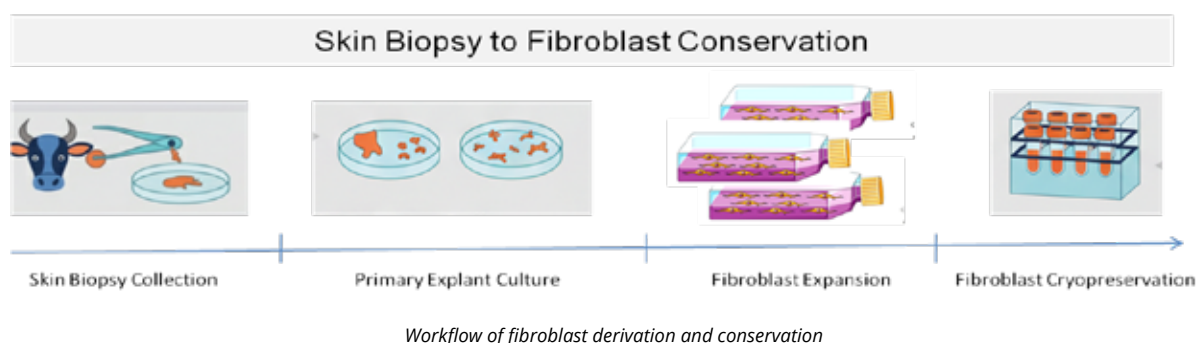
to preserve this indigenous breed at ICAR-NBAGR, the cloned embryos of Chilika buffalo are successfully generated using Handmade Cloning (HMC) technology and cryopreserved through vitrification. This approach bypasses traditional micromanipulation intensive cloning methods, enabling efficient production of superior cloned embryos from both male and female donor cells. Somatic cells derived from both male and female donor animals were utilized for nuclear transfer, and reconstructed embryos were cultured in vitro to suitable developmental stages. A total of 20 cloned embryos were generated, with a cleavage rate of 98% and blastocyst rate of 30%. Subsequently, 20 cloned embryos were cryopreserved, including 10 derived from male donor cells and 10 from female donor cells, and stored in cryo straws (Vitrifit) under liquid nitrogen conditions (-196°C).

This work initiates ex situ conservation strategies for indigenous buffalo breeds at ICAR-NBAGR through

embryo cryobanking. It establishes a foundational framework for the systematic preservation of elite germplasm using advanced reproductive technologies. Future plans include extending cryoconservation to other low population indigenous breeds and integrating these resources into national livestock conservation programs.

Somatic cells preservation of indigenous breeds

The somatic cell lines of different breeds across 6 livestock species were generated and cryo-preserved. Ear tissue samples of male and female animals were used to generate somatic cells using DMEM+10% FBS in a humidified incubator at 37°C and 5% CO₂. Fibroblast cells (1x10⁶ cells/ml) of the 4th passage that were following the normal sigmoid growth curve and free from any contamination were cryopreserved at -196°C in the LN₂.



The inventory is maintained at the National Gene Bank of ICAR- NBAGR, Karnal, India. This year, 35 indigenous breeds belonging to six livestock species (Cattle, buffalo,

sheep, goat, pig, donkey) were conserved as somatic cells, preserving their valuable genotypes for posterity (Table 1).

***In vitro* conserved Indigenous livestock and poultry populations (2024-25).**

Species	No. of breeds conserved	Breeds / populations
Cattle	5	Dangi, Amritmahal, Nagori, Rath
Goat	10	Anjori, Nandidurga, Pantja, Chaugarkha, Bidri, Marwari, Udaipuri, Andamani, Chegu, Sumi-Ne
Sheep	13	Muzaffarnagari, Deccani, Bellari, Nali, Kenguri, Mandya, Hassan, Garole, Marwari, Magra, Chokla, Kendrapada, Nilgiri
Buffalo	5	Toda, Bargur, Luit, Dharwadi, Chhattisgarhi
Pig	1	Tenyi Vo
Donkey	1	Spiti
Total	35	

Six of these breeds - Toda buffalo, Nilgiri & Kendrapada sheep, Chegu & Sumi-Ne goat and Tenyi-Vo pig - fall under the critical, endangered or vulnerable categories as per the National Breed Watch List- 2022.

With the addition of these, 33 out of 38 high-priority breeds have been cryo-preserved so far. With the conservation of 35 breeds in 2025, the somatic cell repository at ICAR-NBAGR, Karnal has been strengthened with a total of 145 livestock breeds of 10 livestock species.

The inventory is maintained at the National Gene Bank of ICAR- NBAGR, Karnal, India. By preserving these unique gene combinations in the form of somatic cells, India is fulfilling its international commitment to UN

Sustainable Development Goal 2.5.1, which aims to maintain the genetic diversity of seeds, cultivated plants, and farmed/domesticated animals. This diversity is the raw material needed to breed future generations of livestock that are more resilient to heat, disease, and resource scarcity.

Furthermore, cryopreserved fibroblasts from the Chilika breed at passages 6 and 7 were successfully used for somatic cell nuclear transfer (SCNT). Results support the competence of cryopreserved cells as donor cells for cloning applications. Successful embryo development highlights the competence of cryopreserved cells as donor cells for cloning applications and also their use for genetic conservation of indigenous breeds.

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

Genomic Diversity of AnGR

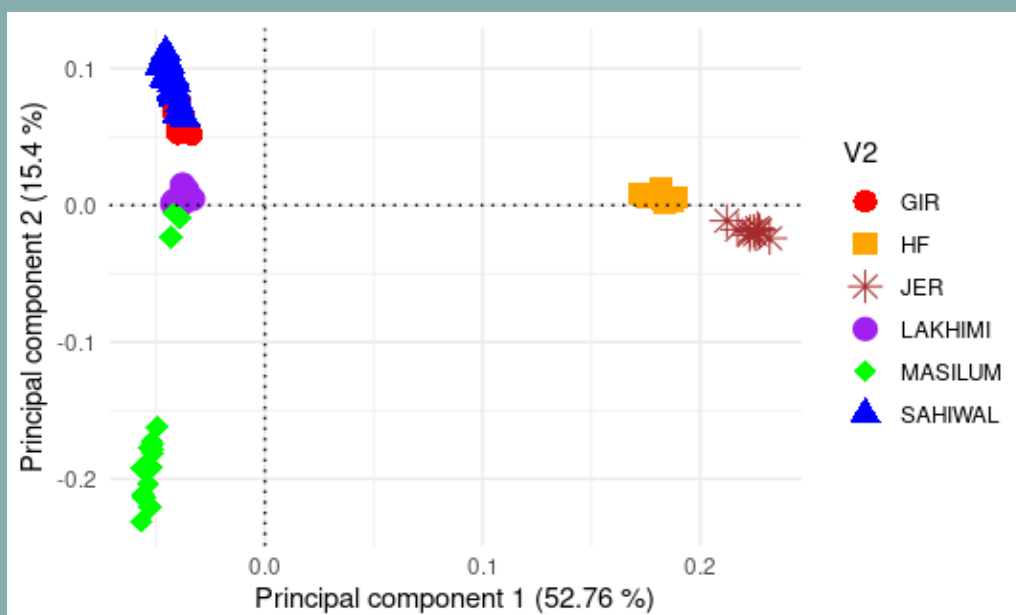
Admixture mapping of cattle in Eastern and Western India

The genomic diversity, population structure, and selection signatures of Lakhimi and Masilum cattle from Northeast India were assessed and compared with Gir, Sahiwal, Holstein Friesian, and Jersey breeds. A total of 88 samples were genotyped using the INDUSCHIP4 SNP Genotyping Array (Affymetrix), which contains 64,752 SNPs. Post quality control, the number of retained SNPs averaged 34,685 in Lakhimi, 23,613 in Masilum, 30,972 in Gir, and 24,688 in Sahiwal. Genetic differentiation (F_{ST}) analysis indicated that Lakhimi and Masilum are closely related ($F_{ST} = 0.0689$) and more similar to Gir and Sahiwal than to taurine breeds. Nucleotide diversity values showed variation between the two Northeast breeds, with Masilum recording the highest diversity ($\pi = 0.42$) and Lakhimi showing a moderate level ($\pi = 0.36$). Estimates of linkage disequilibrium (LD) decay and effective population size ($N_e = 81$ for Lakhimi; $N_e = 70$ for Masilum) suggested random mating, substantial genetic diversity, and stable breeding populations. Population structure analyses distinguished the Northeast breeds from both taurine and other indicine breeds. Lakhimi exhibited the highest degree of admixture, reflecting historical gene

flow, while Masilum maintained a relatively distinct genetic identity. Selection signature analyses revealed key candidate genes linked to milk production (*STAT4*, *ZEB2*, *EDIL3*), fertility (*GSTA2*), growth, immunity, and stress tolerance in Lakhimi cattle, while Masilum cattle showed genes associated with hypoxia tolerance, muscle development, fertility, and stress adaptation. Pathway enrichment highlighted strong genomic signatures for climate resilience, disease resistance, reproduction, and milk yield. Hub genes such as *EGFR*, *DOCK1*, *CXCL8*, *ELMO1*, *PDE10A*, and *PLCB1* play central roles in breed-specific adaptations and economically important traits. The study highlights the uniqueness of Lakhimi and Masilum cattle as important reservoirs of genetic diversity, underscoring their potential value in future breeding and conservation programs.

Genome-Wide SNP based Population Structure and Genetic Diversity in Indigenous Cattle Breeds

Indian indigenous cattle constitute an important reservoir of adaptive genetic variation, yet genome-scale information remains limited for many breeds. This study provides a comprehensive ddRAD-based genomic assessment of population structure, genetic



Principal Component Analysis (PCA) of genetic variation among indigenous and taurine cattle breeds

Genetic diversity across the different cattle breeds

Breed	Tajima	pi	Ho	He	Ho/He	FiS
Badri	0.143082	3.05E-05	0.417	0.582	0.717	0.282
Deoni	0.065104	2.51E-05	0.430	0.569	0.755	0.244
Gir	0.643308	2.68E-05	0.417	0.582	0.716	0.283
Hariana	0.644933	2.61E-05	0.409	0.590	0.694	0.305
HF	0.145076	2.16E-05	0.400	0.599	0.666	0.333
Kankrej	0.515806	2.10E-05	0.375	0.624	0.601	0.398
Khillar	0.669791	3.11E-05	0.426	0.573	0.744	0.255
Konkan	0.049295	1.71E-05	0.388	0.611	0.636	0.3635
Ladakhi	0.079113	1.89E-05	0.407	0.592	0.686	0.313
Malvi	0.177722	3.25E-05	0.421	0.578	0.729	0.270
Nagori	0.090185	2.13E-05	0.428	0.571	0.750	0.2496
Nimari	0.624953	2.30E-05	0.419	0.580	0.723	0.276
Ongole	0.154771	2.68E-05	0.401	0.598	0.669	0.330
Rathi	0.38815	1.89E-05	0.397	0.602	0.658	0.341
RedSindhi	0.0574	1.99E-05	0.419	0.580	0.721	0.278
Sahiwal	0.597089	2.64E-05	0.398	0.601	0.661	0.338
Shwet Kapila	0.175067	3.53E-05	0.428	0.571	0.750	0.249
Tharparkar	0.131063	1.38E-05	0.369	0.630	0.585	0.414

diversity, and runs of homozygosity across 18 Indian indigenous cattle breeds. The identification of over 12.5 million high-quality autosomal SNPs revealed substantial variation in SNP counts, heterozygosity, and nucleotide diversity among breeds, reflecting heterogeneous demographic histories and selection pressures. The cattle breeds included in the study were; Ladakhi (n=6), Badri (n=10), Hariana (n=12), Sahiwal (n=12), Gir (n=12), Rathi (n=11), Kankrej (n=12), Malvi (n=10), Nagori (n=9), Nimari (n=12), Red Sindhi (n=7), Tharparkar (n=4) Ongole (n=10), Deoni (n=7), Khillar (n=12), Konkan Kapila (n=10), Shwet Kapila (n=4). The mapping of ddRAD data was performed using with *Bos taurus* reference genome build ARS-UCD1.2, revealed an overall mapping of 97.19 % with a mean mapping quality of 7. After stringent filtering of raw SNPs (within 10 bp distance, mean depth <5, and 10% missing data), a total of 1,25,20,470 high quality autosomal SNPs were identified across 17 native Indian cattle breeds. The range 3,72,730-9,94,079 autosomal SNPs were identified across the breeds. The highest SNP count was observed in Khillar (9,94,079), followed by Nimari (8,97,541), Hariana (8,61,765), and Sahiwal (8,16,701). In contrast, the lowest SNP counts were recorded in

Tharparkar (3,72,730), Ladakhi (5,13,486), Nagori (6,28,610), and Shwet Kapila (6,45,740). Overall, the wide range of SNP counts reflects substantial genetic variation among the studied cattle populations. For the assessment of the genetic diversity and population structure various genetic parameter such as Tajima's D, nucleotide diversity, observed heterozygosity (Ho), expected heterozygosity (He), Ho/He ratio inbreeding coefficient (FIS) was identified. Tajima's D values varied across different breeds, ranging from 0.065 to 0.670, with lowest D values in Deoni (0.065) and Konkan (0.049) and highest D values in Gir (0.643), Hariana (0.644), and Khillar (0.669), suggested neutral (low value) and balancing selection among the breeds. In addition, cattle breeds Shwet Kapila (3.53E-05) showed the lowest nucleotide genetic diversity followed the Malvi (3.25E-05), Khillar (3.11E-05) while, Tharparkar (1.38E-05), Konkan (1.71E-05), Ladakhi (1.89E-05), and Rathi (1.89E-05) revealed the highest nucleotide genetic diversity. The observed heterozygosity (Ho) ranged from 0.369 (Tharparkar) to 0.430 (Deoni), whereas expected heterozygosity (He) was consistently higher, ranging from 0.571 (Nagori, Shwet Kapila) to 0.630 (Tharparkar). However, Ho/He ratio was

below 1 in across the all breeds, with highest value 0.755 in Deoni and 0.585 in Tharparkar, reflecting the deficit of heterozygotes in the population. The inbreeding coefficient (FIS) was positive across all populations, varying from 0.249 (Shwet Kapila) to 0.41 (Tharparkar), suggesting moderate inbreeding in population. F_{ST} data suggested moderate to high genetic differentiation across the 18 breeds. Admixture analysis uncovered complex ancestral components, reflecting both shared genetic backgrounds and breed-specific differentiation. Several breeds exhibited distinct clusters such as Ladakhi, Tharparkar, and Shwet Kapila cattle retained unique genetic signatures indicative of isolation and local adaptation. Phylogenetic reconstruction corroborated these patterns, grouping breeds according to geographic origin and functional type, and highlighting evolutionary divergence between northern hill breeds and southern peninsular populations. High-quality SNPs were used to identify total number ROH in each breed using PLINK version 1.9 software. Breed-wise ROH counts ranged from 53 in Tharparkar to 818 in Harijana, with Gir, Khillar, and Ongole also showing high ROH burdens. Across chromosomes, ROH occurrence was highest on BTA1 and lowest on BTA29, although the chromosomal pattern varied among breeds, indicating heterogeneous demographic histories and selection pressures. Most ROH segments (69.59%) were short (1-2 Mb), suggesting that ancient inbreeding and historical founder effects contributed more strongly than very recent consanguinity to the homozygosity landscape of these populations. Longer ROHs (>8 Mb) were concentrated in Harijana, Kankrej, Gir, Nagori, and Sahiwal, consistent with more recent inbreeding or sustained directional selection in these breeds. Overall, the results highlight marked between-breed differences in genomic diversity and homozygosity, and they provide a useful framework for prioritizing breed-specific conservation and mating strategies for Indian cattle genetic resources.

Admixture analysis of buffalo breeds of India

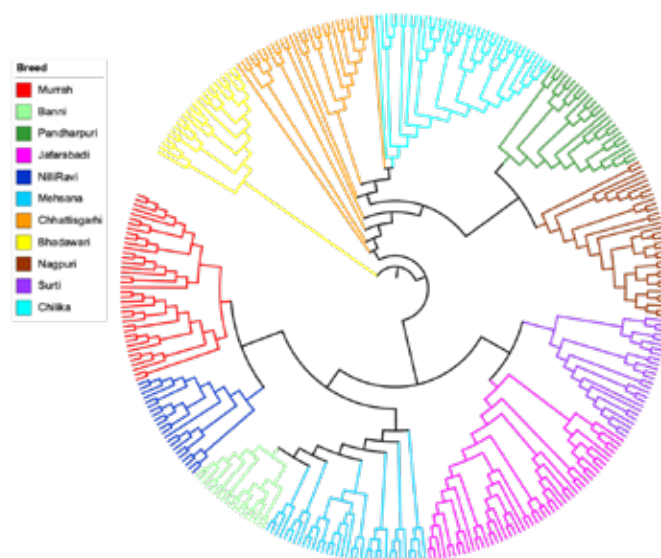
A total of 384 samples from belonging to 11 buffalo breeds were processed for SNP genotyping using unified buffalo SNP array (61353 markers). Out of

the total 384 DNA samples, 18 samples failed during quality control filtering. The buffalo breeds, number of samples, and average call rate of passing samples is mentioned below:

Details about breeds, sample size and call rates

Sr. No.	Breed (sample size)	Average call rate for passing samples (%)
1	Banni (20)	99.424
2	Bhadawari (25)	99.687
3	Chhatishgarhi (31)	99.613
4	Chilika (38)	99.676
5	Jaffarabadi (48)	99.565
6	Mehsana (61)	99.676
7	Murrah (49)	99.609
8	Nagpuri (34)	99.713
9	Nili-Ravi (24)	99.527
10	Pandharpuri (28)	99.464
11	Surti (26)	99.619

During the preliminary analysis, average call rate for passing samples and best and recommended markers were found to be 99.736 and 98.484 percent. The genotyping data of 365 animals were filtered with --maf (0.01), --hwe (0.001), --geno (0.05), mind (0.05), --het ($\pm 3SD$). Further, the SNPs on sex chromosomes were removed from genotyping data. Finally, 54,777 SNPs were retained for further downstream analysis. Further, mean MAF per breed was calculated using Plink v1.9 and phylogenetic analysis was done using TASSEL.



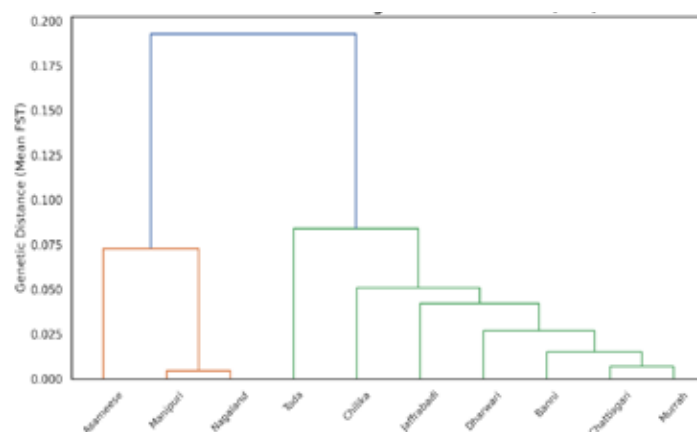
Phylogenetic analysis of 11 buffalo breeds

Genomic diversity, population structure & demographic dynamics in diverse native buffalo breeds

WGS data has been generated at 20x coverage in 80 animals of 10 buffalo populations including Murrah (MUB), Banni (BNB), Chilika (CHB), Jaffarabadi (JFB), Chhattisgarhi (CGB), Toda (TDB), Dharwadi (DHB), Manipuri (MNB), Nagaland (NGB) and Assamese (ASB). After quality filtering of raw sequence data, gVCFs and joint VCFs were generated using the NDDDB buffalo reference genome. Genome-wide nucleotide diversity (π), Tajima's D, heterozygosity and inbreeding coefficients (FIS) were computed for each buffalo breed. Nucleotide diversity (π) ranged from 0.002 to 0.003 indicating that the studied buffalo populations possess moderate genome-wide genetic variation. Genome wide Tajima's D distributions were largely bell shaped and centred near neutrality (≈ 0). Most breeds clustered around positive values (≈ 0.7 – 0.8), suggesting relatively balanced allele frequencies and no evidence of recent selective sweeps. Breeds such as CGB, NGB, ASB, and DHB exhibited lower H_o than H_e indicating a deficit of heterozygotes within these populations. This pattern suggests possible inbreeding, population subdivision, assortative mating, or restricted gene flow. In contrast, breeds such as MUB, CHB, JFB, TDB, and BNB displayed higher observed heterozygosity than expected heterozygosity, indicating excess heterozygosity within the populations.

Inbreeding coefficients (FIS) analysis showed positive values for breeds such as Chhattisgarhi, Manipuri, Nagaland and Assamese buffalo indicating higher levels of inbreeding and reduced genetic variability. In contrast, negative or near zero FIS values in other breeds suggest outbreeding or balanced genetic diversity, consistent with their higher heterozygosity and nucleotide diversity.

Principal component analysis (PCA) based on LD-pruned SNPs revealed strong genetic stratification among buffalo breeds. PC1 and PC2 explained 59.27% and 8.04% of total variation, respectively, separating northeastern buffalo populations (Assamese, Manipuri and Nagaland) from mainland breeds. Toda also showed distinctness from other breeds, reflecting

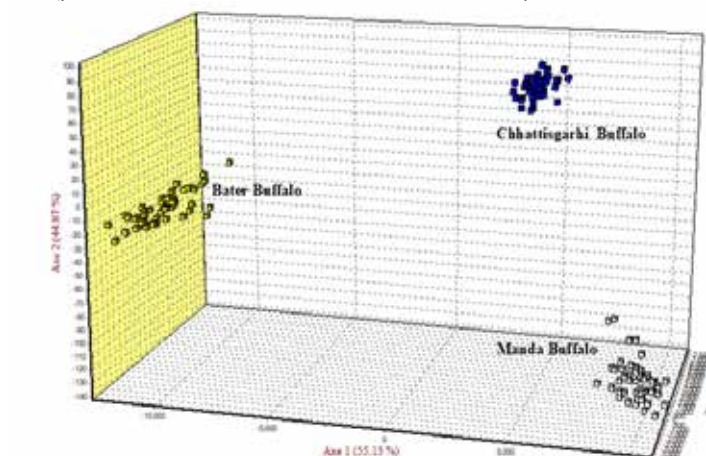


Hierarchical Clustering of Buffalo Breeds (FST)

its unique genetic background. FST based clustering patterns showed Assamese, Manipuri and Nagaland buffaloes grouping closely, consistent with their geographical proximity, while breeds such as Toda and Chilika appeared more distinct showing their genetic separation from rest of the buffalo breeds. The other remaining buffalo breeds such as (MUB, BNB, JFB, DHB, CGB) clustered relatively closer. Efforts are underway to generate WGS data and analyse Bhadawari, Surti, Mehsana and Nili Ravi buffaloes.

Genetic characterization of indigenous buffalo of Bastar region of Chhattisgarh

Genetic diversity and population structure of the local buffalo population of the Bastar region was delineated, using 23 microsatellite markers genotyping 48 unrelated individuals. Most of the loci were highly informative (mean PIC = 0.671), and neutrality tests confirmed their suitability for population genetic analysis. A total of 189 alleles were detected, with

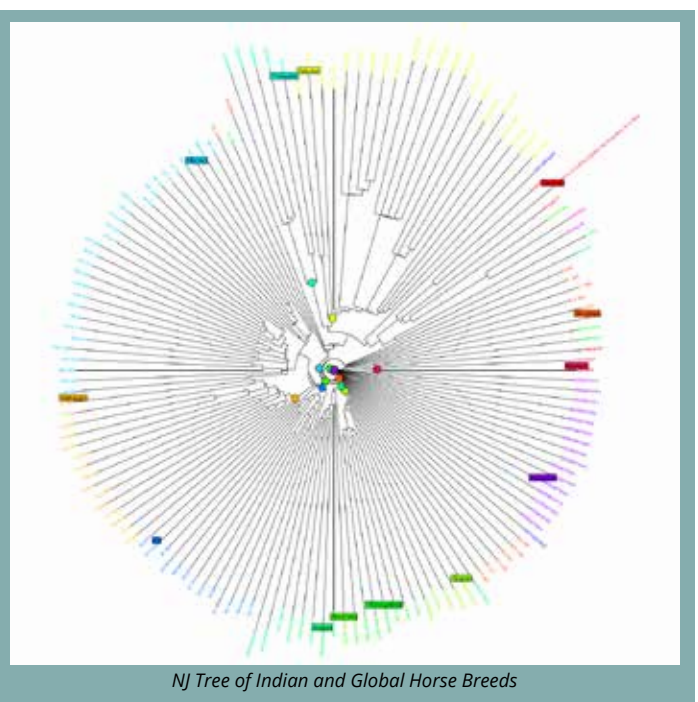


Plot of multivariate factorial correspondence analysis

a mean allelic diversity of 8.22, indicating high polymorphism. The effective number of alleles averaged 3.81. Mean observed (0.69) and expected heterozygosity (0.71) values, along with a Shannon's index of 1.53, demonstrated substantial genetic variability and maintenance of genetic heterogeneity over time. The near-zero mean inbreeding coefficient ($F_{IS} = 0.0056$) and largely non-significant deviations from Hardy-Weinberg equilibrium indicated minimal inbreeding and a genetically stable population. Bottleneck analysis showed contrasting results across mutation models: IAM suggested a mild historical bottleneck, whereas SMM and TPM models, along with the normal L-shaped allele frequency distribution, indicated no evidence of a recent or severe bottleneck and supported mutation-drift equilibrium. This suggests long-term demographic stability of the Bastar buffalo despite potential historical contractions. Comparative analysis of diversity parameters between registered Chhattisgarhi breed and Bastar buffalo populations revealed clear differences in their genetic composition. The Bastar population exhibited higher allelic diversity (8.22 vs. 7.54) and greater observed/expected heterozygosity (0.69/0.71 vs. 0.57/0.32) than Chhattisgarhi buffalo, indicating a broader genetic base and lower genetic erosion. To understand the genetic differentiation, Manda the registered buffalo breed from adjoining Koraput and Malkangiri districts of Odisha was also included. Wright's fixation indices revealed moderate to high population differentiation across the three studied breeds. The overall F_{ST} (0.336) indicated substantial genetic structuring, reflective of restricted gene flow and long-term geographical or reproductive isolation. Pairwise Nei's genetic distance further clarified the relationships: Bastar and Manda buffaloes showed the highest genetic diversity and lowest genetic identity ($D = 2.7873$; $I = 0.0616$), identifying them as the most genetically distinct pair. Bastar and Chhattisgarhi buffalo exhibited moderate differentiation ($D = 1.9389$; $I = 0.1439$), whereas Chhattisgarhi and Manda buffaloes were the most closely related ($D = 1.0782$; $I = 0.3402$). Further, genetic characterization of buffalo population identified from Northern hill region of Chhattisgarh was also carried out. The population showed sufficient genetic diversity and genetic distinctness from buffalo population from Baster region. Overall, the Bastar buffalo represents a genetically diverse, stable, and well-adapted indigenous population with distinct identity. These findings support its potential for recognition as a distinct breed.

Whole-Genome Analysis of Indian and Global Horse Breeds

A comprehensive autosomal whole-genome sequencing (WGS) analysis was performed to investigate genomic diversity, population structure, and evolutionary relationships among indigenous Indian horse breeds in a global context. The study included approximately 229 horse genomes comprising 100 Indian horses representing Marwari (n=34), Kathiawari (n=30), Bhimthadi (n=14), Kachchhi-Sindhi (n=14), Zanskari (n=10), Spiti (n=9), Manipuri (n=7), and Bhutia (n=2), together with international breeds including Arabian, Thoroughbred, Quarter Horse, Akhal-Teke, Mongolian, Yakutian, Iberian, Lusitano, and Przewalski horses. Whole-genome datasets were processed using a GATK-based joint genotyping pipeline. Individual gVCF files were integrated through GenomicsDBImport and GenotypeGVCFs (GATK v4.5.0.0) against the telomere-to-telomere horse reference genome (GCF_041296265.1_TB-T2T). Joint variant discovery identified approximately 19.9 million autosomal variants across the complete dataset. Subsequent quality-control filtering, including removal of low-quality variants, loci with high missingness, rare alleles, and markers deviating from Hardy-Weinberg equilibrium, yielded a high-confidence dataset containing approximately 9.34 million autosomal SNPs from 152 representative



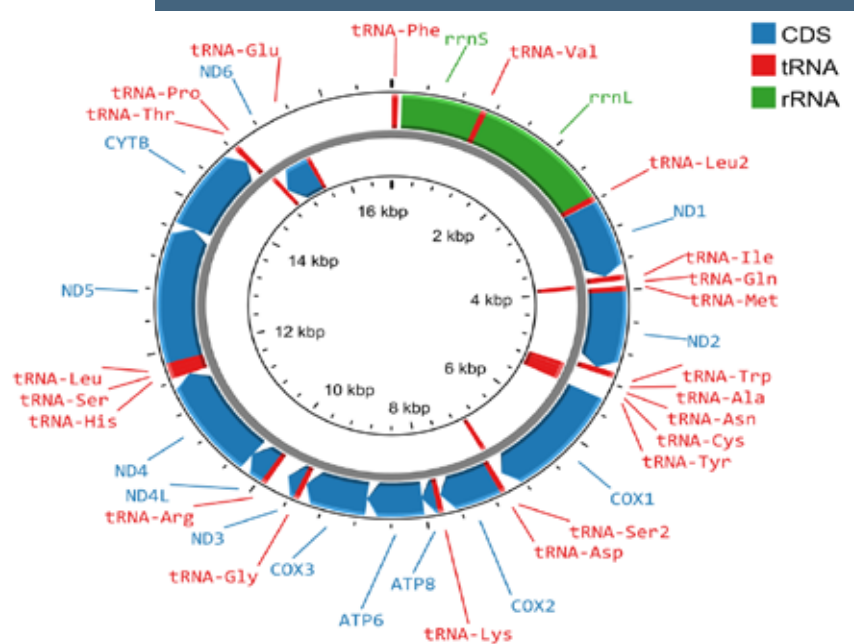
individuals. To reduce marker redundancy caused by linkage disequilibrium, SNP pruning was performed, resulting in approximately 298,000 independent genome-wide markers for population structure analyses. Principal Component Analysis (PCA) based on the LD-pruned SNP dataset revealed clear genetic structuring among horse populations and successfully differentiated major lineages according to their geographic origin and breeding history. Indian breeds formed a broad cluster distinct from most international breeds, while maintaining breed-specific sub-structuring. Marwari, Kathiawari, Bhimthadi, and Kachchhi-Sindhi horses clustered relatively close to one another, reflecting shared ancestry and historical gene flow among western Indian horse populations. However, distinct breed-level differentiation was still evident, indicating the influence of selective breeding and regional adaptation. The Himalayan breeds, Zanskari and Spiti, clustered together and exhibited genetic proximity to Mongolian and other northern Asian horses, consistent with adaptation to high-altitude environments and historical trans-Himalayan connections. Manipuri horses occupied a separate genetic position from western Indian breeds, supporting their unique evolutionary history and possible influence from East and Southeast Asian horse lineages. Among global breeds, Arabian, Thoroughbred, Akhal-Teke, Yakutian, Mongolian, and Przewalski horses formed distinct clusters corresponding to their known breeding histories and geographic origins.

Neighbor-Joining phylogenetic analysis corroborated the PCA results, with individuals clustering largely according to breed ancestry and geographic origin. The combined analyses demonstrate substantial genomic diversity within Indian horse populations and confirm the existence of breed-specific genetic signatures despite evidence of historical admixture. This extensive autosomal genomic resource provides a robust foundation for future studies on admixture, population differentiation, selection signatures, breed identification, conservation genetics, and genomic improvement of indigenous horse genetic resources.

Chromosome-level assembly of the Indian Red Jungle fowl

The domestic chicken *Gallus gallus domesticus* is one of the most economically important avian species globally, serving as a major source of protein through meat and egg production. Genomic research on chickens has been extensive, and their genome serves as a reference for avian biology and comparative vertebrate genomics. A high-quality, chromosome-level genome assembly of the Indian Red Jungle fowl (*Gallus gallus murghi*), wild ancestor of domestic chickens was generated. A multi-platform sequencing strategy was employed, integrating PacBio HiFi long reads, Illumina whole-genome sequencing (WGS), and Hi-C data to ensure high accuracy, depth, and structural resolution. PacBio sequencing generated large-scale long-read data with high read length and quality, while Illumina provided $\sim 30\times$ coverage, and Hi-C data ($\sim 93\times$) facilitated chromosome-level scaffolding.

The *de novo* assembly was performed using HiFi reads with Hifiasm, followed by redundancy removal using Purge_dups and scaffolding with Hi-C data through YAHs. The final assembly spanned approximately 1.1 Gb, with a contig N50 of ~ 44.7 Mb and scaffold N50 exceeding 90 Mb, representing a significant improvement over existing chicken reference genomes. Polishing with NextPolish enhanced base-level accuracy, resulting in a high-quality assembly with a BUSCO completeness



Annotation of Ggm mitogenome

Assembly statistics of GRCg6a (RJF), GRCg7b (Broiler) and Ggm

Metric	Ggm	GRCg7b	GRCg6a
Total Length	1,071,088,187 bp	1,053,332,251 bp	1,065,365,428 bp
Missing Chromosomes	-	-	6
Scaffold N50	90.9 Mb	90.9 Mb	20.8 Mb
Contig N50	36.5 Mb	18.8Mb	17.7 Mb
Scaffold L50	4	4	12
Contig L50	8	18	19
GC Content	42.12%	42 %	42 %

score of 99.1% and a quality value (QV) greater than 50, indicating very low error rates. Chromosome-level curation using tools such as Ragtag and PretextView resulted in 37–38 well-defined chromosomes, with minimal fragmentation and fewer unplaced scaffolds compared to GRCg6a and GRCg7b references.

The mitochondrial genome was assembled separately using MitoHiFi, enabling accurate reconstruction and annotation of 13 protein-coding genes, 22 tRNAs, and 2 rRNAs. Phylogenetic analysis confirmed the close evolutionary relationship of Indian Red Jungle fowl with native and domestic chicken breeds, supporting its role as a key ancestral lineage.

Furthermore, the study generated the first Indian chicken pangenome dataset, identifying 34,531 non-reference novel sequences (NRNS) spanning ~70.8 Mb. Functional analyses indicated their involvement in key biological processes such as epigenetic regulation, cell adhesion, and signaling pathways. Incorporation of these NRNS into an updated pangenome significantly improved mapping efficiency for WGS and RNA-Seq datasets (up to ~99.8%), demonstrating enhanced analytical performance over conventional reference genomes. Overall, this study provides the first high-quality chromosome-level genome assembly of Indian Red Jungle fowl along with a comprehensive pangenome resource. The improved genome continuity, discovery of novel sequences, and enhanced mapping efficiency establish this work as a valuable contribution to avian genomics, evolutionary biology, and genetic improvement programs.

National Bovine Genomic Centre for Indigenous Breeds

National Bovine Genomic Centre for Indigenous Breeds (NBGC-IB) was established under the Rashtiya Gokul Mission (RGM), Ministry of Fisheries, Animal

Husbandry and Dairying, Govt. of India, in August 2018 for development of Genomic Chip and implementation of genomic selection in the country at ICAR-NBAGR.

Unified Genomic Chips: The Unified SNP chips for cattle (Gau Chip with 67K markers) and buffalo (Mahish Chip with 62K markers) were developed and validated in collaboration with NDDDB Anand, NIAB Hyderabad, and BAIF Pune. 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.

A state-of-the-art infrastructure has been established for DNA isolation and storage, high-throughput DNA genotyping using the GeneTitan™ Instrument, computational analysis, and efficient management of large-scale genotyping data.

In 2024-25, a total of 3753 blood samples of cattle and buffalo were received from various centres of NDDDB, Anand at NBGC-IB, ICAR-NBAGR, Karnal. The samples were belonging to 4 cattle and 2 buffalo breeds. Out of the total samples, 2018 samples were from cattle and 1735 samples from buffalo breeds. The genomic DNA was isolated using Qiagen commercially available kit. The genotyping process of received samples are underway.



Trait characterization & Evaluation of AnGR

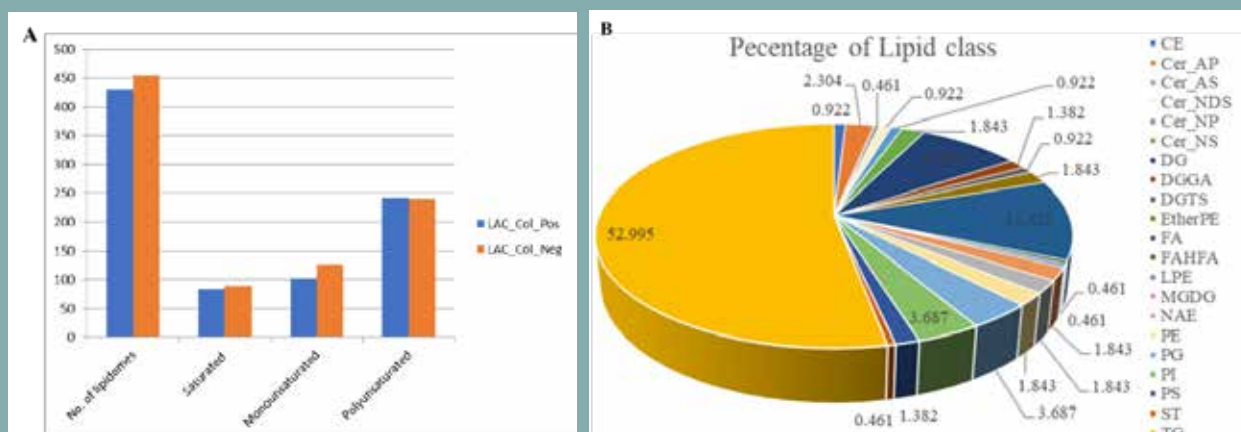
Lipidomic Profiling of Colostrum and Mature Milk in Ladakhi Cow

The colostrum and milk of Ladakhi cows naturally adapted to high altitude region of Leh-Ladakh is considered to be enriched with nutrients and metabolites. In this study, an effort was made to analyze the lipidomic composition of colostrum as well as milk of this unique germplasm mainly reared under extensive grazing system on highland pastures of Leh-Ladakh. The lipidome profile will help to complement the existing multiomic dataset including genomic, transcriptomic, proteomic and metabolomic data on this unique germplasm. Such an effort would lead to provide molecular understanding of Ladakhi cow adaptation to hypoxic and stressful environment of high altitude of Ladakh. A comprehensive lipidome signature of Ladakhi cow colostrum as well as mature milk was generated using LC-MS/MS (Q-Exactive Plus Biopharma–High Resolution Orbitrap). Spectral data was processed using MS-DIAL version 5.5 in both positive and negative ionization modes. Lipidomic profiling of Ladakhi cow colostrum through MS Dial software resulted in initial identification of 430 lipid molecules in positive ion mode and 454 in negative ion mode. Among the identified lipids, the distribution of saturation types revealed that the total number of saturated, monounsaturated and polyunsaturated lipid molecules were 84 and 88, 102 and 126, and 241 and 240 in positive and negative ion mode, respectively.

The file was further processed to generate a robust lipid signature of Ladakhi cow colostrum. Following normalization and quality processing, a total of 607 lipid molecules were retained. Application of a coefficient of variation (CV) threshold of 50% further refined the dataset, resulting in 217 lipid molecules for downstream analysis. Spearman correlation analysis of the five samples revealed a high degree of similarity in lipidomic profiles.

Five different lipid categories including, FA, GL, GP, SP, and ST were identified in the Ladakhi cow colostrum. These categories were further grouped into 21 major classes. The classification of identified lipids revealed that the triglycerides dominated (53%) the lipid class, followed by fatty acids, diglycerides, phosphatidylethanolamines, and phosphatidylglycerols. Both saturated and unsaturated long-chain triglycerides were among the most abundant, indicating a balance between energy supply and structural roles.

The major enriched pathways include Co-inhibition by PD-1, Phosphorylation of CD3 and TCR zeta chains, Translocation of ZAP-70 to the immunological synapse, Activated NTRK2 signaling through FRS2 and FRS3, Alpha-protein kinase 1 signaling pathway, CD28-dependent Vav1 pathway, CDC42 GTPase cycle, CLEC7A (Dectin-1) signaling, Cell death signaling via NLRP3, NRIF and NAIP, Cyclin D-associated events in G1, DCC-mediated attractive signaling, Dectin-1 mediated noncanonical NF- κ B signaling, Downregulation of



Lipid molecules identified in Ladakhi cow colostrum. A) The bar graph showing the total number of lipidomes and the distribution of saturated, monounsaturated, and polyunsaturated lipid species in each group. Values are presented as counts of lipid molecules identified. B) Pie chart showing the percentage of each class after application of 50% CV threshold. Data is represented in percentage of each class.

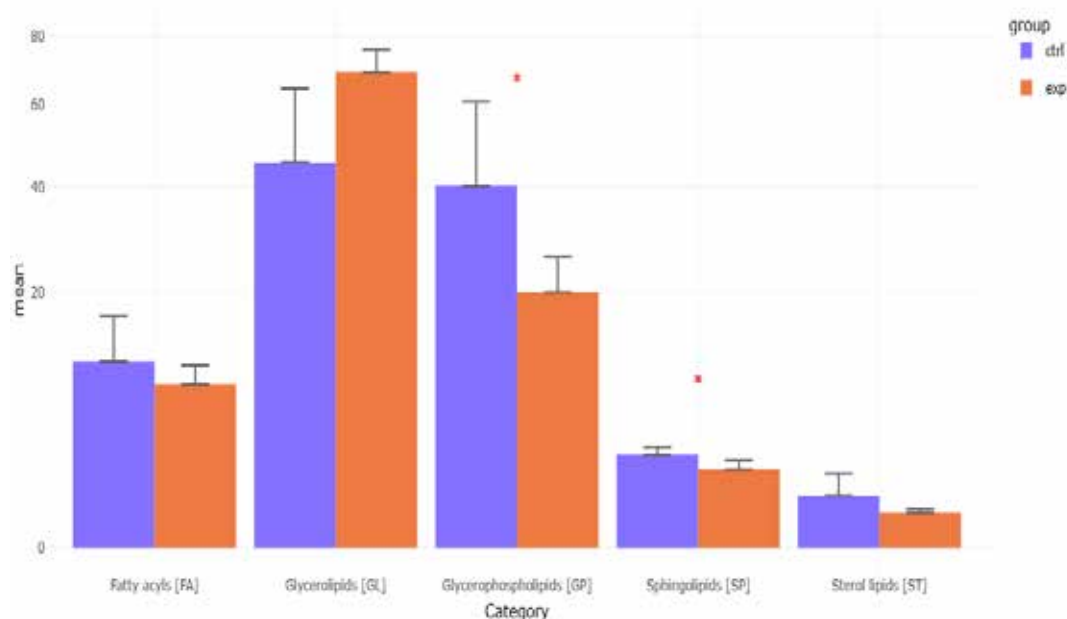


Fig.: Comparative mean abundance of major lipid classes in colostrum (blue) and mature milk (orange) samples

ERBB2 signaling, Downregulation of ERBB2:ERBB3 signaling. This suggests a strong association between lipid molecules and immune regulation. The enrichment of pathways in colostrum lipidome strongly indicates that lipids are not merely nutritional components but active mediators of immune regulation, signaling, and developmental processes. The presence of PD-1 co-inhibition, CD3/TCR phosphorylation, and ZAP-70 translocation suggests that lipid-associated molecules may facilitate T-cell signaling and immunomodulation, critical for neonatal protection.

Further, comparative lipidome analysis of 5 colostrum and 5 mature milk samples was performed using lipid-sig 2.0 tool. The PCA score plots illustrated the tight clustering, suggested high reproducibility of experiment and indicating the significant differences in lipid composition between colostrum and mature milk of Ladakhi cattle. The first principal component (PC1) explains 68.1% of the total variance, while the second principal component (PC2) explains 12.5% of the variance, indicated lipid variability between the two groups. Spearman correlation of analysis quantitative value of the samples exhibited the strong correlation within the samples.

Five distinct major lipid categories and 25 major lipid classes were identified between the colostrum and mature milk of Ladakhi cows (Fig.4). The major lipid categories are fatty acid (FA), glycolipids (GL), glycerophospholipid (GP), sphingolipids (SP), and sterol (ST) lipids. A total of 228 lipid species were

differentially expressed, with 85 lipid metabolites upregulated significantly in colostrum while 143 metabolites were downregulated in mature milk ($p < 0.05$). The glycerophospholipid and sphingolipid were enriched in colostrum, highlighting roles in early calf growth and development, while certain diglycerides were more abundant in mature milk. The lipid molecules including DG 16:0, DG 41:5, DG 10:0_18:1, DG 28:1, DG 24:1, and TG 8:0_8:0_14:1, TG 8:0_10:0_14:1, TG 8:0_10:0_16:1, TG 8:0_8:0_18:1 upregulated in mature milk samples related to glycerolipids classes. However, several lipids such as PE O-18:1_22:6, PE O-18:0_20:3, PE O-17:1_20:5, PE P-17:0_20:5, and PE O-16:0_18:2 were significantly enriched in colostrum as compared to mature milk samples. Colostrum exhibited higher ether-to-ester ratios, whereas mature milk showed higher lysophospholipid-to-phospholipid ratios, indicating stage-specific differences. Network based analyses identified key enzymes such as SMPD, LPCAT, CEPT1, PTDSS2 and three major hubs: ether glycerophospholipid, sphingolipid, and Hex2Cer-centered, emphasizing the complex metabolic interconnectivity between colostrum and mature milk. KEGG analysis identified 30 metabolic pathways, with glycerophospholipid, sphingolipid, and linolenic acid metabolism being the most significant (Fig. 2D). Overall, Ladakhi cow colostrum shows a structurally and functionally enriched lipidome compared to mature milk, underscoring its role in neonatal growth, immunity, and high-altitude adaptation. This lipidome

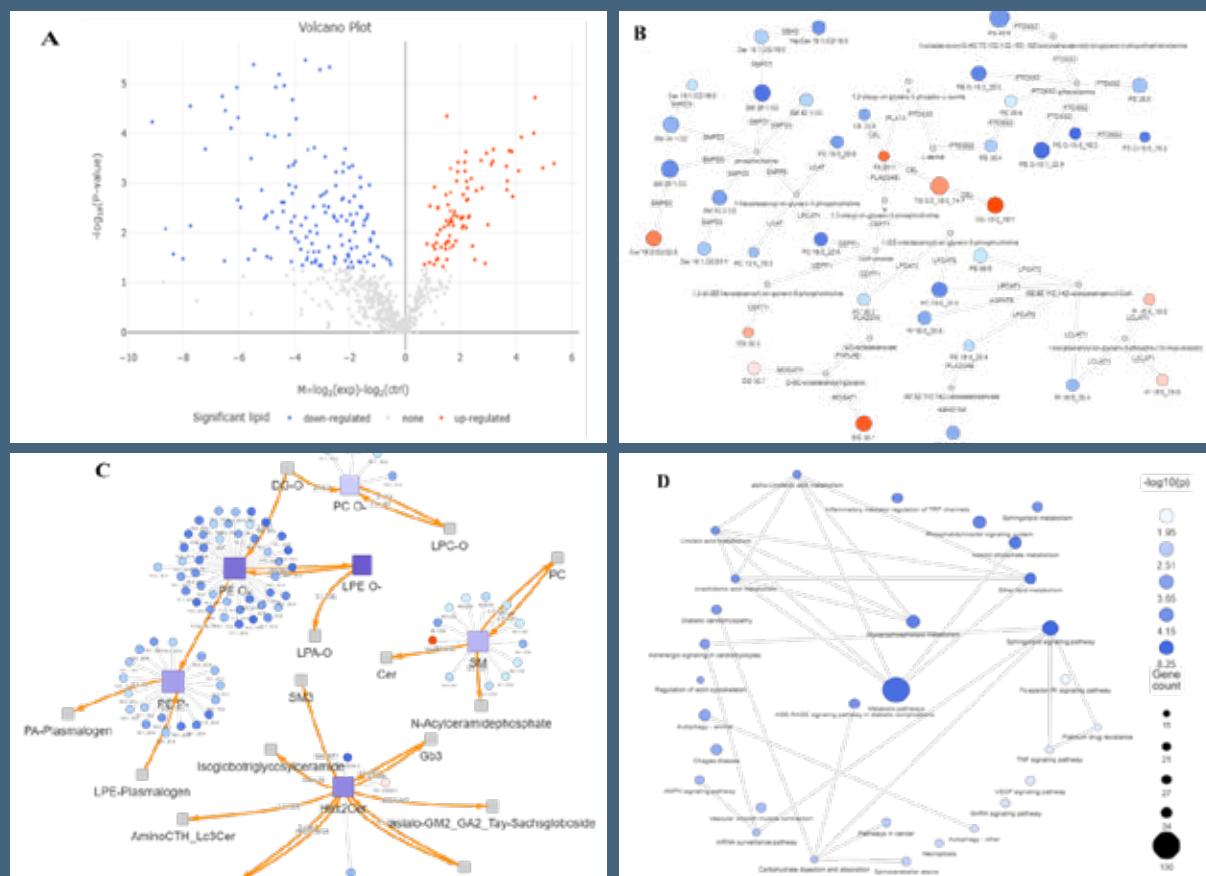


Fig. Differential Lipidome between Ladakhi cow colostrum and milk. A) Volcano plot of the significant ($p < 0.05$) expressed upregulated and downregulated lipid molecule between the colostrum and mature milk. B) Integrated lipid-enzyme interaction network of differentially expressed lipid species between colostrum and mature milk. The red and blue colour indicated the upregulated and downregulated, lipid species respectively, in mature milk as compared to the colostrum C) Lipid reaction network analysis of differentially expressed lipid species between colostrum and mature milk. D) KEGG pathways of the differentially expressed lipid species between colostrum and mature milk.

based analysis infers that colostrum lipids are enriched in metabolic pathways that regulate immune defense, cellular signaling, and developmental programming, ensuring neonatal survival in the hypoxic, high-altitude environment of Ladakh. In contrast, mature milk lipidome is generally expected to shift toward nutritional and metabolic maintenance, aligning with the long-term growth needs of calves.

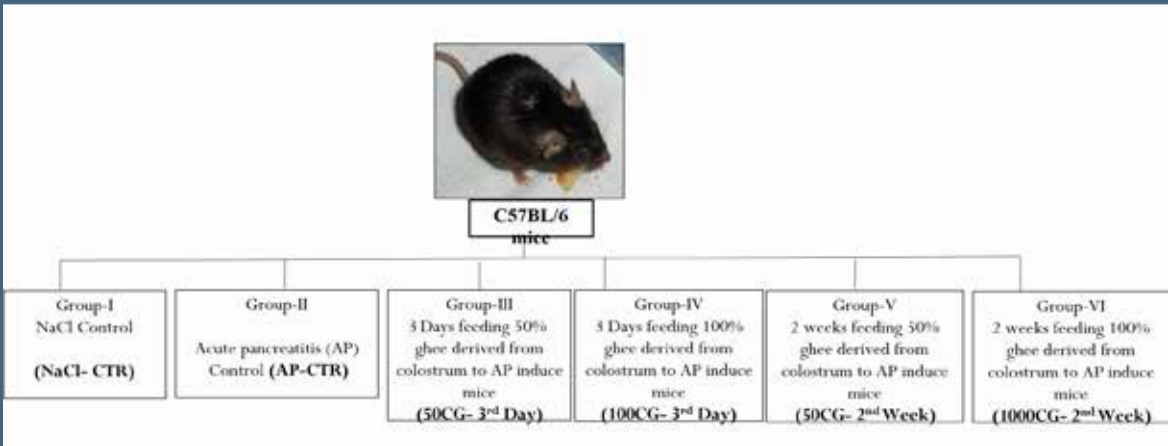
Evaluation of Ladakhi cow's colostrum-derived ghee in acute pancreatitis mice model

The present study was planned to assess the protective and recovery effects of Ladakhi cow colostrum-derived ghee at different doses and durations. Our hypothesis was that feeding colostrum-derived ghee from Ladakhi cows will reduce the severity of acute pancreatitis in mice by restoring hematological balance, normalizing organ weights, and mitigating inflammatory responses in a dose- and duration-dependent manner.

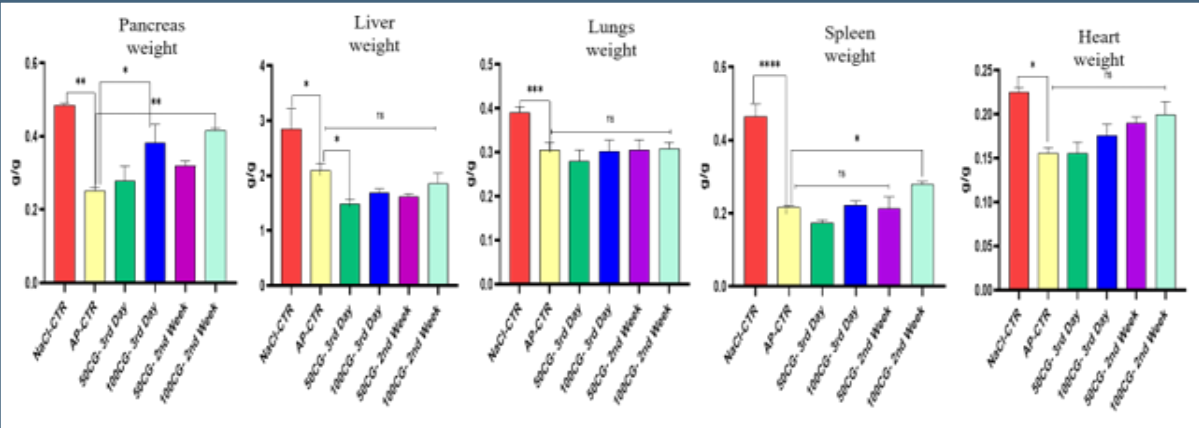
The C57BL/6 mice were divided into six groups, including NaCl and acute pancreatitis controls. Two groups received Ladakhi cows' colostrum-derived ghee (50% and 100%) for 3 days after pancreatitis induction.

Another two groups were fed the same ghee diets for 2 weeks post-induction. This design tests short- and long-term effects of colostrum ghee on pancreatitis outcomes.

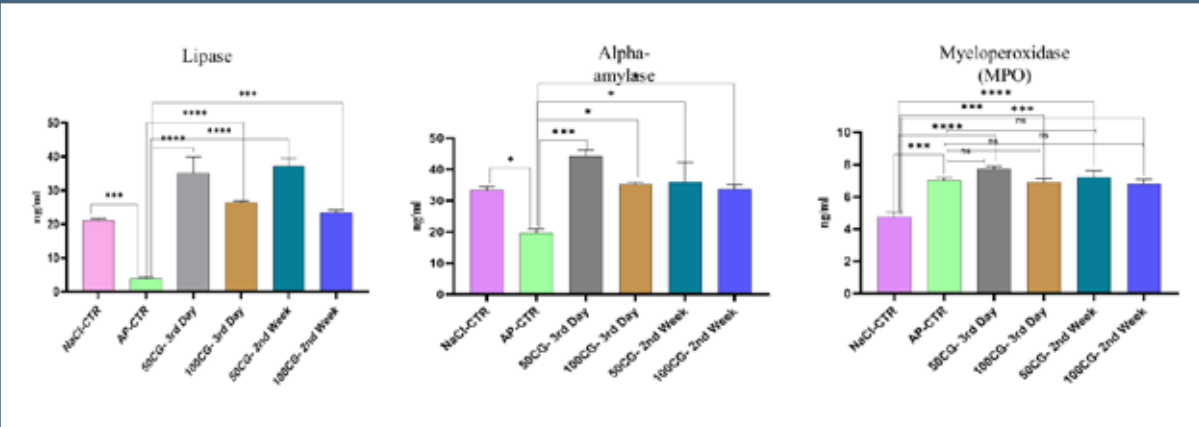
Neutrophil and lymphocyte counts showed significant alterations in acute pancreatitis controls compared to NaCl controls. Colostrum ghee feeding, especially at 100% for two weeks, improved leukocyte balance and platelet counts. RBC and MCH values also trended toward normalization in treated groups, indicating hematological recovery. Pancreas weight was significantly reduced in acute pancreatitis controls compared to NaCl controls (**Fig.2**). Feeding colostrum-derived ghee, especially at 100% for two weeks, helped restore pancreas and spleen weights toward normal. Other organs (liver, lungs, heart) showed minimal or non-significant changes across treatment groups. Further, serum enzyme levels (e.g., amylase, lipase) were significantly elevated in acute pancreatitis controls compared to NaCl controls (**Fig.3**). Feeding Ladakhi cow colostrum-derived ghee reduced these enzyme levels, with stronger effects at 100% and longer duration (2 weeks). Liver function markers (ALT, AST) showed partial normalization in treated groups, indicating systemic recovery. Overall, colostrum



C57BL/6 mice trial for acute pancreatitis.



Evlauatipn of organ weight across different group of treatments



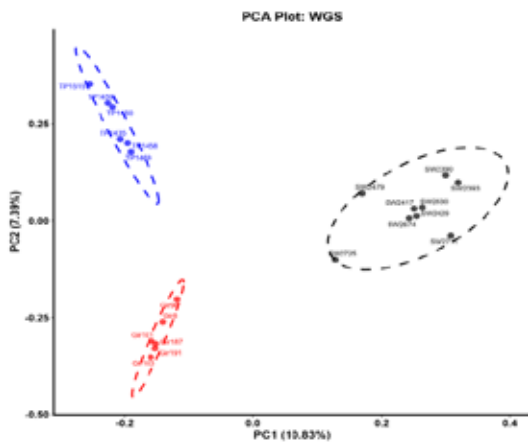
Analysis of biochemical activities in serum samples across different groups

ghee supplementation improved biochemical profiles, supporting its protective role against pancreatitis-induced damage.

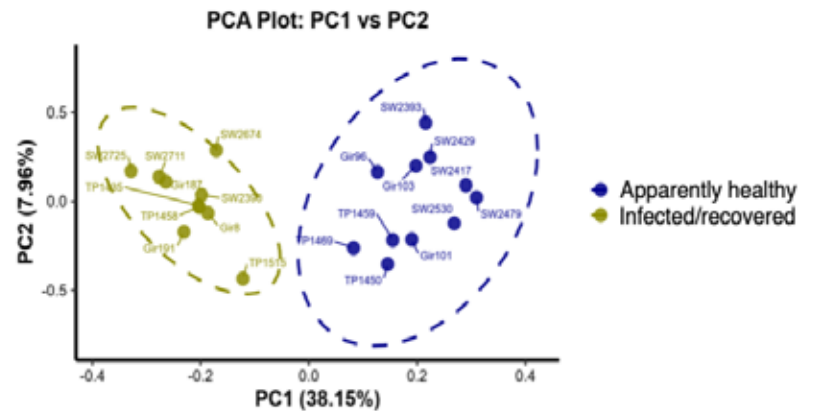
Under standing genetic basis of Identification of Lumpy skin disease infection in cattle

Lumpy Skin Disease (LSD) is an economically important viral disease affecting cattle worldwide, causing

significant production losses. An attempt was made to investigate the genetic basis underlying differential susceptibility to LSD using whole-genome sequencing (WGS) approach. Whole-genome data were generated for LSDV-infected and apparently healthy animals from three indigenous cattle breeds, i.e., Gir, Sahiwal, and Tharparkar, during a natural outbreak. Population structure analysis using Principal Component Analysis (PCA) and phylogenetic reconstruction revealed



Principal component analysis revealed three cattle breeds clustered into three distinct groups, demonstrating clear genetic differentiation among breeds



PCA of ML prioritised SNPs differentiating infected/recovered and apparently healthy animals irrespective of breeds

clear breed-wise clustering, confirming genetic distinctiveness among the studied populations.

A targeted analysis of immune-related genes was conducted to identify variants associated with disease resilience. SNP-prioritization using TRES enabled the identification of the top 4,765 candidate variants, which were distributed across 555 immune-related genes. Further, a Machine Learning-based SNP prioritization was performed that enabled the identification of top 1000 candidate variants distributed in 78 immune-related genes. Further, population genetic analyses integrating F_{ST} , integrated haplotype score (iHS), revealed 27 high-confidence SNPs per group showing strong and contrasting signatures of selection.

Further, Tajima's D analysis identified four candidate variants exhibiting signatures of recent positive selection in two key immune-related genes. Of these, three variants were detected in *IL20RA*, a gene involved in epithelial immune signaling, and showed evidence of positive selection in infected animals. In contrast, one variant was identified in *ARHGAP15*, a regulator of neutrophil activation and immune cell migration, and exhibited signatures of selection in apparently healthy (disease-resistant) animals. These findings suggest that distinct immune pathways may underlie differential susceptibility and resistance to disease. The identified genomic regions and candidate genes provide valuable resources for marker-assisted selection and precision breeding programs aimed at improving LSD resistance in indigenous cattle. Furthermore, the findings contribute to the sustainable management and valorisation of Animal Genetic Resources.

Prevalence and genetic diversity of *Anaplasma* spp. in Indian cattle

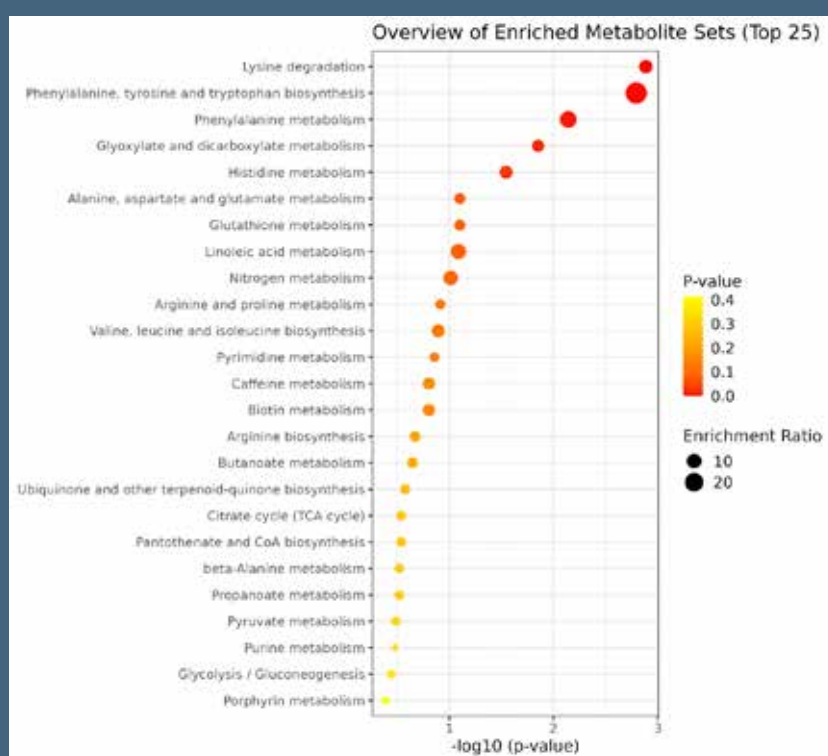
A nationwide molecular survey was conducted to determine the prevalence, species distribution, and genetic diversity of *Anaplasma* spp. in indigenous and exotic/crossbred cattle across diverse agro-climatic zones of India. Blood samples were collected from apparently healthy cattle across 23 states and 3 Union Territories, representing the Northern Temperate, North-western Arid and Semi-arid, Eastern, and Southern Peninsular agro-climatic zones. A total of 5,029 cattle from 26 states and Union Territories were screened for anaplasmosis. Species-specific PCR assays targeting the *MSP4* gene (*A. marginale*) and the *16S rRNA* gene (*A. bovis* and *A. platys*) were employed for pathogen detection and molecular characterization. The overall prevalence of *Anaplasma* infection was 41.1%, with crossbred cattle exhibiting significantly higher infection rates (45.1%) than indigenous breeds (37.3%). *A. marginale* was the predominant species (33.0%), detected in cattle from 25 states and Union Territories, with the highest prevalence recorded in Punjab (65.0%). *A. platys* had an overall prevalence of 12.1%, with the highest occurrence observed in Odisha (27.4%), Punjab (24.3%), and Kerala (23.0%). *A. bovis* was detected at a lower overall prevalence (4.3%) but exhibited a distinct geographical distribution, with the highest prevalence reported from Assam (23.5%). Genetic diversity analysis of *A. marginale* was performed using *MSP4* gene sequencing of 59 isolates from 21 states and two UTs (Delhi and Puducherry), alongside global reference sequences from 21 countries. The

analysis revealed 21 distinct strains circulating within India, indicating substantial genetic heterogeneity. Six strains were shared across multiple states, suggesting inter-state transmission likely facilitated by livestock movement, trade, communal grazing, and tick dispersal. Phylogenetic analysis grouped Indian isolates into three major clusters, showing affiliations with strains from diverse regions including South America, North America, Europe, Asia, and Australia. These findings highlight both the evolutionary complexity and transcontinental connectivity of *A. marginale*. Overall, the study demonstrates widespread distribution of *Anaplasma* spp. in Indian cattle, with higher prevalence in crossbred animals and substantial genetic diversity in *A. marginale*.

Composition and metabolomic profiles of sheep and goat milk

Milk and dairy products are integral to human nutrition, supplying both macronutrients and bioactive compounds. While bovine milk dominates global consumption, sheep and goats are increasingly valued for the distinct qualities of their milk. This study compared the proximate composition, amino acids, vitamins, minerals, fatty acids, and metabolomic signatures of Nali sheep and Beetal goat milk, two indigenous breeds maintained under identical feeding and management conditions. Proximate analysis

revealed significantly higher protein, fat, lactose, and ash in sheep milk, whereas goat milk contained higher moisture. Amino acid profiling revealed that isoleucine, phenylalanine, histidine, alanine, and aspartic acid were more abundant in goat milk, while sheep milk contained greater lysine and leucine. Vitamin and mineral analyses highlighted the superior nutritional richness of sheep milk, with consistently higher levels of B-complex vitamins, vitamin C, vitamin A, calcium, magnesium, zinc, and phosphorus. Fatty acid profiles were largely similar, though goat milk had elevated cis- and trans-linoleic acids. The values of atherogenic and thrombogenic indices, together with the concentration of hypercholesterolemic fatty acids, indicated that sheep milk possesses a comparatively healthier fatty acid profile. Untargeted metabolomics identified more than 2,400 metabolites, of which 231 were differentially expressed (Fold change >1.5, $p < 0.05$). Sheep milk was enriched in L-carnitine, choline, orotic acid, and citric acid, compounds associated with energy metabolism, neurodevelopment, and immune function, while goat milk showed higher levels of glutamine, oxoglutaric acid, citrulline, and N-acetylneuraminic acid, linked to gut health, cardiovascular support, and antioxidant activity. Collectively, these results demonstrate that while both milks offer valuable bioactive properties, sheep milk exhibits a relatively superior nutritional and metabolic profile, reinforcing its potential as a functional food of high nutritional relevance.



Metabolic pathways associated with upregulated metabolites in sheep, showing the highest levels of metabolite enrichment

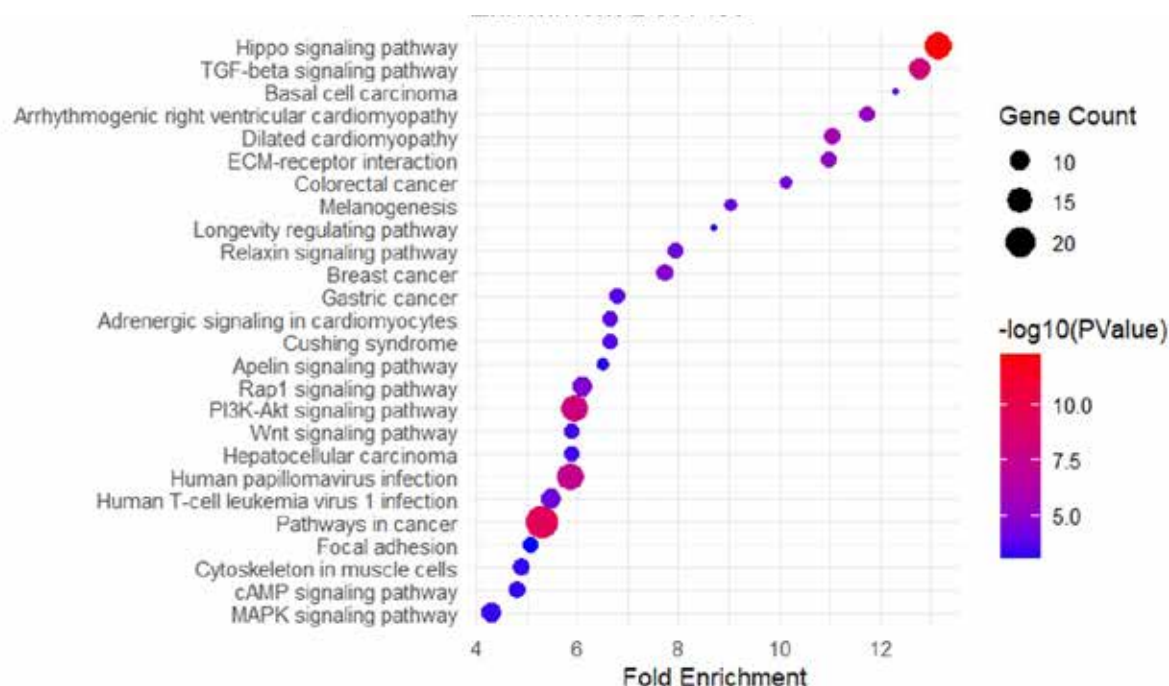
Multi-Omics for performance and adaptation traits in Indian sheep and goat

Multi-Omics insights into hypoxia adaptation in Changthangi goats and sheep: High altitude ecosystems impose a complex combination of environmental stressors, including chronic hypobaric hypoxia, low ambient temperatures, elevated ultraviolet radiation and increased oxidative stress. These conditions disrupt oxygen delivery, mitochondrial respiration, redox balance and cellular homeostasis, necessitating coordinated adaptive responses at genetic, molecular and physiological levels. The Changthangi goat, indigenous to the trans-Himalayan cold desert of Ladakh, thrives under these extreme conditions while sustaining economically valuable traits such as high quality pashmina fibre production. This unique phenotype makes the breed an ideal biological system for dissecting the genetic mechanisms underlying environmental resilience and hypoxia tolerance.

In silico impact assessment of missense mutations in key genes associated with hypoxic stress in Changthangi goats: At the most fundamental level, adaptation is driven by genetic variation that alters protein structure and function. To identify such variants, focus was on missense mutations in key hypoxia-associated genes namely *CXCL9*, *MRPL22* and *SDS*. These genes were selected based on their involvement in hypoxic signaling, oxidative stress responses and energy metabolism. Using comprehensive *in silico* tools, the physicochemical consequences of amino acid substitutions, including changes in protein stability, hydrophobicity, secondary structure and conserved functional domains were evaluated. Two missense variants (*CXCL9*-rs653275315 and *MRPL22*-rs654804090) were predicted to exert deleterious effects by destabilizing protein folding and disrupting evolutionarily conserved residues, whereas *SDS*-rs644425445 appeared functionally neutral. These results suggest that specific coding variants may influence hypoxia responsiveness by modulating protein efficiency under stress conditions. Detailed structural modeling revealed that deleterious variants were located within highly conserved domains critical

for protein-protein interactions and enzymatic stability. The *MRPL22* mutation alters hydrophobic interactions essential for mitochondrial ribosome integrity, potentially impairing mitochondrial protein synthesis and oxidative phosphorylation under hypoxia. Similarly, the *CXCL9* gene interacts with the receptor *CXCR3* leading to the activation of the PI3K/Akt signaling pathway, which regulates immune-mediated hypoxia responses, cell survival and apoptosis. Phylogenetic conservation analysis across mammalian species demonstrated strong evolutionary constraint at these variant sites, underscoring their functional importance. The persistence of such variants in high-altitude populations suggests a finely balanced tradeoff between structural stability and adaptive advantage in extreme environments.

Genomic signatures of selection in Changthangi and Jamunapari goats: While functional variants generate adaptive potential, evolutionary selection determines their retention and population-level significance. To examine how environmental pressures have shaped the Changthangi genome, a whole-genome comparative analysis was performed between high-altitude Changthangi goats and lowland Jamunapari goats. Complementary selection signature methods namely, Tajima's D, nucleotide diversity (π), composite likelihood ratio (CLR), integrated haplotype score (iHS), fixation index (FST) and cross-population extended haplotype homozygosity (XP-EHH) were employed to capture both recent and ancient selection events. This integrative approach identified candidate regions under selection, revealing a complex genomic landscape shaped by altitude-specific pressures. In Changthangi goats, genes under strong selection were enriched in pathways regulating keratinocyte differentiation, extracellular matrix organization, angiogenesis, metabolic reprogramming and hypoxia signaling. The key genes identified mainly *BMP2*, *SMAD3*, *WNT9B*, *COL1A2*, *ITGA4*, *ADCY4* and *RPS6KB1* reflect selection for fiber quality, tissue integrity and metabolic efficiency under low oxygen conditions. Network analysis further identified *FGF5*, *SMAD7* and *COL1A2* as hub genes, suggesting coordinated regulation of follicle development and stress adaptation. In contrast, Jamunapari goats exhibited selection on genes



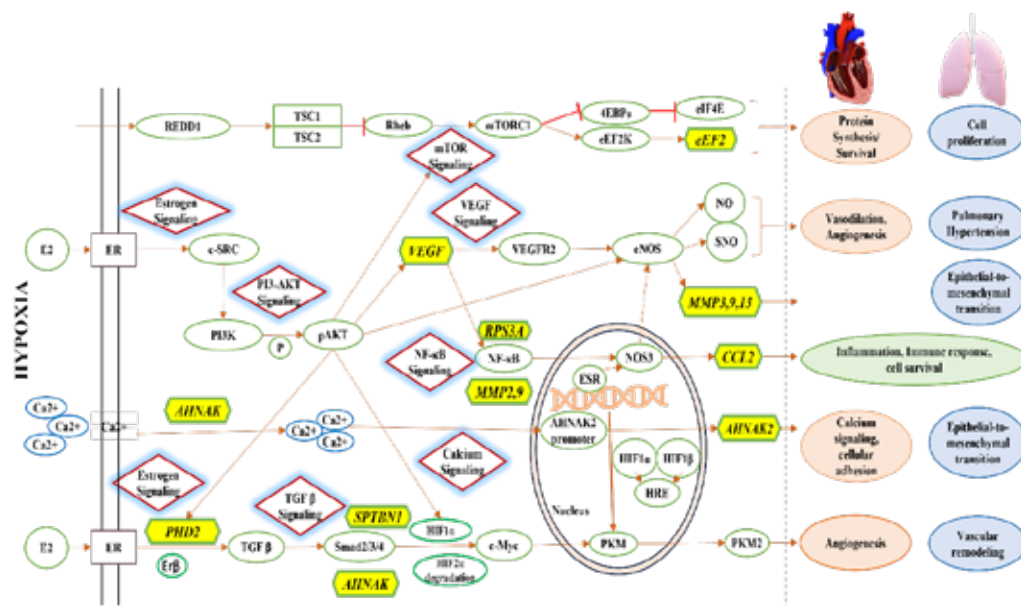
Significantly enriched KEGG pathways ($P < 0.05$) for fiber-associated genes in Changthangi goats

involved in growth, lactation, cellular proliferation and thermoregulation, highlighting divergent evolutionary strategies shaped by contrasting ecological niches. Pathway analyses revealed enrichment of signaling cascades such as Wnt, BMP/TGF- β , Hedgehog, Rap1, PI3K-Akt and ECM receptor interaction, which are central to cell fate determination, tissue remodeling and stress responsiveness. These pathways provide a mechanistic bridge between genomic selection and physiological outcomes, suggesting that adaptation is driven not by isolated genes but by coordinated regulatory networks. The identification of central hub genes indicates potential master regulators that integrate environmental signals and modulate downstream adaptive responses.

Dual cardiac and pulmonary tissue transcriptomics reveals insights into hypoxia resilience in Changthangi sheep: To determine how selected genomic regions translate into physiological function, transcriptomic profiles of the heart and lung, organs that are directly involved in oxygen sensing, transport and utilization were analysed. RNA sequencing revealed extensive transcriptional remodeling in both tissues, with 13,968 genes commonly expressed, indicating shared core hypoxia response mechanisms. Highly

expressed genes such as *AHNAK*, *SPTBN1*, *TPT1* and *YBX1* were associated with mitochondrial integrity, cytoskeletal stability, calcium signaling, estrogen mediated protection and PI3K-Akt signaling, all of which contribute to cellular survival under hypoxic stress. In addition, 184 heart specific and 760 lung specific genes were identified. Cardiac tissue exhibited enrichment of genes involved in calcium signaling, neuroactive ligand-receptor interaction and muscle differentiation, with *CCK*, *FGF5*, *FGF16* and *MYOD1* supporting ischemic tolerance and oxidative stress defense. Pulmonary tissue showed enrichment of estrogen signaling, neuroprotection, extracellular matrix remodeling and inflammatory regulation, mediated by *ACTB*, *NEUROD1* and members of the *CHRNA* and *MMP* gene families.

These findings support a multiscale model of high-altitude adaptation in Changthangi sheep. Functional coding variants provide the molecular substrate for adaptation, genome-wide selection shapes the retention of advantageous alleles, while tissue-specific transcriptional networks execute adaptive physiological responses. This integrative framework demonstrates how genetic variation, evolutionary pressure and regulatory complexity converge to produce hypoxia resilience.



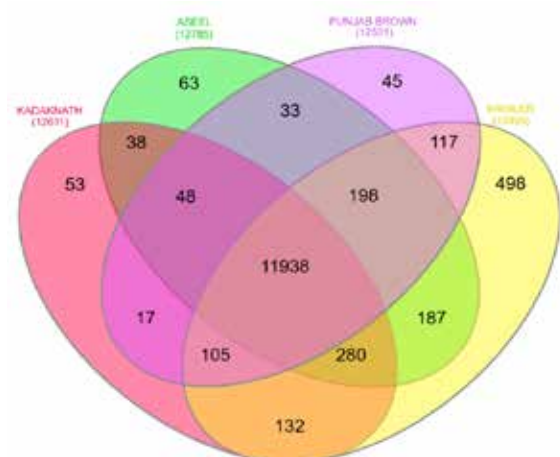
Dual-tissue pathway interaction diagram integrating the role of signaling pathways in heart and lung tissues of Changthangi sheep

Functional genomics for assessing performance traits in chicken

Hepatic transcriptomics in chicken: Shared functions and breed specific adaptations: The liver is a central metabolic organ in chickens, playing a pivotal role in lipid metabolism, energy homeostasis, immune regulation and systemic physiological balance. Given its critical functions, hepatic gene expression patterns provide valuable insights into both fundamental biological processes and breed-specific adaptations related to growth, stress tolerance, immunity and production traits. Chicken breeds differ widely in their genetic backgrounds and physiological characteristics, ranging from highly selected commercial broilers to indigenous breeds such as Kadaknath, Aseel and Punjab Brown, which are valued for their resilience, adaptability and unique meat qualities. Understanding both conserved and divergent hepatic transcriptomic signatures across these genetically diverse breeds is essential for deciphering the molecular basis of liver function and its contribution to phenotypic diversity in poultry.

Conserved hepatic gene expression across diverse breeds: To identify core molecular mechanisms underlying hepatic homeostasis, a comparative transcriptomic analysis of liver tissues from four genetically diverse chicken breeds-Kadaknath, Aseel, Punjab Brown and commercial Broiler was performed. RNA sequencing revealed 11,938 genes that were

commonly expressed across all breeds, reflecting a shared transcriptional framework essential for liver function. Among these, the top 100 most abundantly expressed genes were examined in detail. Functional enrichment analyses highlighted key metabolic pathways, including glycolysis and gluconeogenesis (*LDHA*, *ALDOB*, *FBP1*), fatty acid metabolism (*FASN*, *ELOVL5*, *ELOVL6*) and ferroptosis-related iron homeostasis (*TF*, *CP*, *SLC40A1*). The enrichment of coagulation-related genes (*FGA*, *FGB*, *FGG*, *SERPIND1*, *SERPINA10*) underscored the role of liver in hemostasis, while genes such as *APOB*, *APOH*, *ACO1* and *SCP2* were associated with lipid transport and adipogenesis. The immune-related genes (*HRG*, *AHSG*, *KNG1*) were consistently expressed across breeds. Network analysis identified *AHSG*, *FGB*, *SERPIND1* and *SPIA1* as central regulatory hubs, indicating a tightly



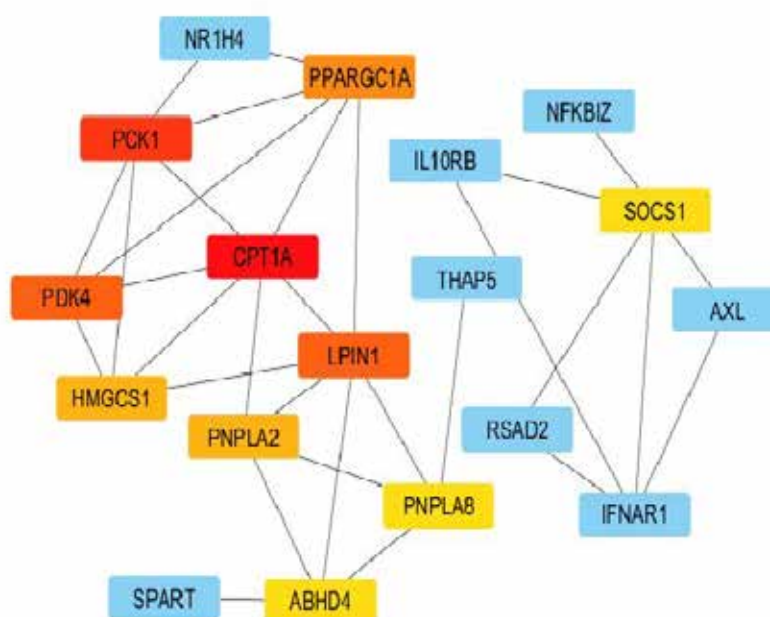
Venn diagram illustrating shared and breed-specific hepatic gene expression patterns across the four chicken breeds

coordinated and evolutionarily conserved hepatic regulatory network shared across chicken populations.

Gene expression diversity in liver across indigenous chicken breeds: While a conserved transcriptional core maintains essential liver functions, indigenous chicken breeds exhibit notable variation in hepatic gene expression reflecting breed-specific metabolic and physiological adaptations. To explore this diversity, hepatic transcriptomes from Aseel, Kadaknath and Punjab Brown chickens were compared. Distinct expression patterns were observed across breeds, with APOV1 and VTG2 showing higher expression in Aseel, suggesting enhanced lipid transport and reproductive investment. In Kadaknath, elevated expression of SPIA3, HMGCS1, and HSP90B1 pointed toward adaptations related to lipid metabolism, stress tolerance and cellular protection. Punjab Brown chickens exhibited higher expression of DIO2 and EPAS1, genes involved in thyroid hormone regulation and hypoxia response, indicating metabolic and environmental adaptability. These expression differences highlight how indigenous breeds have adapted hepatic metabolic pathways in response to distinct ecological niches, selection pressures and production purposes.

Comparative liver transcriptomics of Kadaknath and Aseel chickens: To further dissect the molecular basis of breed-specific traits, a focused comparative

transcriptomic analysis was conducted between Kadaknath and Aseel, two indigenous breeds with contrasting phenotypes. Kadaknath is renowned for its black, lean, iron-rich meat with high protein and antioxidant content, whereas Aseel is characterized by muscular build, endurance and exceptional stress tolerance. RNAseq analysis identified 435 differentially expressed genes (DEGs) associated with lipid metabolism, oxidative phosphorylation, mitochondrial function and stress response. In Kadaknath, upregulation of genes such as *CPT1A*, *PCK1*, *TXNRD3* and *PPARGC1A* suggested enhanced fatty acid oxidation, efficient energy utilization and strong antioxidant defense, likely contributing to its lean and nutrient-dense meat profile. Conversely, Aseel chickens showed higher expression of stress-responsive ribosomal genes (*MRPL18*, *RPL11*) and mitochondrial genes (*NDUFA1*, *NDUFA8*, *NDUFB9*, *PTPMT1*), supporting elevated energy demands and resilience under physical stress. Gene co-expression network analysis further identified key hub genes regulating these breed-specific metabolic strategies. These results suggest a conserved transcriptional core ensuring fundamental liver functions across genetically diverse breeds, while superimposed layers of breed-specific gene regulation drive metabolic specialization and phenotypic diversity.



Interaction networks of DEG in Kadaknath chicken

Molecular divergence in skin tissue of Broiler and Naked Neck chickens:

The skin is a key organ contributing to structural support, feather anchorage and physiological adaptation in poultry. Understanding breed-specific skin biology provides foundational insights for improving poultry production under changing environmental conditions. A comparative transcriptomic analysis of skin tissue from Broiler (BR) and Naked Neck (NN) chickens was conducted to investigate molecular differences associated with skin traits. Differential expression analysis identified approximately 600 genes showing significant expression differences, including 182 genes upregulated in BR and 418 in NN, indicating distinct functional specializations of the skin in the two chicken types. BR-upregulated genes were predominantly associated with developmental patterning and extracellular matrix organization, driven by key regulators including HOX gene clusters, morphogenetic factors and structural matrix components. These pathways likely support tissue integrity, coordinated epidermal dermal organization feather anchorage and structural robustness, consistent with the stable skin architecture required for intensive commercial production systems. In contrast, NN-upregulated genes were enriched for muscle contraction, sarcomere assembly, calcium-dependent signaling and membrane excitability, reflecting a transcriptional landscape optimized for dynamic skin responsiveness. Key myogenic regulators (*MYOD1*, *MYOG*, *MYF5*, and *MYF6*), contractile proteins (*ACTN2* and *TNNT2*) and calcium-handling genes underpin an integrated muscle cytoskeletal network that may enhance thermoregulatory efficiency, vascular modulation and environmental adaptability in Naked Neck chickens. A clear molecular divergence in skin biology between BR and NN chickens was observed, wherein BR skin emphasizes developmental organization and structural reinforcement, while NN skin exhibits physiological features that may enhance environment adaptability. These findings provide baseline molecular insights into



GgaMusTransDb database

the transcriptional pathways that represent potential molecular targets for climate-resilient poultry breeding and sustainable production strategies.

Development of chicken muscle transcriptome database -GgaMusTransDb:

The *Gallus gallus* Muscle Transcriptome Database (GgaMusTransDb) is a comprehensive and curated bioinformatics resource designed to facilitate in-depth exploration of muscle-related transcriptomic landscapes in chicken. This database consolidates high-throughput transcriptomic data generated from muscle tissues of five genetically and phenotypically diverse chicken breeds, namely Ankaleshwar, Aseel, Kadaknath, Nicobari, and Punjab Brown. These breeds represent a wide range of indigenous and improved poultry germplasm, making the database valuable for both basic and applied research. GgaMusTransDb provides detailed insights into gene expression profiles associated with muscle growth, development, and physiology. By integrating RNA sequencing (RNA-seq) datasets, the database enables comparative analysis of transcript abundance across different chicken breeds, thereby aiding in the identification of breed-specific and conserved muscle-related genes. Such analyses are critical for understanding the genetic basis of muscle development, meat quality traits, and adaptive responses to environmental conditions.



**ICAR-NBAGR
Annual Report
2025**

Research Projects



Division & Group Wise Research Project

LIST OF RESEARCH PROJECTS (April, 2024 to March, 2025)

S. No.	Project Type	Project	Workers	Duration	Status
Animal Genetic Resources Division					
1	<i>Institute funded (7.86)</i>	Computational judgement of livestock population uniformity on the basis of photographs.	Avnish Kumar and Dinesh Kumar Yadav, Indu Devi (ICAR-NDRI)	April, 2022 to March, 2025	Completed
2	<i>Institute funded (8.0)</i>	Network Project on Animal Genetic Resources.	Director (Co-ordinator), AK Mishra (I/c NwP)	January 1996 cont.	Ongoing
3	<i>Externally funded (9.39)</i>	Advanced Research Project on Canine (ARPC).	Raja KN , AK Mishra, Reena Arora and Indrajit Ganguly	November 2024 to March, 2026	Ongoing
4	<i>Externally funded (9.29)</i>	CRP on agro-biodiversity conservation of Animal Genetic Resources (CRP on AB).	Rekha Sharma , Reena Arora and Sonika Ahlawat	June, 2015 to March, 2026	Ongoing
5	<i>Externally funded (9.38)</i>	National Bovine Genomic Centre-Indigenous Breeds (NBGC-IB).	RK Pundir and Amod Kumar, RK Gandham w.e.f. 19.02.2025 (BRIC-NIAB)	September 2018 to March, 2026	Ongoing
6	<i>Institute funded (7.93)</i>	Stray Cattle in India: Exploring societal challenges, genetic resource implications, and sustainable policy responses (Inter-Institutional).	Dinesh Kumar Yadav , SK Niranjana, NH Mohan, Anil Kumar and Khem Chand (ICAR-NIAP)	July, 2025 to March, 2028	New
7	<i>Institute funded (7.94)</i>	Phenotypic measurement of animal population using computer vision techniques.	Avnish Kumar , Dinesh Kumar Yadav and Monika Saini	April, 2025 to March, 2027	New
8	<i>Institute funded (7.92)</i>	Development of protocols for conservation of Buffalo Genetic Resources via Somatic Cell Nuclear Transfer (SCNT) and embryo vitrification.	Monika Saini , Rekha Sharma, Raja KN and Co-PIs from ICAR-NDRI or ICAR-CIRB	August 2025 to July, 2027	New
Animal Genetics Division					
1	<i>Institute funded (Service project-7.78)</i>	Evaluation of genetic diversity in conserved cattle and buffalo bulls.	Amod Kumar	April, 2020 cont.	Completed
2	<i>Institute funded (Service project-7.67)</i>	Karyotyping and DNA Testing for Screening Genetic Defects in Indian Bovines.	SK Niranjana , Amod Kumar and Monika Sodhi	April, 2016 to March, 2026	Ongoing
3	<i>Institute funded (7.85)</i>	Admixture Mapping of Cattle in Eastern and Western India.	SP Dixit , Indrajit Ganguly, Sanjeev Singh, Avnish Kumar Bhatia, SK Niranjana, Rahul Behl, Amod Kumar	August, 2021 to March, 2026	Ongoing
4	<i>Institute funded (7.88)</i>	Development of a panel of genome-wide ancestry informative markers in Indian horse and pony Breeds.	Indrajit Ganguly , Sanjeev Singh, SP Dixit, SK Niranjana, Amod Kumar, Rahul Behl, Sonika Ahlawat, RK Pundir and, KK Kanka (ICAR-IIAB), SC Mehta, Anuradha Bhardwaj and TK Bhattacharya (ICAR-NRCE)	Oct., 2023 to March, 2027	Ongoing
5	<i>Institute funded (7.90)</i>	Characterization of genes/loci associated with endurance ability in Indian horses.	Rahul Behl , Indrajit Ganguly, SK Niranjana and Amod Kumar	July, 2024 to March, 2026	Ongoing
6	<i>Institute funded (7.91)</i>	Development of reference panel and admixture analysis of buffalo genetic resources of India.	Amod Kumar , RK Pundir, SP Dixit, Sanjeev Singh, Indrajit Ganguly and Rahul Behl	April, 2024 to March, 2027	Ongoing
Animal Biotechnology Division					
1	<i>Institute funded (7.89)</i>	Unravelling breed signatures behind variability susceptibility to Lumpy skin disease.	Ravi Kumar Gandham (BRIC-NIAB), M Mukesh, B Mishra, Amod Kumar and BP Mishra and Vikas Vohra (ICAR-NDRI)	July, 2023 to March, 2025	Completed

S. No.	Project Type	Project	Workers	Duration	Status
2	<i>Externally funded-DBT (9.32)</i>	Exploring Molecular basis of seasonal variation of seminal attributes and identification of potential biomarkers for selection of Buffalo bulls with quality semen.	RS Kataria , Pawan Singh (ICAR-NDRI), Pardeep Kumar (ICAR-CIRB), Manishi Mukesh and MS Dige	Sept., 2020 to Sept., 2024	Completed
3	<i>Externally funded DST-ASACODER (9.33)</i>	Characterizing Milk Colostrum of Ladakhi Cows and Yak for Identification of Biomolecules with Therapeutic Potential.	Manishi Mukesh , Monika Sodhi, RS Kataria and SK Niranjana and A Mohanty (ICAR-NDRI), Manish Sharma (DRDO-DIPAS), Md. Zahid Ashraf (Jamia Millia Islamia), Sathees (Rd IISc Bangalore), and Vijay Bharti (DRDO-DIHAR, Leh).	January, 2021 to Dec. 2024	Completed
4	<i>Externally funded (9.30)</i>	Comparative genomics of ruminant livestock species of India (CRP Genomics-Animal Component).	Reena Arora and Sonika Ahlawat	2020 to 2026 (month)	Ongoing
5	<i>Externally funded (CABIN-9.31)</i>	Comparative genome analysis of Indian chicken breeds.	Reena Arora , Rekha Sharma, Sonika Ahlawat, SB Lal (CCPI), DC Mishra, Md. Samir Farooqi and Sudhir Srivastava (ICAR-IASRI)	October, 2020 to March, 2026	Ongoing
6	<i>Externally funded -9.34 (IAEA Research Contract No. 24756)</i>	Delineating Genomic Diversity, Population Structure and Demographic Dynamics in Diverse Native Buffalo Breeds of India (Coordinated Research Project).	Monika Sodhi , RS Kataria Manishi Mukesh and BP Mishra (upto January, 2025)	Nov., 2022 to Oct., 2027	Ongoing
7	<i>Externally funded-UDBT (9.37)</i>	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	April, 2023 to March, 2026	Ongoing
8	<i>Externally funded-ILRI (9.40)</i>	Pangenome Analysis and Identification of Selection Signatures for Conservation of Red Jungle Fowl.	Simmi Tomar, AK Tiwari, Jaydep Rokade (ICAR-CARI), Ravi Kumar Gandham (BRIC-NIAB) and Akhilesh Mishra (Pench Tiger Reserve)	April, 2023 to March, 2026	Ongoing
9	<i>Externally funded-NASF (9.35)</i>	Deciphering the genetic basis of lower susceptibility of indigenous cattle to bovine anaplasmosis.	Sonika Ahlawat , Reena Arora, Rekha Sharma, Anish Yadav and Rajesh Godhara (SKUAST),	August, 2024 to March, 2027	Ongoing
10	<i>Externally funded-NLM (9.36)</i>	Comparison of milk compositional and transcriptomic landscape of major and minor dairy species of India.	Sonika Ahlawat , Reena Arora, Rekha Sharma, Raja KN and Vivek Sharma (ICAR-NDRI)	April, 2024 to March, 2027	Ongoing
11	<i>Institute funded (13.4)</i>	Exploring Epigenetic and transcriptomic signatures in native and non-native bovines of Ladakh for adaptation to high altitude (Inter-Institutional).	Manishi Mukesh , RK Gandham (BRIC-NIAB), Monika Sodhi, MS Dige, SK Niranjana, Bina Mishra, RS Kataria, Manish Sharma (Sci.-E, DRDO-DIPAS, New Delhi), and Vijay Bharti (Sci.-E, DRDO-DIHAR, Leh)	3 Years	New
12	<i>Institute funded (7.95)</i>	Characterization of meat traits in indigenous pig using multi-omics approach.	Karan Veer Singh , Sonika Ahlawat, MS Dige, ICAR-NRC Meat, ICAR-NRC Pig and BAU, Ranchi (Proposed collaborator)	3 Years	New
13	<i>Institute funded (7.96)</i>	Establishing genome assembly of Jamunapari goat and/or pangenome analysis.	Ravi Kumar Gandham (BRIC-NIAB) , Manishi Mukesh, Bina Mishra, Indrajit Ganguly and NH Mohan	2 Years	New

Functional Group-I project

1	<i>Institute funded (UP/2021)</i>	Identification and Characterization of Indigenous AnGR of Uttar Pradesh.	AK Mishra , RS Gandhi (upto 30.04.2022) Reena Arora, Avnish Kumar, Amod Kumar, PS Dangi and Avneesh Kumar (DUVASU)	August, 2021 to March, 2026	Completed
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S. No.	Project Type	Project	Workers	Duration	Status
2	<i>Institute funded (UK/2023)</i>	Identification and Characterization of Indigenous AnGR of Uttarakhand.	Amod Kumar , AK Mishra, Reena Arora, Avnish Kumar and BN Shahi (Prof. at GBPUAT, Pantnagar)	July, 2023 to March, 2027	<i>Ongoing</i>

Functional Group-II project

1	<i>Institute funded (TN & KL/2021)</i>	Survey and Documentation of Indigenous AnGR of Tamil Nadu & Kerala	Raja KN , RK Pundir and Sonika Ahlawat	August, 2021 to March, 2026	<i>Ongoing</i>
2	<i>Institute funded (AP & TG/2023)</i>	Survey and documentation of Indigenous AnGR of Andhra Pradesh and Telangana.	Sonika Ahlawat , RK Pundir, Raja KN and R Vinoo (SVVU, Tirupati)	July, 2023 to March, 2026	<i>Ongoing</i>

Functional Group-IV project

	<i>Institute funded (MH/GJ/GA/HP/2021)</i>	Identification of Indigenous Animal Genetic Resources of Maharashtra, Gujarat, Goa and Himachal Pradesh.	Sanjeev Singh , Indrajit Ganguly, SP Dixit and SV Kuralkar (PGIVAS, Akola)	August, 2021 to July, 2027	<i>Ongoing</i>
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Functional Group-V project

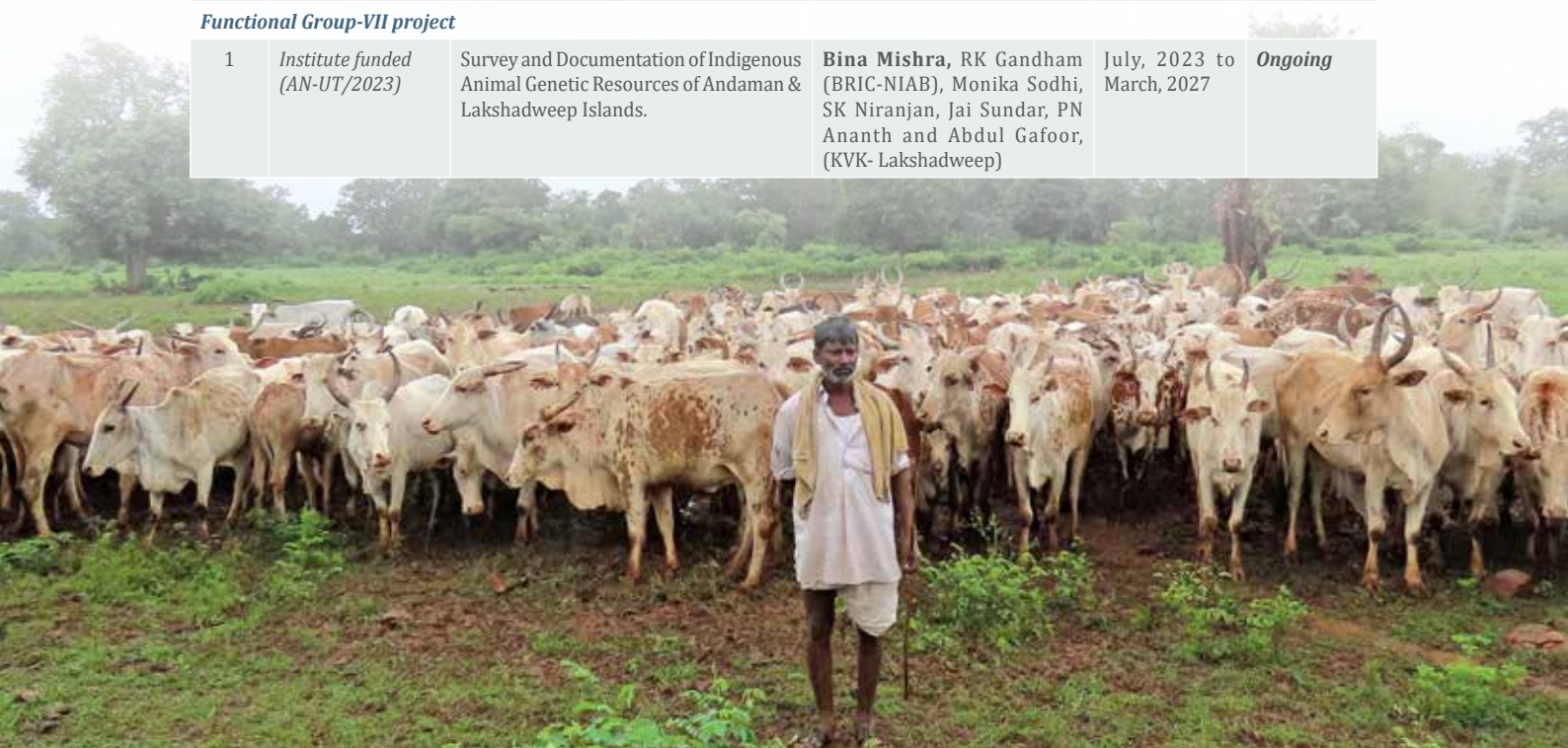
1	<i>Institute funded (MP/2021)</i>	Survey and documentation of native AnGR of Madhya Pradesh state.	SK Niranjana , DK Yadav, Monika Sodhi, RS Kataria, Bina Mishra (from Jan., 2023) and Ajay Ramtaka (DAH, MP)	August, 2021 to March, 2027	<i>Ongoing</i>
2	<i>Institute funded (RAJ/2021)</i>	Identification, characterization, documentation and registration of non-descript animal and poultry genetic resources of Rajasthan.	DK Yadav , RS Kataria, SK Niranjana, Monika Sodhi, Bina Mishra (from Jan., 2023) and Sandeep Saraswat (DHD Rajasthan)	August, 2021 to March, 2026	<i>Ongoing</i>
3	<i>Institute funded (CG/2021)</i>	Characterization and documentation of farm animal genetic resources of Chhattisgarh state.	Monika Sodhi , RS Kataria, SK Niranjana and DK Yadav, Bina Mishra, Asit Jain Kishore Mukharjee (CGKV, Durg) and Rohini Pathak (DVS, Chhattisgarh)	August, 2021 to March, 2027	<i>Ongoing</i>

Functional Group-VI project

1	<i>Institute funded (LA-UT/2021)</i>	Cataloguing and characterization of native non-descript Animal Genetic Resources of Ladakh (UT).	Karan Veer Singh , M Mukesh, R Behl, MS Dige and Feroz Din Sheik (KVK, SKUAST-Leh, Nodal Officer AHD, Ladakh)	August, 2021 to March, 2026	<i>Ongoing</i>
2	<i>Institute funded (WB/2025)</i>	Identification and Characterization of Indigenous Animal Genetic Resources of West Bengal.	MS Dige , Manishi Mukesh Karan Veer Singh and Rahul Behl	August, 2025 to July, 2028	<i>New</i>

Functional Group-VII project

1	<i>Institute funded (AN-UT/2023)</i>	Survey and Documentation of Indigenous Animal Genetic Resources of Andaman & Lakshadweep Islands.	Bina Mishra , RK Gandham (BRIC-NIAB), Monika Sodhi, SK Niranjana, Jai Sundar, PN Ananth and Abdul Gafoor, (KVK- Lakshadweep)	July, 2023 to March, 2027	<i>Ongoing</i>
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**ICAR-NBAGR
Annual Report
2025**

Publications



Publication: Research papers

International

S. No.	Title	Authors	Journal	Volume/Issue	NAAS IF
1	Genome wide locus-specific ancestry analysis revealed adaptive admixtures in crossbred cattle of India	Goli RC, Chishi KG, Mahar K, Ganguly I, Singh S, Dixit SP, Sruthi OS, Choudhary S, Diwakar V, Rath P, Chinnareddyvari CS, Dige M, Metta M, Kumar A, Aderao GN, Sukhija N and Kanaka KK	Scientific Reports	15(1):17069, doi: 10.1038/s41598-025-01971-7	9.80
2	RASEL: An Ensemble Model for Selection of Core SNPs and Its Application for Identification and Classification of Cattle Breeds	Kanaka KK, Ganguly I, Singh S, Kuralkar SV, Dixit S, Sukhija N and Goli RC	Biochemical Genetics	doi: 10.21203/rs.3.rs-6048799/v1	8.10
3	Comparative insights into X-chromosome and autosomal autozygosity in zebu cattle	Mehla K, Goli RC, Kar D, Ganguly I, Singh S and Dixit SP	The Nucleus	doi: 10.1007/s13237-025-00586-7	8.10
4	Mitogenome diversity and evolution of <i>Bos indicus</i> cattle in India	Sarath Kumar T, Singh S, Ganguly I and Dixit SP	Gene	936:149096, doi:10.1016/j.gene.2024.149096	8.60
5	Utilitarian Selection signatures Co-localized with Copy Number Variation Regions in Indian Goat Breeds revealed through Whole Genome Re-Sequencing	Sukhija N, Ganguly I, Kanaka K, Dixit SP, Singh S, Bhatia A, Goli RC and Rath P	Genome	doi: 10.1139/gen-2025-0029	8.30
6	Genome wide copy number diversity in Indian goat breeds scaled to world-wide breeds	Sukhija N, Ganguly I, Kanaka KK, Dixit SP, Singh S, Bhatia A, Goli RC and Rath P	Small Ruminant Research	249:107525, doi: 10.1016/j.smallrumres.2025.107525	7.60
7	Cataloging copy number variation regions and allied diversity in goat breeds spanning pan India	Sukhija N, Kanaka KK, Ganguly I, Dixit SP, Singh S, Goli RC, Rath P, Nandini PB and Koloi S	Mammalian Genome	36(2):523-540, doi: 10.1007/s00335-025-10122-2	-
8	Comparative genome analysis of international transboundary cattle breeds	Yadav A, Singh S, Dharamshaw CA, Ganguly I, Chinnareddyvari CS and Dixit SP	Gene	960(12):149515, doi:10.1016/j.gene.2025.149515	8.60
9	Genetic signatures of meat type Kanniadu goat: A genome-wide exploration	Yadav R, Vanzampuii ZST, Dixit S, Singh S, Bhatia AK, Iram D and Ganguly I	Small Ruminant Research	251:107564, doi:10.1016/j.smallrumres.2025.107564	7.60
10	Chicken pulmonary micro RNAs targeting the PB2 (segment 1) of avian influenza virus	Choudhary A, Nidhishree NS, Pundir RK, Asaf MVN, Mishra A, Raut AA, Agarwal M and Kumar A	Animal Research and One Health	00:1-14, doi:10.1002/aro2.70034	-
11	Dissecting genomes of multiple yak populations: unveiling ancestry and high-altitude adaptation through whole-genome re-sequencing analysis	Ahmad SF, Gangwar M, Kumar A, Kumar A, Dige MS, Jha GK, Gaur GK and Dutt T	BMC Genomics	26 (1):214, doi:10.1186/s12864-025-11387-2	9.50
12	Development and validation of a high-density SNP chip tailored for genomic analysis in Indian backyard chickens.	Vijh RK, Arora R, Sharma U, Raheja M, Kapoor P, Ahlawat S and Sharma R	British Poultry Science	66(6):1-9, doi:10.1080/00071668.2025.2500343	7.60
13	Genomic insights into milk production, growth and adaptation traits in Jamunapari goats through whole-genome re-sequencing	Parsad R, Ahlawat S, Chhabra P, Sharma U, Arora R, Sharma R, Gera R and Bagiyal M	Small Ruminant Research	252:107600, doi:10.1016/j.smallrumres.2025.107600	7.60
14	Genome-wide selective sweep analysis in high-altitude Changthangi goats reveals candidate genes for pashmina fiber production.	Parsad R, Ahlawat S, Vasu M, Chhabra P, Sharma U, Arora R and Sharma R	Mammalian Genome	36(4):1098-1111, doi:10.1007/s00335-025-10155-7	-

S. No.	Title	Authors	Journal	Volume/Issue	NAAS IF
15	Comparative liver transcriptomics of Kadaknath and Aseel chickens reveals molecular basis of their unique nutritional and metabolic traits	Bagiyal M, Ahlawat S, Chhabra P, Sharma U, Arora R, Sharma R, Khatak S, Parsad R and Gera R	British Poultry Science	doi:10.1080/00071668.2025.2562145	7.60
16	Identification and validation of stable reference genes for quantitative PCR in small ruminants under high-altitude hypoxic and tropical conditions.	Vasu M, Ahlawat S, Arora R, Sharma R, Mohan NH, Mir MA and Singh MK	Small Ruminant Research	253:107651, doi:10.1016/j.smallrumres.2025.107651	7.60
17	Development and validation of high-density SNP array for genomic studies in Indian yak populations.	Kumar A, Dige M, Arora R, Niranjana SK, Ahlawat S, Sharma R, Kour A, Ahmad SF, Raja KN, Singh KV, Sharma U, Raheja M, Garsa AK, Dureja V, Maggon M, Yadav S, Popli K and Vijh RK	BMC Genome Data	27(1), doi:10.1186/s12863-026-01404-y	-
18	Molecular signatures of Capripox virus: In-silico RFLP as a diagnostic differentiator	Barkathullah N, Sonowal J, Patel CL, Kumar KR and Mishra B	International Journal of Advanced Biochemistry Research	9(7S):84-86, doi:10.33545/26174693.2025.v9.i7Sb.4745	5.29
19	Characterization of metabolite profiles in milk derived exosomes from indicus, crossbred and taurine cows by proton nuclear magnetic resonance analysis.	Garg V, Mukesh M, Kumar U, Kumar D, Mahajan R, Kataria RS, Kumari P and Sodhi M	Food Chemistry	473:143015, doi:10.1016/j.foodchem.2025.143015	14.50
20	Biochemical Profiles of High Fat Diet Mice Model with Feeding of Cow Milk representing different beta casein genotypes with reference of A1/A2 allele.	Preeti, Mukesh M, Singh P, Dubey SK, Bhakri G, Kumar A, Chaudhary V, Kataria RS, Niranjana SK, Mohanty AK and Sodhi M	Ecology, Environment & Conservation	31(1):118-125, doi:10.53550/EEC.2025.v31i01.022	5.05
21	Characterization and genetic diversity analysis of lesser-known goat population of northern hills of Chhattisgarh	Bhagat, Vandana, Bhonsle D, Sodhi M, Mukherjee K, Kataria RS, Santra AK, Gendley MK and Khune VN	Scientific Reports	15:45761, doi:10.1038/s41598-025-28568-4	9.80
22	Kangayam and Tharparkar cattle exhibit higher duplications in innate immune genes compared to Sahiwal, Gir, Karan Fries, and Holstein Friesian: insights from an array comparative genomic hybridization	Roshan, Mayank, Vats A, Bajwa KK, Sharma S, Thambiraja M, Sodhi M, Singh D, Yennamalli RM and Onteru SK	Mammalian Genome	36(3):812-826, doi:10.1007/s00335-025-10136-w	-
23	Hypoxia-Inducible Factor genes: Molecular architecture and regulatory dynamics of Hypoxia-Inducible Factors in livestock: A narrative review	Parsad R, Bagiyal M, Malhotra S, Arora R and Sonika A	International Journal of Biological Macromolecules	12:149673, doi:10.1016/j.ijbiomac.2025.149673	13.70
24	Comparative RNA-seq profiling of hepatic transcriptomes in Kadaknath and commercial broiler chickens at distinct growth stages	Bagiyal M, Ahlawat S, Arora R, Sharma R, Khatak S, Chhabra P, Sharma U, Parsad R and Gera R	Gene Reports	43:102473, doi:10.1016/j.genrep.2026.102473	-
25	From heritage to high-tech: Genomics for Indian chicken breeds	Arora R, Ahlawat S and Sharma R		Document No.148/2025 ISBN 9789383537914	-
26	Characterizing metabolome signature of colostrum, transition and mature milk of indigenous cows (<i>Bos indicus</i>) adapted to high altitude environment of Leh-Ladakh	Amarjeet, Kumar U, Sodhi M, Kumar D, Vivek P, Niranjana SK, Kataria RS, Kumar S and Mukesh M	Food Chemistry	464:141767, doi:10.1016/j.foodchem.2024.141767	14.50
27	Deciphering genomic basis of unique adaptation of Ladakhi cattle to Trans-Himalayan high-altitude region of Leh-Ladakh in India	Tiwari M, Sodhi M, Chanda D, Kataria RS, Niranjana SK, Singh I, Bharti VK and Mukesh M	Gene	942:149251, doi:10.1016/j.gene.2025.149251	8.60

S. No.	Title	Authors	Journal	Volume/Issue	NAAS IF
28	Exploring the genetic footprints of high altitude adapted humans and livestock	Tiwari M, Gujar G, Ponsuksili S, Shashank CG, Sharma S, Sodhi M and Mukesh M	Mammalian Genome	36(4):1005-1028, doi:10.1007/s00335-025-10161-9	2.7
29	Omics approaches to understand impact of heat stress on semen quality and fertility in bovines	Chitkara, Meenakshi, Gurao A, Kaur H, Dige MS, Sodhi M, Mukesh M and Kataria RS	Reproduction Science	274:107786, doi:10.1016/j.anireprosci.2025.107786	8.20
30	Serum Biochemical and Gene Expression Changes in the Spermatozoa of Buffalo Bulls Under Heat Stress	Vasisth R, Karpenahalli Ranganatha Sriranga, Chitkara M, Gurao A, Singh LP, Dige MS, Sodhi M, Mukesh M and Kataria RS	Biochemical Genetics	64(2):2020-2047, doi:10.1007/s10528-025-11122-2	8.10

National

S. No.	Title	Authors	Journal	Volume/Issue	NAAS IF
1	Phenotypic characterization of Nagavali sheep of Andhra Pradesh and husbandry practices adopted by farmers	Mishra AK, Raja KN, Vinoo R, Narayan Rao G and Sagar G	Indian Journal of Small Ruminants	31(1):16-19, doi:10.5958/0973-9718.2025.00021.4	5.11
2	High Altitude Adaptation in Livestock and Poultry: Exploring Morphological, Physiological, Biochemical and Omic Insights: A Review	Gera R, Mishra AK, Arora R, Parsad R, Bagiyal M, Chhabra P, Sharma U, Ahlawat S, Sharma R and Kumar R	Indian Journal of Animal Research	59(3):357-364, doi:10.18805/IJAR.B-5416	6.40
3	Indigenous Livestock Wealth of Uttar Pradesh and Uttarakhand States of India - Status and Prospects for Characterization	Kumar A, Mishra AK, Kumar A and Shahi BN	Journal of Livestock Biodiversity	14(1):13-19.	-
4	Phenotypic Mapping of Animal Genetic Resources in Dehradun District of Uttarakhand	Kumar A, Mishra AK, Arora R, Kumar A, Singh AK and Shahi BN	Journal of Livestock Biodiversity	14(1):46-48, Article URL: https://epubs.icar.org.in/index.php/JLB/article/view/170904	-
5	Characterization of the Indigenous Kow Bakar Black Goat of Uttarakhand	Shahi BN, Kumar D, Kumar S, Mishra AK and Kumar A	Journal of Livestock Biodiversity	14(1):49-52, Article URL: https://epubs.icar.org.in/index.php/JLB/article/view/170389	-
6	Kow Debar: An Indigenous Black Sheep Population from the Hills of Uttarakhand	Shahi BN, Kumar D, Kumar S, Mishra AK and Kumar A	Journal of Livestock Biodiversity	14(1):80-83, Article URL: https://epubs.icar.org.in/index.php/JLB/article/view/169096	-
7	Phenotypic Characterization of Syiar Markasa: An indigenous chicken of Meghalaya	Deori S, Ethman A Marak, Katiyar R, Sarma M, Islam R, Das S, Chakravarty H, Paul DR, Ghatak S, Mishra AK, Rajkumar U and Doley S	Indian Journal of Hill Farming	38(1):1-6, doi:10.56678/iahf-2025.38.01.1	4.64
8	Indigenous livestock wealth of Uttar Pradesh and Uttarakhand states of India - Status and prospects for characterization	Kumar A, Mishra AK, Kumar A and Shahi B	Journal of Livestock Biodiversity	14(1):13-19, Article URL: https://epubs.icar.org.in/index.php/JLB/article/view/170904	-
9	Morphometric and genetic characterization of Mouli sheep of Karnataka	Yadav DK, Jain A, Kulkarni VS and Arora R	Indian Journal of Small Ruminants	31(1):20-24, doi:10.5958/0973-9718.2025.00010.X	5.11
10	Identification and <i>in-silico</i> impact assessment of missense mutations in key genes associated with hypoxic stress in Changthangi goats	Chhabra P, Arora R, Ahlawat S, Gera R, Bagiyal M, Sharma U and Parsad R	Indian Journal of Biochemistry and Biophysics	62:854-860, doi:10.56042/ijbb.v62i8.16577	7.50
11	Hepatic gene expression reveals functional diversity in indigenous chicken breeds	Bagiyal M, Ahlawat S, Khatak S, Chhabra P, Sharma U, Arora R, Sharma R, Parsad R and Gera R	Journal of Livestock Biodiversity	14(1):68-73, Article URL: https://epubs.icar.org.in/index.php/JLB/article/view/169856	-
12	Assisted Reproductive Technologies for Livestock Biobanking	Saini M, Sharma R, Raja KN and Mohan NH	Journal of Livestock Biodiversity	14(1):2025.	-

Other Scientific Publications and Technology

Review Articles

S. No.	Title	Authors	Details
1	High altitude adaptation in livestock and poultry: Exploring morphological, physiological, biochemical and omic insights	Gera R, Mishra AK, Arora R, Parsad R, Bagiyal M, Chhabra P, Sharma U, Ahlawat S, Sharma R and Kumar R	Indian Journal of Animal Research, 59 (3):357-364
2	Unraveling canine genetic diversity: molecular insights into behavior, morphology, and physiology	Singh A, Sharma M, Kumar V, Arora R, Sharma R, Raja KN and Ahlawat S	Mammalian Research, 70:407-420, doi:10.1007/s13364-025-00814-0
3	Hypoxia-Inducible Factor genes: Molecular architecture and regulatory dynamics of Hypoxia-Inducible Factors in livestock: A narrative review	Parsad R, Bagiyal M, Malhotra S, Arora R and Sonika A	International Journal of Biological Macromolecules, Dec. 12:149673, doi:10.1016/j.ijbiomac.2025.149673
4	Advances in equine genomics: Decoding the genetic architecture of morphology, performance, behaviour and adaptation.	Sharma M, Singh A, Kumar V, Olla N, Arora R, Sharma R, Mohan NH and Ahlawat S	Molecular Biotechnology, doi:10.1007/s12033-025-01544-z
5	Deciphering the molecular drivers for cashmere/ pashmina fiber production in goats: a comprehensive review.	Vasu M, Ahlawat S, Arora R and Sharma R	Mammalian Genome, 36(1):162-182, doi:10.1007/s00335-025-10109-z

Technical Articles and Lead Papers

S. No.	Title	Authors	Details
1	Bioinformatics Tools for Analyzing Genomic Data.	Kumar A, Ahmad SFA and Nidhishree NS	In Compendium 'Applying Genomic Models in Prediction of Breeding Value using BLUPF90 Software' CAFT on National Dairy Research Institute, Karnal, (Haryana), India, 238 p
2	Current Status and Future Prospects of Genomic Selection in India.	Pundir RK and Kumar A	In Compendium: National Conference on Transforming Small Ruminant Production: Empowering Precision Farming and Genomic Innovations for Enhanced Productivity and Sustainable Development at ICAR-CIRG, Makhdoom, Mathura
3	Utilizing omics to understand domestic animal diversity.	Kumar A and Niranjan SK	In Compendium: 'Farm-to-Fork Approach for Strengthening Mithun (Bos frontalis) Value Chain and Doubling the Income of Tribal Farmers of North-East, India' at ICAR-NRC on Mithun, Nagaland, 140 p.
4	Decoding Variation through SNP Microarray: The Journey from DNA to Genotype.	Kumar A and Gandham RK	In Compendium: Next-Gen Animal Breeding: An Approach to Genomics, Selection Strategies, and Artificial Intelligence for Dairy Animals at National Dairy Research Institute, Karnal, (Haryana), India, 321p
5	Genome-Wide Association Studies in Livestock: Concepts, Methods, and Application in Genomic Selection.	Gaur GY and Kumar A	In Compendium: Next-Gen Animal Breeding: An Approach to Genomics, Selection Strategies, and Artificial Intelligence for Dairy Animals at National Dairy Research Institute, Karnal, (Haryana), India, 321p
6	DNA based genetic disorders in dairy cattle: New genomic approaches for their identification.	Niranjan SK, Surati U and Kumar A	In Compendium: Next-Gen Animal Breeding: An Approach to Genomics, Selection Strategies, and Artificial Intelligence for Dairy Animals at National Dairy Research Institute, Karnal, (Haryana), India, 321p
7	Status of registered other livestock and poultry breeds of India.	Kumar A and Mishra AK	In Compendium 'Characterization, Registration and Conservation of Native Animal Genetic Resources' at ICAR-NBAGR, Karnal, (Haryana), India
8	Novel Method of Breed Assignment through Machine learning in Buffalo	Gandham R, Kumar A and Vohra V	In Compendium 'Buffalo Production and Health in a Changing Climate: Innovations for a Resilient Future' ICAR-IVRI, Izatnagar Bareilly

S. No.	Title	Authors	Details
9	Cattle Genome: Insights into Indian Zebu.	Gandham RK, et al.	In Compendium 'Precision Animal Breeding through Genomics, Artificial Intelligence and Machine Learning' WBUAFS, Kolkata
10	Genomic Era of Small Ruminants: The Indian Scenario in	Arora R, Ahlawat S, Sharma R and Sharma U	In Compendium: "Transforming Small Ruminant Production: Empowering Precision Farming and Genomic Innovations for Enhanced Productivity and Sustainable Development' ISSGPUCON, 5-7 March, 2025 at ICAR-CIRG, Makhdoom, Mathura, UP
11	Harnessing omics approaches to unlock the genetic potential of small ruminants in Ladakh	Ahlawat S, Arora R, Sharma R, Singh MK and Mir MA	In Compendium: "Transforming Small Ruminant Production: Empowering Precision Farming and Genomic Innovations for Enhanced Productivity and Sustainable Development' ISSGPUCON, 5-7 March, 2025 at ICAR-CIRG, Makhdoom, Mathura, UP
12	Status of registered large and small ruminants of India	Singh S and Mishra AK	In Compendium 'Characterization, registration and conservation of Native Animal Genetic Resources' during training program 8-12 September, 2025 at ICAR-NBAGR, Karnal
13	Genetic mechanisms underpinning the adaptation of small ruminants to diverse climatic conditions	Ahlawat S	In Compendium 'Climate Resilient Livestock Production: Emerging Concepts and Technologies for Sustenance' International conference, 23-24 November, 2025 at ICAR-NIANP, Bengaluru.
14	Unraveling the genomic basis of adaptation and production in small ruminants of Ladakh using multi-omics approaches	Ahlawat S	In Compendium "Advancing animal health and production through biochemical and biotechnological innovations" National Symposium on 28-29 November, 2025 at West Bengal University of Animal and Fishery Sciences, Kolkata
15	Omics revolution: Decoding economic traits in livestock	Ahlawat S	In Compendium 'Bridging Science and Society: Biotechnology for Sustainable One Health' International Conference during 3-5 December, 2025 at LUVAS, Hisar
16	Biomolecules for value addition and enhancing utilization of indigenous livestock	Sodhi M, Mukesh M, Garg V and Kataria RS	In Compendium: "Characterization, Registration and Conservation of Native Animal Genetic Resources" Training program during 8-12 Sept., 2025, at ICAR-NBAGR, Karnal (Haryana).
17	Bovine Milk-Derived Biomolecules: A Translational Approach for Conservation and Sustainable Utilization of Cattle Genetic Resources	Sodhi M, Mukesh M and Kataria RS	In Compendium: "Characterization, Registration and Conservation of Native Animal Genetic Resources" Training program during 8-12 Sept., 2025, at ICAR-NBAGR, Karnal (Haryana).
18	Genetic characterization and diversity analysis of native AnGR using candidate gene approach	Kataria RS, Dige MS, Gurao A, Sodhi M and Mukesh M	In Compendium: "Characterization, Registration and Conservation of Native Animal Genetic Resources" Training program during 8-12 Sept., 2025, at ICAR-NBAGR, Karnal (Haryana).
19	Multi-omic approach to characterize adaptation and milk traits in native AnGR	Mukesh M, Kataria RS and Sodhi M	In Compendium: "Characterization, Registration and Conservation of Native Animal Genetic Resources" Training program during 8-12 Sept., 2025, at ICAR-NBAGR, Karnal (Haryana).
20	Advances in Assisted Reproductive Techniques for conservation of native AnGR	Saini M, Sharma R and Raja KN	In compendium "Characterization, Registration and Conservation of Native Animal Genetic Resources" 8-12 September, 2025 at ICAR-NBAGR, Karnal ISBN: 978-93-83537-90-7. (Page No:81-90)
21	Strategies for conserving indigenous AnGR and activities of National Gene Bank	Raja KN, Sharma R, Saini M, Singh AK and Aggarwal RA	In compendium "Characterization, Registration and Conservation of Native Animal Genetic Resources" 8-12 September, 2025 at ICAR-NBAGR, Karnal ISBN: 978-93-83537-90-7. Pp 65-71
22	Approaches for ex situ conservation of native AnGR with specific reference to somatic cell banking	Sharma R, Ahlawat S, Saini M and Arora R	In compendium "Characterization, Registration and Conservation of Native Animal Genetic Resources" 8-12 September, 2025 at ICAR-NBAGR, Karnal ISBN: 978-93-83537-90-7. Pp 72-80
23	Technological advancements and their application for management of Native Animal Genetic Resources	Mishra BP and Niranjana SK	In Compendium: 'Technological advancements and their application for management of Native Animal Genetic Resources', SOCDAB National Symposium, Bangluru, 21-22 January 2025. (ISBN: 9788196834128), 1-6

Popular Articles

क्रम संख्या	शीर्षक	लेखक	विवरण
1	उननत सहायक प्रजनन तकनीकों द्वारा पशुधन सुधार: एक समकालीन जैव प्रौद्योगिकी परिप्रेक्ष्य	रोहित बरवड़, अमोद कुमार एवं क. ए. सरवणन	पशुधन प्रकाश. आईसीएआर – राष्ट्रीय पशु आनुवंशिक संसाधन ब्यूरो, करनाल
2	चिलिका भैंस: वर्तमान स्थिति और संरक्षण एवं सुधार की दिशा में आगे का मार्ग	महेश शिवानंद डिगे, मोनिका सैनी, मनिशी मुकेश और रंजीत कटारिया	पशुधन प्रकाश. आईसीएआर – राष्ट्रीय पशु आनुवंशिक संसाधन ब्यूरो, करनाल
3	आत्मनिर्भर गौशाला - एक सार्थक पहल	हितेश पुरोहित, रेखा शर्मा, उर्मिला पानु, सोनिका अहलावत एवं रीना अरोड़ा	खेती (ICAR), जुलाई 77(3): 35-36

Book Chapters

S. No.	Title	Authors	Publication
1	Selection Signatures Underlying Meat Production in Livestock Species.	Kumar A, Nidhishree NS and Surati U	In Book: Biotechnological interventions in Meat Science ISBN : 978-93-58998-99-3, Pages 1-330, Elite Publishing House, New Delhi
2	Innovations in Reproductive Technologies for Enhancing Small Ruminant Conservation through Bio banking	Sharma R, Saini M, Ahlawat S, Arora R	In Book: Biotechnological Approaches for Small Ruminant Production; Nagarajan G, Kumar R, Mahla AS and Kumar A. (Eds.). Pp11-31 ICAR-CSWRI, Avikanagar ISBN: 978-81-955679-1-1.
3	Innovations in Reproductive Technologies for Enhancing Small Ruminant Conservation through Bio banking	Sharma R, Saini M, Ahlawat S, Arora R	In Book: Biotechnological Approaches for Small Ruminant Production; Nagarajan G, Kumar R, Mahla AS and Kumar A. (Eds.). Pp11-31 ICAR-CSWRI, Avikanagar ISBN: 978-81-955679-1-1.

Book/Concept/Compendium/Monograph/Technical Bulletin/ Training Manual

S. No.	Type of Publication	Title	Authors	Details
	Monograph (edited)	Periyar Cattle: The Semi-feral cattle of Kerala	Thomas M, Marykutty T, Venkatachalapathy RT, Kurien C, Anjali CB, Raja KN and Mishra AK	Published by Kerala Veterinary and Animal Science University, Thrissur
	Monograph (edited)	Breed Descriptors of Livestock and Poultry populations of Eastern region	Chandran PC, Kamal R, Kumar R, Pundir RK, Mishra AK, Sharma R, Kumari R, Sarma K and Das A	Published by ICAR- Research Complex for Eastern Region, Patna P:76,
	Monograph (edited)	Cattle Genetic Resources of Karnataka: Gudadheri Cattle	Inamdar B, Prasad K, Ilyas M, Mishra AK, Kumar Amodh and Vidyasagar	Published by KVA&FSU, Bidar, Karnataka
	Monograph (edited)	Cattle Genetic Resources of Karnataka: Koppal Cattle	Prasad K, Inamdar B, Reddy S, Biradar SC, Yatish HM, Mishra AK, Kumar A and Ashwagosh	Published by KVA&FSU, Bidar, Karnataka
	Monograph	From heritage to high-tech: Genomics for Indian chicken breeds	Arora R, Ahlawat S, Sharma R	Document No.148/2025, ISBN 9789383537914, ICAR-NBAGR, Karnal, India.
	Strategic Paper	Animal Genetic Resources in Union Territory of Lakshadweep: Strategy for Sustainable Management	Mishra B, Gandham RK, Niranjana SK, Abdul Gafoor VM, Sodhi M, Ananth PN and Mishra BP	ISBN: 978-93-83537-88-4, ICAR-NBAGR Karnal.
	Training Manual	“Characterization, Registration and Conservation of Native Animal Genetic Resources”	M Mukesh, MS Dige, Monika Sodhi, NH Mohan	September 08-12, 2025) at ICAR-NBAGR, Karnal ISBN: 978-93-83537-90-7.
	Compendium	Omics Era: Genome to Pangenome, Proteome, and Metabolome in Animal Science	Gandham RK et al.	Winter School ISBN :978-93-83537-98-3
	Book	Ready Reckoner for Omics Data Analysis	Gandham R K et al.	ISBN: 978-93-83537-97-6

Copyright

S.N.	Title	Applicant/ Owner	Author	Filing date	Diary No.	Type	Status / Remark	Certificate No. /Date of issue
1	Breed Watchlist 2022	Director, ICAR-NBAGR	RK Pundir, AK Mishra, HK Narula, DK Yadav, MS Dige, SK Niranjana, BP Mishra	10.2.2025	4646/2025-CO/A	Artistic	Copyright Granted	AT-20250159062 16.5.2025
2	21 st Livestock Census: Livestock & Poultry Breeds: A Ready Reckoner	Director, ICAR-NBAGR	SK Niranjana, Raja KN, Sanjeev Singh, I Ganguly, AK Mishra, SP Dixit, RK Pundir, BP Mishra	07.2.2025	4351/2025-CO/L	Literary	Copyright Granted	LD-20250164747 19.5.2025
3	Chang-khi dog: Integral part of Changpa nomadic life	Director, ICAR-NBAGR	BP Mishra, Raja KN, RK Pundir, Karanveer Singh, Aarti Shere	10.2.2025	4643/2025-CO/CF	Cinematography	Copyright Granted	CF-202505968 15.7.2025
4	Map of Livestock Diversity Across India	Director, ICAR-NBAGR	Monika Sodhi, RAK Aggarwal, BP Mishra, Raja KN	10.2.2025	4645/2025-CO/A	Artistic	In process	
5	Map of distribution of registered breeds of India	Director, ICAR-NBAGR	Raja KN, BP Mishra	10.2.2025	4644/2025-CO/A	Artistic	Copyright Granted	AT-20250160192 04.8.2025
6	Chilika buffalo: Preserving a vital genetic legacy	Director, ICAR-NBAGR	B P Mishra, Raja KN, Dige MS, Niranjana SK, Aarti Shere	10.2.2025	4642/2025-CO/CF	Cinematography	In process	

Accessions Obtained

- A. The 777K genotyping data generated from eleven indigenous cattle breeds are publicly available at the *Indian Biological Data Centre (IBDC)* under the *Indian Nucleotide Data Archive (INDA)* with the study accession number INRP000280, accessible at <https://ibdc.dbtindia.gov.in/inda/submittedStudyHome>, and under the *International Nucleotide Sequence Database Collaboration (INSDC)* with project accession numbers PRJEB102997, ERA35134988, accessible via <https://www.ebi.ac.uk/ena/browser/home>. Earlier, the data were deposited on the ICAR-Krishi data portal (<http://krishi.icar.gov.in/jspui/handle/123456789/31167>; <http://krishi.icar.gov.in/jspui/handle/123456789/69832>); however, these links are currently non-functional. The updated and accessible dataset is now hosted on the IBDC repository.
- B. The 101 whole genome re-sequencing data generated on 11 Indian goat breeds/populations are publicly available at the **Indian Biological Data Centre (IBDC)** under the **Indian Nucleotide Data Archive (INDA)** with the study accession number

INRP000280, accessible via the IBDC portal (<https://ibdc.dbtindia.gov.in/inda/submittedStudyHome>). The corresponding datasets are also available under the **International Nucleotide Sequence Database Collaboration (INSDC)** with the project accession numbers **ERP169860 / PRJEB86514**, which can be accessed through the ENA browser (<https://www.ebi.ac.uk/ena/browser/home>).

- C. 22 samples – WGS data of cattle (PRJEB104528) ; 1 – Red Jungle Fowl (PRJNA1301553) - submitted at IBDC-Dr. Ravi Kumar Gandham.

Visual documentary

- Changkhi Dog - An Integral part of Changpa Nomadic Life, <https://www.youtube.com/watch?v=VVHp3Vjjwgc>.
- Ladakh's livestock heritage: resilience in the highlands, <https://youtu.be/IVeu5II-858?si=wPrrNRnv2c7lGTn>.
- Documentary video on AnGR of Lakshadweep Island was designed developed in-house by NBAGR and released by Dr. Raghavendra Bhatta, DDG(AS) during the Stakeholder's meet.

Awards & Recognition

Awards (Poster/Oral Presentation)

1. Best Oral Presentation Award: Chaudhary R., Abdul Rahim, Pourouchottamane R., Chauhan P., Mishra Anil and Tomar Arun for Phenotypic characterization of Shiwalik Hill goat population in Himachal Pradesh during National Conference on Transforming small ruminant production: Empowering precision farming and genomic innovations for enhanced productivity and sustainable development organized by ISGPU at ICAR- CIRG from 5-7 March, 2025.
2. Mishra A. K. Chief editor: 2nd Prize Pashudhan Prakash by NARAKAS Karnal, on 30.6.2025
3. Mishra A. K. Advisor Brajbhasha: NBAGR Karnal confers 2nd Prize in Hindi, by NARAKAS, Karnal under Institutional category on 30.6.2025.
4. Second Position in Poster presentation: Amod Kumar, R K Pundir, Divya Chanda, Vandana Dureja, Seema Yadav, Mehak Maggon, Preeti Verma and Nidhishree N. S. for Exploration of selection signatures in Gir cattle using medium density SNP array. In National Symposium and XXII Annual Convention of SOCDAB & National Conference on Technological advancement and their application for management of Native Animal Genetic Resources (AnGR), organized by Department of Animal Genetics & Breeding, Animal Science Block, Veterinary College, KVAFSU, Hebbal, Bengaluru, during January 21-22, 2025.
5. द्वितीय स्थान, सतर्कता जागरूकता सप्ताह में पोस्टर प्रस्तुति. आईसीएआर- राष्ट्रीय पशु आनुवंशिक संसाधन ब्यूरो, करनाल।
6. Second Position in Oral presentation: Utsav Surati, Saket K. Niranjana, R.K. Pundir, Ymberzal Koul, Vikas Vohra, Ranjit Singh Kataria, Ajay Kumar Dang, Sushant Kumar Dash and Amod Kumar for Comparative Transcriptome Profiling Unveils the Genetic Basis of Salinity Tolerance in Chilika Buffalo. In National Conference of the Indian Society for Buffalo Development (ISBD) on Buffalo Production and Health in a Changing Climate: Innovations for a Resilient Future organized by Division of Physiology and Climatology, ICAR-Indian Veterinary Research Institute, Izatnagar, Uttar Pradesh, India during December 15-16, 2025.
7. First Position in Poster presentation: Utsav Surati, Saket K. Niranjana, RK Pundir, Ymberzal Koul, Vikas Vohra, Ranjit Singh Kataria, Ajay Kumar Dang and Amod Kumar* for Inter-breed genomic scans uncovered adaptive signals underlying salinity tolerance in Chilika buffalo in National Conference of the Indian Society for Buffalo Development (ISBD) on Buffalo Production and Health in a Changing Climate: Innovations for a Resilient Future, organized by Division of Physiology and Climatology, ICAR-Indian Veterinary Research Institute, Izatnagar, Uttar Pradesh, India during December 15-16, 2025.
8. Second Position in Poster presentation: Rohit Barwar, K.A. Saravanan, G.K. Gaur, Arun Kumar, S.S. Misra, Amod Kumar, R.K. Gandham for Genome-Wide Assessment of Population Structure, Admixture Analysis and Phylogenetic Analysis of Malpura and Patanwadi Sheep With Worldwide Sheep Breeds in International Conference on Precision Animal Breeding through Genomics, Artificial Intelligence and Machine Learning organized by WBUAFS, Kolkata, during November 13-14, 2025.
9. Best Poster presentation: Ravi Kumar Gandham, Mahesh Neupane, Sarwar Azam, Neelam Topno, Manas Ranjan Praharaj, Kathiravan Periasamy, Subir Das, Pankaj Kumar, Himanshu Patil, Dharendra Suthar, Neelima Hosamani, Sayta Pal Arya, Shakti Kumar, Vikas Vohra, Raju BMK, Avnish Kumar Bhatia, Manishi Mukesh, Amod Kumar, Mahesh Dige,

- Benjamin D Rosen, Curtis P Van Tassell and Subeer S. Majumdar for Cattle Genome: Insights into Indian Zebu. In International Conference on Precision Animal Breeding through Genomics, Artificial Intelligence and Machine Learning, organized by WBUAFS, Kolkata during November 13-14, 2025.
10. Prof. K.N. Sharma Memorial Award-2023: Reena Arora for 'Microsatellite-based analysis deciphers the uniqueness of three lesser-known Indian cattle populations "Indian Journal of Animal Sciences, 93 (8): 795–801, August 2023/ Article <https://doi.org/10.56093/ijans.v93i8.127951>.
 11. First Best Paper Award- Strategic Cryobanking of Cells for Conserving Indigenous AnGR by Sharma R., Ahlawat S., Arora R., Prasad S. & Yadav S. in National Symposium on Technological Advancement and Their Application for Management of Native Animal Genetic Resources (AnGR) & XXII Annual Convention of Society for Conservation of Domestic Animal Biodiversity (SOCDAB).
 12. First Poster Presentation Award- Deciphering hypoxia adaptation in heart and lung tissue of high-altitude sheep, by Ritika Gera, Shreya Malhotra, Reena Arora, Sonika Ahlawat, Rekha Sharma, Mohsin Ayoub Mir, Manoj Kumar Singh & Rajesh Kumar in ISSGPUCON2025: Transforming Small Ruminant Production: Empowering Precision Farming and Genomic Innovations for Enhanced Productivity and Sustainable Development on 5-7 March, 2025 at ICAR-CIRG, Makhdoom, Mathura, UP.
 13. Young Scientist Award: Narasimha Tanuj Gunturu, Manoj Kumar Goud Pyatla, Benjamin D. Rosen, T. K. Bhattacharya, Sivalingam Jayakumar, Amod Kumar, R.K. Pundir, Bina Mishra, B. P. Mishra, A. K. Tiwari, Simmi Tomar, and Ravi Kumar Gandham for Indian Chicken: Genome to Pangenome at National Symposium on Technological Advancement and Their Application for Management of Native Animal Genetic Resources (AnGR) at XXII Annual Convention of Society for Conservation of Domestic Animal Biodiversity (SOCDAB) on January 21-22, 2025.
 14. *PN Bhat Award (2025)*: This award was given by Indian Society of Animal Genetics and Breeding (ISAGB) for publishing research article "Characterizing metabolome signature of colostrum, transition and mature milk of indigenous cows (*Bos indicus*) adapted to high altitude environment of Leh-Ladak in the highest impact factor (15.8) journal (*Food Chemistry*).
 15. Second Best Oral Presentation award to Ram Parsad, Sonika Ahlawat, Reena Arora, Ritika Gera, Meena Bagiyal, Pooja Chhabra & Upasna Sharma for "Integrating multi-omics to understand the genetic basis of high-altitude adaptation in Changthangi goats" during National Symposium on "Transforming Small Ruminant Production: Empowering Precision Farming and Genomic Innovations for Enhanced Productivity and Sustainable Development" during 5-7 March 2025.
 16. Best Oral Presentation Award to Sonika Ahlawat, Shreya Malhotra, Swati Ruhil, Reena Arora, Rekha Sharma, Vivek Sharma, Raja K.N., and N.H. Mohan for "Nutritional and metabolomic comparisons of sheep and goat milk highlight the enhanced bioactive potential of sheep milk" during International Conference on "Bridging Science and Society: Biotechnology for Sustainable One Health" held at LUVAS, Hisar from 3-5 December, 2025.

Fellow of the Academy

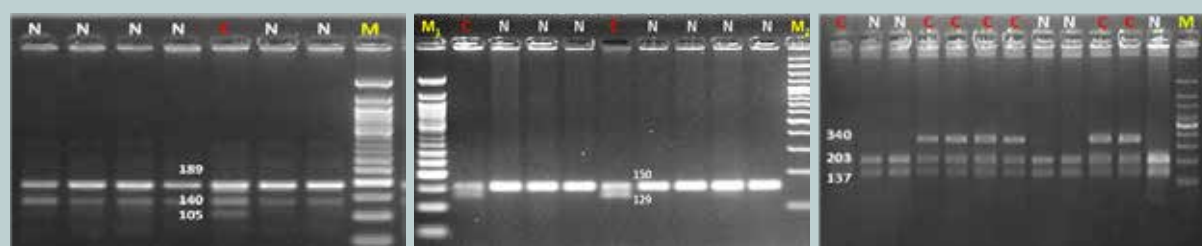
- ISSGPU Fellow Award 2025 to DK Yadav, Conferred by ISSGPU during the National Conference (ISSGPUCON 2025) on "Precision Farming and Genomic Innovations in the Small Ruminant Sector" held at ICAR-CIRG, Makhdoom, Mathura (UP) from March 5 to 7, 2025.

Inclusion of HH1, HH3 and JH1 genetic disease screening in bulls under MSP for Semen Production (2025)

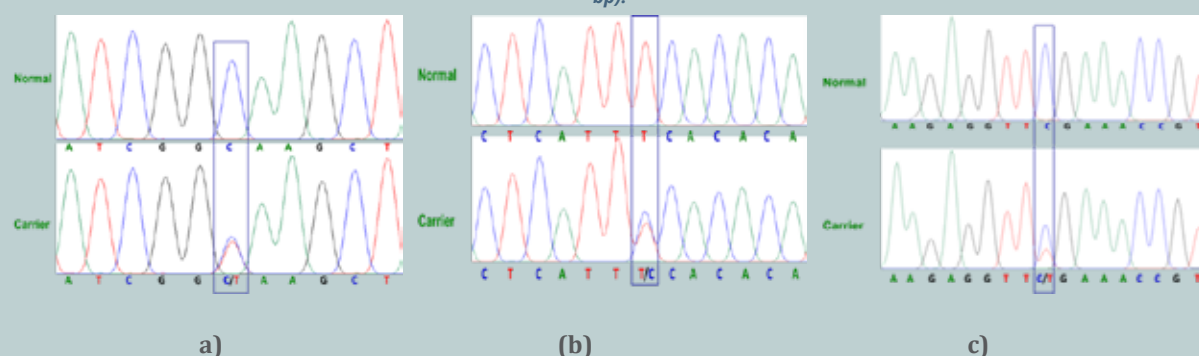
Mutations causing lethal genetic diseases –Holstein Haplotype 1 (HH1) and Holstein Haplotype 3 (HH3) mutations were first time reported for their occurrence in Holstein Frisian (HF) & HF crossbreds; and Jersey Haplotype 1 (JH1) in Jersey and Jersey crossbred cattle in India. PCR based tests were developed for the screening of these lethal mutations in cattle population. One novel amplification-refractory mutation system (ARMS) PCR based test was developed for screening of HH1. Amplification-refractory mutation system (ARMS) PCR based tests were developed for screening of HH3. ARMS-PCR and PCR-RFLP (Taq α I) based tests were developed for screening of JH1. During screening of these genetic mutations using PCR based tests, the

frequencies of the disease carriers (heterozygotes) were found to be more than 2 percent in the respective cattle populations.

Considering their presence in Indian cattle of exotic origin, Dept of Animal Husbandry & Dairying, MoFAHD, Govt of India, has included, testing of three genetic diseases- Holstein Haplotype 1 (HH 1), Holstein Haplotype 3 (HH3) in HF and HF crossbred bulls and CWC 15 (Jersey Haplotype 1 or JH1) in Jersey & Jersey crossbred bulls for production of semen, under **Minimum Standard Protocol (MSP) – 2025** (OM -N-05015/33/2025-Cattle_Div dated 09.12.2025), as a precaution to control Genetic Disorders in the progenies for the bulls kept in Semen Stations across the country.



a) **(b)** **c)**
Figure: PCR Assays for detection of HH1, HH3 and JH1 haplotypes in cattle. a) Tetra-ARMS-PCR based assay for HH1 screening. M: 50 bp ladder, C: HH1Carrier (189, 140,105 bp) N: Normal (189, 140bp); b) PCR Primer-introduced restriction analysis based assay for HH3 screening. M1: 50 bp ladder, M2: 100 bp ladder, C: HH3 Carrier (150, 129, 21 bp) N: Normal (150 bp); and c) PCR-RFLP assay for JH1. Lane M: 100 bp ladder, C: JH1 Carrier and N: Normal. Outer primer set (OF and OR) of T-ARMS PCR was used to produce the PCR product (340 bp).



a) **(b)** **c)**
Figure : Sequencing of PCR Products of normal and carrier animals. The locus is boxed, showing normal with one peak and carrier with two peaks. a) HH1, b) HH3 c) JH1

Reference

Kumar A, Gupta ID, Mohan G, Vineeth MR, Jayakumar S and Niranjana SK*. 2019. Development of PCR based assays for detection of lethal Holstein haplotype 1, 3 and 4 in Holstein Friesian cattle. Molecular and Cellular Probes, 50: 101503 doi: 10.1016/j.mcp.2019.101503

Kumar A, Gupta ID, Mohan G, Vineeth MR, Ravi kumar D, Jayakumar S, Kataria RS, Niranjana SK* (2021) Alternate PCR assays for screening of JH1 mutation associated with embryonic death in Jersey cattle. Molecular and Cellular Probes. 55:101688. <https://doi.org/10.1016/j.mcp.2020.101688>

वार्षिक समीक्षा बैठक
पशु आनुवंशिकता के क्षेत्र में 30-31, 2025

Annual Review Meeting
Genetics



Dr. B.P. Mishra

Dr. Raghavendra Bhatta

Dr. G. K. Ga



**ICAR-NBAGR
Annual Report
2025**

**Capacity
Building**



HRD Programme

Training Organized

Type of Program	Title	Organizing Agency	Duration	Organizer/Co-Ordinator
Training	Characterization, Registration and Conservation of Native Animal Genetic Resources	Veterinary Officers from the Department of Animal Husbandry & Veterinary Services (DAH&VS), Odisha	8-12 September, 2025	Dr Manishi Mukesh
Capacity Building Program	Preventive Vigilance	ICAR-NBAGR, Karnal	4 November, 2025	Indrajit Ganguly
Training Program	Dairy Farming for Women Farmers under the Scheduled Caste Sub-Plan	ICAR-NBAGR, Karnal	24-26 September, 2025	Dr. Raja KN and Dr. Sonika Ahlawat
Training program	21 day ICAR Sponsored Winter School on "Omics Era: Genome to Pangenome, Proteome, and Metabolome in Animal Science"	ICAR-NBAGR, Karnal	20 Jan-9 Feb, 2025	Dr. R.K. Gandham and Dr. Monika Saini

Training Attended

Type of Program	Title	Organizing Agency	Duration	Scientist Attended
21 Days National Level Training Programme	Next-Gen Animal Breeding: A Hands-on Approach to Genomics, Selection Strategies, and Artificial Intelligence in Dairy Animals	ICAR-NDRI, Karnal	19 November-9 December, 2025	Dr. Amod Kumar
Online Training Program	Course production and management for MOOCs	ICAR-NAARM, Hyderabad	20-24 January, 2025	Dr. Sanjeev Singh
MDP Training	Intellectual property valuation and technology management	ICAR-NAARM, Hyderabad	3-7 March, 2025	Dr. Sanjeev Singh
Training	"PGCs Biobanking and Surrogate Technology for Conservation and Development of Chicken Genetic Resources	ICAR-CARI, Izatnagar.	27-31, October 2025	Dr. Monika Saini
Conclave	ESTIC-2025	Bharat Mandapam, New Delhi under category of young S&T leaders (below 45 years) organized by Ministry of Science & Technology, New Delhi.	3-5 November 2025	Dr. Monika Saini

Conferences / Seminars /Symposia Attended

Type of Program	Title	Organizing Agency	Duration	Scientist Attended
National Symposium	Technological Advancement and Their Application for the Management of Native Animal Genetic Resources	SOC DAB	21-22 January 2025 at College of Veterinary Sciences, Hebbal Bengaluru	Dr. Anil Kumar Mishra Dr. Dinesh Kumar Yadav
स्वर्ण जयंती समारोह	राज भाषा विभाग स्वर्ण जयंती समारोह	राज भाषा विभाग	26 जून, 2025 को नई दिल्ली	Dr. Anil Kumar Mishra
National Conference	Precision Farming and Genomic Innovations in Small Ruminant Sector	ISSGPUCON 2025	5-7 March, 2025 at ICAR-CIRG, Makhdoom, Mathura (UP)	Dr. Dinesh Kumar Yadav
International Conference	"Precision Animal Breeding through Genomics, Artificial Intelligence and Machine Learning	ISAGBCON-2025	13-14 November 2025, Biswa Bangla Convention Centre, New Town, Kolkata.	Dr. R K Gandham
National Conference	Buffalo Production and Health in a Changing Climate: Innovations for a Resilient Future	Indian Society for Buffalo Development (ISBD)	15-16 December 2025	Dr. R K Gandham

Type of Program	Title	Organizing Agency	Duration	Scientist Attended
Congress	On (Organismal and Environmental Genomics"	All-India Congress of Genetics & Genomics (AICGG)	BIT, Mesra, on 5-6 January 2026	Dr. R K Gandham
National Symposium	"Progress and Emerging Trends in Animal Health and Production Including Poultry and Wildlife in the Global Context"	IAAVR	12-13 February 2026	Dr. R K Gandham
National Conference	Livestock Physiology in Next-Generation Physiological Approaches for Climate-Adaptive Livestock Production	APACON, Bidar	9-10 October 2025	Dr. R K Gandham

Lecture Delivered (outside)

Type of Program	Title	Organizing Agency	Duration	Scientist Attended
Capacity Building Programme on Statistical Tools for Data Analysis in Agricultural and Social Science Research	Two lectures—one on Principal Component Analysis (PCA) and Factor Analysis and another on Clustering and Discriminant Analysis	CCSHAU, College of Agriculture, Bawal	6-19 May 2025	Dr. Dinesh Kumar Yadav
National Training Programme on Next-Gen Animal Breeding: A Hands-on Approach to Genomics, Selection Strategies, and Artificial Intelligence in Dairy Animals	Survey Strategies, Multivariate Analysis, and Integrated Classification Approaches for Animal Genetic Resources	CAFT, NDRI, Karnal	19 Novemer-9 December 2025	Dr. Dinesh Kumar Yadav
37 th National Training Programme on Bioinformatics Tools for Analyzing Genomic Data	Applying genomic models in prediction of breeding value using BLUPF90 software	ICAR-NDRI, Karnal.	10- 30 January 2025	Dr. Amod Kumar
ICAR-Sponsored 21-Day Winter School on Utilizing Omics to Understand Domestic Animal Diversity	Farm-to-Fork Approach for Strengthening Mithun (Bos frontalis) Value Chain and Doubling the Income of Tribal Farmers of North East India	ICAR-NRC on Mithun, Nagaland	16 January -5 Febuary 2025	Dr. Amod Kumar

Farmers Awareness & Outreach Program

Stakeholder Meet in Lakshadweep

ICAR-NBAGR organized a Stakeholder Meet on 'Animal Genetic Resources of Lakshadweep (UT): Strategy for Documentation and Sustainable Management' at Kavaratti (Union Territory of Lakshadweep) on 9th January, 2025 in collaboration with ICAR-Krishi Vigyan Kendra (KVK) and Department of Veterinary & Animal Husbandry Services, Union Territory of Lakshadweep. Dr Raghavendra Bhatta, DDG (AS), ICAR, New Delhi was the Chief Guest and Shri Rajthilak S (IFS), Secretary, Agriculture, Fisheries, Animal Husbandry, Environment & Forest, and Science & Technology, Union Territory of Lakshadweep, was Guest of Honor. About 50 participants including scientists/officers of ICAR-NBAGR, KVK Lakshadweep and Department of Environment & Forest, Govt. of Lakshadweep, Department of Veterinary & Animal Husbandry Services and local livestock keepers attended the Meet. On the occasion, a Strategy paper on 'Animal Genetic Resources in Union Territory of Lakshadweep: Strategy for

Sustainable Management' and a documentary on AnGR of Lakshadweep was also released. Animal health kits were also distributed among livestock keepers on the occasion.

Felicitation of Breed Applicants

Indian Council of Agricultural Research (ICAR) felicitated applicants of animal breeds registered during 2023 to 2025 in a ceremony held on January 17, 2025, at NASC Complex ICAR, New Delhi. In the ceremony, about 80 breed applicants were honored for registering 18 breeds of indigenous livestock, poultry and dog breeds. Vice-chancellors and Directors of various SAUs/SVUs, DDGs ADGs of ICAR, and officers from DAHD also attended the program.

Dr. Himanshu Pathak, Secretary (DARE) and Director General (ICAR) graced the occasion as chief guest. In his address, Dr Raghavendra Bhatta, Deputy Director General (Animal Sciences), ICAR informed about the breeds registered by the ICAR. He said that registering





the animal breeds was started by the ICAR in 2008 so as to protect native breeds. Dr Abhijit Mitra, Animal Husbandry Commissioner, Govt. of India, complimented all the breed applicants. It would also let initiate various government programs for the development of these breeds in their states. The livestock keepers would be benefitted by these programs in the long run. He also appreciated the efforts of ICAR-NBAGR for supporting DAHD for conducting Breed-wise Livestock Census (2024) in the country.

Out of the 18 breeds, three each from Ladakh (UT) and Andaman & Nicobar (UT) as primary home tract. Other states are Andhra Pradesh (1), Assam (1), Chhattisgarh (1), Gujarat (1), Maharashtra (2), Himachal Pradesh (1), Rajasthan (1), Tripura (1), Uttarakhand (1) and Uttar Pradesh (2). Two breeds were having more than one state as their native tract.

Scientists-Farmers Interface Meet *Kadmat (Lakshadweep)*

ICAR Scientists -Farmers Interface Meet was organized on 12th January, 2025 at Kadmat island of Lakshadweep (UT) with goat and poultry keepers, in collaboration with the KVK, Kavaratti (Lakshadweep) and Dept. of Animal Husbandry, Lakshadweep. Farmers were sensitized about scientific management of indigenous AnGR. Around 40 farmers attended the program. Dr Raghavendra Bhatta, DDG (AS) ICAR, Dr B P Mishra, Director, ICAR-NBAGR, other scientists of the NBAGR and KVK, Officers of Dept. of Animal Husbandry, Lakshadweep attended the programs. Animal Kit/ supplements were also distributed to the beneficiaries under the TSP scheme.

Haryana

A Farmers and Scientists Interface meet was organized at Garhi Khajur village in Gharaunda tehsil of Karnal district (Haryana) on 22.03.2025, in collaboration with Haryana Pashu Vigya Kendra, Uchani (LUVAS). Scientists

interacted with the women farmers and explained in detail about scientific management and health aspects of livestock as well as native Animal Genetic resources management. Kits comprising mineral mixture, calcium, dewormer, digestive stimulant etc were also distributed among 300 beneficiaries belonging to SC community under Schedule Caste Sub-Plan program.

One day farmer-scientist interaction program under SCSP in village Dadupur Roran, district Karnal was organized on 23rd September, 2025. A kit containing 2 kg mineral mixture, 1 litre calcium, 3 deworming bolus (3 gm each) and one set of gum boots were distributed to 48 Scheduled caste beneficiaries. Total 48 Farmers were participated.

A Three days training programme on Animal Husbandry under SCSP was organized for women farmers of Karnal district (Haryana) during 24-26 September, 2025. Total 36 Women Farmers were participated.

One day farmer-scientist interaction program under SCSP in village Nalwipar Tilla, district Karnal was organized on 8 October, 2025. A kit containing 2 kg mineral mixture, 1 litre calcium, 3 deworming bolus (3 gm each) and one set of gum boots were distributed to 56 Scheduled caste beneficiaries.

One day farmer-scientist interaction program on Kisan Diwas in village Katlaheri, district Karnal was organized on 23rd December, 2025 under SCSP. A kit containing mineral mixture and gum boots were distributed to 80 Scheduled Caste Women beneficiaries.

Uttarakhand

Scientist Farmers interaction meet at Telliwala village, Haridwar (Uttarakhand) in collaboration with KVK, Haridwar. Distributed health kit to the 26 beneficiaries.

Ladakh (UT)

The NBAGR team organized Farmer's Interface and Awareness Camp in collaboration with the Sheep



Husbandry Department at Lamayuru. The camp was attended by more than 65 farmers of Lamayuru, Wanla and other nearby villages. Animal feed and medicines were distributed to the livestock keepers. Farmers awareness and interactive program was organized with help of local AHD & Sheep Department at Kanji, more than 50 farmers attended the event and benefitted by receiving animal feed, as well as medicines. Farmers awareness and interactive program at Shargole, about 90 farmers of Shergole and other nearby villages attended the camp and benefitted. During the event, Mohd Jawad, Hon'able Councillor, Shargole constituency, Ladakh Autonomous Hill development Council (LAHDC), Kargil also attended the camp and

addressed the farmers. A farmer awareness camp was also organized at Shani village of Zaskar valley.

Viksit Krishi Sankalp Abhiyan

The ICAR-National Bureau of Animal Genetic Resources (NBAGR), Karnal, actively participated in the nation-wide campaign "*Viksit Krishi Sankalp Abhiyan*" organized by the Ministry of Agriculture and Farmers Welfare from 29 May to 12 June, 2025. The primary objective of the campaign was to promote modernization of Indian agriculture through scientific outreach, adoption of sustainable practices, and empowerment of the farming community. During the fifteen days program 19 scientists participated in the program covering more than 250 villages from 06 districts (Panchkula, Jind, Fatehabad, Kaithal, Kurukshetra and Yamunanagar) of Haryana as team involving various departments.

Overall, the campaign facilitated effective farmer-scientist interaction and served as a platform for transferring knowledge and technologies to the grassroots level. More than 3500 farmers participated and interacted with scientists and the farmers were sensitized about unique qualities and management of indigenous livestock and poultry and its role in agriculture sector and human health.

Farmer's exposure visit

About thirty progressive farmers (17 Women & 13 Men) from Kullu district of Himachal Pradesh made an exposure visit to ICAR-NBAGR, Karnal on 09.04.2025. Krishi Vigyan Kendra, Kullu (CSKHPKV, Palampur)





organized the visit under the program of Natural farming. Farmers interacted in detail about the role of ICAR-NBAGR in management of indigenous Animal Genetic Resources and also about indigenous livestock and poultry breeds suitable rearing in the hilly terrain of Himachal Pradesh, Kullu district in particular. The visit was coordinated by Dr A K Mishra, and Dr Raja K N Principal Scientists of the bureau.

School students' exposure visit

About 188 students (101 boys & 87 girls) of class X from Pratap Public School, Karnal made an exposure visit to ICAR-NBAGR, Karnal on 17.04.2025. Students interacted in detail about the role of ICAR-NBAGR in management of indigenous Animal Genetic Resources and also showed interest regarding the DNA based diversity studies, conservation of extinct species etc. and visited National GeneBank and core lab. The visit was coordinated by Dr Rekha Sharma and Dr Raja K N Principal Scientists of the bureau.

Exhibition at the Agriculture Science Congress

The institute displayed its activities at the Agriculture Science Congress (20-22 February, 2025) through an exhibition stall featuring banners and informational materials. A diverse range of technologies, significant achievements and efforts in animal genetic resource conservation were displayed.

PM programs

On 2nd August, 2025 release of 20th installment of fund to the farmers by Hon'ble Prime Minister. Total 64 Farmers were participated. PM Dhan Dhanya Krishi Yojana and Dalham-Aatmanirbharata "The Pulse Mission" on Agriculture and Farmers' Welfare was organized on 11th October, 2025. During the event, participants witnessed the launch by the Hon'ble Prime Minister of India through virtual mode. Total 114 Farmers including 63 Women participants attended the event.

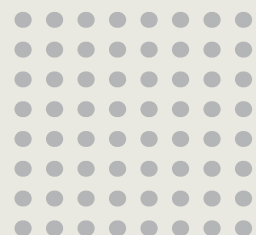


Training for Veterinary Officers of Odisha State (III Batch)
Characterization, Registration and Conservation
of Native Animal Genetic Resources
08-12 September, 2025
National Bureau of Animal Genetic Resources
Karnal



**ICAR-NBAGR
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2025**

**Institute
Activities**



Celebrations

International Biodiversity Day-2025

ICAR- National Bureau of Animal Genetic Resources, Karnal successfully organized the International Biodiversity Day on 22 May, 2025. This year the theme of "International Biodiversity Day" is "Harmony with Nature and Sustainable Development". On this occasion, a poster and speech competition was organized for students to make people aware about the importance of biodiversity and cattle farmers were also honored for rearing native breeds.



Foundation Day celebration

ICAR-NBAGR celebrated its 42nd Foundation Day on 21st September, 2025. Chief Guest Dr. Trilochan Mohapatra, Chairperson, Protection of Plant Varieties & Farmers' Rights Authority (PPV&FRA), Former Secretary, DARE & Director General, ICAR delivered the Foundation Lecture. Dr. Raghavendra Bhatta Deputy Director General (Animal Science), ICAR, New Delhi & Dr. Dheer Singh Director, ICAR-National Dairy Research Institute, Karnal were the guests of honour.

हिंदी पखवाडा आयोजन

ब्यूरो मे 16-30 सितम्बर, 2025 तक हिंदी पखवाडा आयोजित किया जा रहा है। जिसमे ब्यूरो के नियमित कर्मियों, शोध-छात्रों,

आर.ए, एस.आर .एफ, यंग प्रोफेशनल्स एवं संविदा कर्मचारियों द्वारा विभिन्न प्रतियोगिताओं मे भाग लिया गया है।

Observance of Vigilance Awareness Week

The Vigilance Awareness Week (VAW) was observed at ICAR-National Bureau of Animal Genetic Resources (NBAGR), Karnal during 27.10.2025 to 02.11.2025. Various activities were conducted by institute Vigilance Cell to promote transparency and integrity in public governance. The theme of the Vigilance Awareness Week was; Vigilance: Our Shared Responsibility". Vigilance cell also organized a special talk on "Administration and Vigilance Matters" by Sh. J. K. Kewalramani, Former Joint Director (Administration) & Registrar, ICAR-NDRI, Karnal on 29.10.2025. As a part of vigilance campaign period and capacity building, a special talk by Sh. Hareesh Nair, Legal Advisor, ICAR, New Delhi related to vigilance matters, transparency, and integrity from public servants was organized on 06.11.2025 at PG Nair Hall of the institute.

Independence Day Celebration

Bureau celebrated the 79th Independence Day with the unfurling of the National Flag by Director followed by cultural program at the Bureau campus.



Meetings

Breed Registration Committee meeting:

The 12th Meeting of Breed Registration Committee (BRC) was held on January 06, 2025 at NASC, New Delhi. The BRC meeting was chaired by Dr Raghavendra Bhatta, Deputy Director General (Animal Sciences), ICAR. The BRC is the apex body for registration of newly identified animal breeds in the country. Newly registered breeds are- Manah buffalo from Assam, Gaddi dog from Himachal Pradesh, Tripureswari duck from Tripura, Chaugarkha goat from Uttarakhand, Bundelkhandi goat from Uttar Pradesh and Madhya Pradesh, Karkambi pig from Maharashtra, Kheri sheep from Rajasthan, Changkhi dog, Ladakhi donkey, and Ladakhi yak from Ladakh (UT).

Research Advisory Committee meeting: Research Advisory Committee (RAC) meeting was held on 1st July, 2025 at the Bureau under the Chairmanship of Dr. K. Thangaraj, CSIR Bhatnagar Fellow, CCMB.

Quinquennial Review Team meeting: The second Quinquennial Review Team (QRT) meeting was held on 9th July, 2025 and the third meeting was held on 17th -18th December, 2025 at the Bureau under the Chairmanship of Dr. M.C. Sharma, Former Director, ICAR-IVRI & CIRG.

Institute Research Council meeting: Institute Research Council (IRC) meeting was held on 14th-15th July, 2025 under the Chairmanship of Director, ICAR-NBAGR.

Institute Management Committee Meeting: Institute Management Committee (IMC) meeting was held on 19th August, 2025 under the Chairmanship of Director, ICAR-NBAGR.

ISO 9001:2015 Certification

Yearly surveillance (2025) of ISO 9001:2015 of the Bureau was conducted on 21st August, 2025.

Annual Review Meeting-NWP on AnGR

ICAR-National Bureau of Animal Genetic Resources organized Annual Review Meet on 'Network Project on Animal Genetic Resources' (NWP-AnGR) during 30-31st January 2025 at the Bureau. Total 44 participants including Principal Investigators of 33 Network Centres participated in the review Meeting and presented the progress report of their respective centres /states. The meeting was chaired by Dr. Raghavendra Bhatta, Deputy

Director General (Animal Science), ICAR, New Delhi. During the meeting, the progress (year 2023-24) of all the centres was reviewed comprehensively.



Another meeting on the progress of Network Project on Animal Genetic Resources (AnGR) under the Chairmanship of Director, NBAGR & Project Co-ordinator NWP-AnGR was held on 22 September, 2025. PIs from 38 NWP centres participated in the review meet.

Interactive Meeting with DAHD

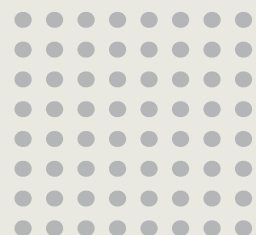
An interactive meeting to discuss the present and future collaborations between ICAR-NBAGR and Dept. of Animal Husbandry & Dairying (DAHD), MoFAHD, Govt. of India was held on 14th May 2025 at the Bureau. Ms. Alka Upadhyaya, IAS, Hon'ble Secretary (AHD), DAH&D, Govt. of India chaired the meeting. She interacted with scientists of the bureau and discussed in detail regarding activities, achievements and way forward of the Bureau. The Secretary along with Animal Husbandry Commissioner, and other officers from AHD, Govt. of India also visited various laboratories including National Bovine Genomic Centre-Indigenous Breeds (NBGC-IB) and National Gene Bank.





**ICAR-NBAGR
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2025**

Personalia



Personalia

SCIENTIFIC STAFF

S. No.	Name of Scientist	Designation
1.	Dr. N.H. Mohan	Director
2.	Dr. Satpal Dixit	Pri. Sci./Head AG
3.	Dr. Ravi Kumar Gandham	Pri. Sci. /Head AB
4.	Dr. R.S. Kataria	Principal Scientist
5.	Dr. Anil Kumar Mishra	Principal Scientist
6.	Dr. Monika Sodhi	Principal Scientist
7.	Dr. Dinesh Kumar Yadav	Principal Scientist
8.	Dr. Reena Arora	Principal Scientist
9.	Dr. Manishi Mukesh	Principal Scientist
10.	Dr. Avnish Kumar	Principal Scientist
11.	Dr. Rahul Behl	Principal Scientist
12.	Dr. Bina Mishra	Principal Scientist
13.	Dr. Rekha Sharma	Principal Scientist
14.	Dr. Saket Kumar Niranjana	Principal Scientist
15.	Dr. Indrajit Ganguly	Principal Scientist
16.	Dr. Sanjeev Singh	Principal Scientist
17.	Dr. Karan Veer Singh	Principal Scientist
18.	Dr. Raja KN	Principal Scientist
19.	Dr. Sonika Ahlawat	Senior Scientist
20.	Dr. Dige Mahesh Shivanand	Senior Scientist
21.	Dr. Monika Saini	Senior Scientist
22.	Dr. Amod Kumar	Senior Scientist
23.	Dr. Vishakha Uttam	Scientist

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.	Sh. Subhash Chander	Technical Officer
7.	Sh. Balwinder Singh	Senior Technical Assistant (Driver)
8.	Sh. Deepak	Technician Trainee (T-I)
9.	Sh. Ashok Kumar Singh	Technician Trainee (T-I)
10.	Sh. Balwan Kumar	Technician (T-I)

ADMINISTRATIVE STAFF

S. No.	Name	Designation
1.	Sh. Jitendra Singh Nayal	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. Amita Kumari	Private Secretary
7.	Smt. Shashi Bala	Assistant
8.	Sh. Satish Kumar	Assistant
9.	Smt. Neerja Kaul	Upper Division Clerk
10.	Sh. Naresh Kumar	Upper Division Clerk

SKILLED SUPPORTING STAFF

S. No.	Name	Designation
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

Dr. N.H. Mohan, Director, joined as ICAR-NBAGR on 07.04.2025.

Dr. Monika Saini, Senior Scientist, joined as ICAR-NBAGR on 04.06.2025.

Dr. Vishakha Uttam, Scientist, Joined as ICAR-NBAGR on 27.10.2025.

Superannuation

Dr. B.P. Mishra, Director, superannuated on 31.01.2025

Dr. R.K. Pundir, Pri. Sci. /Head AGR, superannuated on 30.06.2025

Smt. Parvesh Kumari, Technical Officer, superannuated on 30.04.2025

Sh. Anil Kumar, Administrative Officer, superannuated on 31.07.2025

Sh. Shiv Chander, Upper Division Clerk, superannuated on 31.03.2025

Sh. Satbir, Skilled Supporting Staff, superannuated on 28.02.2025.

Promotion

Sh. Mohinder Singh, Skilled Supporting Staff, Promoted as T-1 on 17.10.2025.

Visitors

Dr. Raghavendra Bhatta, Hon'ble DDG (AS), ICAR and Dr. G.K. Gaur, ADG (AP&B), ICAR visited on 30-31.01.2025.

Dr. Raghavendra Bhatta, Hon'ble DDG (AS), ICAR visited on 22.04.2025.

Ms. Alka Upadhyaya, IAS, Hon'ble Secretary (AHD), DAH&D and Dr. Abhijit Mitra, Animal Husbandry Commissioner, Dr. D.A. Sawant, Deputy Commissioner Dr. Bhushan Tyagi, Joint Commissioner, DAH&D visited on 14.05.2025.

Dr. Gurbachan Singh, Former Chairman, ASRB, Dr. N.K. Krishna Kumar, Former DDG (Hort.) ICAR, Dr. O.P. Chaurasia, Director, DRDO visited on 22.05.2025.

Dr. T. Mohapatra, Former DG, ICAR and Dr. Raghavendra Bhatta, DDG (AS), ICAR visited on 21.09.2025.

Sh. Hareesh Nair, Legal Advisor, ICAR visited on 06.11.2025.

Dr. J.S. Tyagi, Director, ICAR-CARI, Izatnagar visited on 01.12.2025. Dr. V.K. Gupta, Director, ICAR-NRC on Pig, Guwahati visited on 02.12.2025.



राजभाषा प्रकोष्ठ: गतिविधियाँ

संस्थान राजभाषा कार्यान्वयन समिति की बैठक

संस्थान में राजभाषा हिंदी के प्रचार-प्रसार और इसके प्रगामी प्रयोग की प्रगति को बल देने हेतु संस्थान राजभाषा कार्यान्वयन समिति की बैठकें दिनांक 13 मार्च 2025, 2 मई 2025, 21 अगस्त 2025

व 12 दिसम्बर 2025 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 कागजात:

तिमाही (वर्ष 2025)	द्विभाषीय रूप में जारी कागजात	हिंदी या अंग्रेजी में जारी कागजात	कुल जारी कागजात	द्विभाषीय कागजात का प्रतिशत
जनवरी से मार्च	223	शून्य	223	100%
अप्रैल से जून	94	शून्य	94	100%
जुलाई से सितंबर	167	शून्य	167	100%
अक्टूबर से दिसंबर	171	शून्य	171	100%

बाह्य हिंदी पत्राचार:

तिमाही (वर्ष 2025)	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	148	06	154	96.10%
अप्रैल से जून	76	14	90	84.44%
जुलाई से सितंबर	131	22	153	85.62%
अक्टूबर से दिसंबर	87	12	99	87.87%

फाइलों में लिखी गई टिप्पणियाँ

तिमाही (वर्ष 2025)	हिंदी में लिखी गई टिप्पणियाँ	अंग्रेजी में लिखी गई टिप्पणियाँ	कुल टिप्पणियाँ	हिंदी में लिखी गई टिप्पणियों का प्रतिशत
जनवरी से मार्च	307	70	377	81.43%
अप्रैल से जून	158	25	183	86.33%
जुलाई से सितंबर	282	77	359	78.55%
अक्टूबर से दिसंबर	340	57	397	85.64%

हिंदी कार्यशालाओं का आयोजन

संस्थान में राजभाषा हिंदी के प्रचार-प्रसार के क्रम में समय-समय पर कार्यशालाओं/व्याख्यानों का आयोजन किया जाता है

- दिनांक 21 मार्च 2025 को “केन्द्रीय सिविल सेवा-आचरण नियम, 1964” विषय पर हिंदी कार्यशाला/व्याख्यान का आयोजन किया गया जिसमें वक्ता के रूप में श्री सुनील कुमार, सहायक प्रशासनिक अधिकारी, भाकृअनुप-भारतीय गेंहू एवं जौ अनुसंधान संस्थान, करनाल उपस्थित हुए | इस आयोजन

में 22 ब्यूरो कर्मी सम्मिलित हुए जिनमें 07 अधिकारी एवं 15 कर्मचारी थे | श्री सुनील कुमार ने बहुत ही सरल भाषा में उपरोक्त विषयक जानकारी दी जिसकी सभी श्रोताओं ने सहज भाव से सराहना की |

- दिनांक 27 जून 2025 को संस्थान में “व्यक्तिगत दावे: प्रस्तुति एवं भुगतान नियम” विषय पर हिंदी कार्यशाला/व्याख्यान का आयोजन किया गया जिसमें वक्ता के रूप में इस संस्थान के श्री रणधीर सिंह, वित्त एवं लेखा अधिकारी उपस्थित रहे | इस

आयोजन में 36 ब्यूरो कर्मी सम्मिलित हुए जिनमें 15 अधिकारी व 21 कर्मचारी थे। सभी श्रोताओं ने बहुत ही तन्मयता से इस प्रस्तुति में भागीदारी की।

- इसी क्रम में दिनांक 16 दिसम्बर 2025 को “भारत की राजभाषा हिंदी” विषय पर हिंदी कार्यशाला/व्याख्यान का आयोजन किया गया जिसमें वक्ता के रूप में श्री धीरज शर्मा, संयुक्त निदेशक (राजभाषा), भाकृअनुप- राष्ट्रीय डेरी अनुसंधान संस्थान, करनाल एवं सचिव नराकास, करनाल को आमंत्रित किया गया। इस आयोजन में 29 ब्यूरो कर्मी सम्मिलित हुए जिनमें 24 अधिकारी एवं 5 कर्मचारी थे। श्री धीरज शर्मा ने ऐतिहासिक, संवैधानिक तथा वर्तमान परिप्रेक्ष्य में भारत की राजभाषा हिंदी की महत्ता का विस्तार से वर्णन किया। सभी ने मुक्त कंठ से इस प्रस्तुति की प्रशंसा की।

पशुधन प्रकाश के तेरहवे अंक (वर्ष-2024) के पुरस्कृत लेख

प्रथम पुरस्कार:- “गैर-गोवंशीय दूध का चिकित्सीय महत्त्व” लेखक- योगिता शर्मा, अनुपमा रानी एवं उमेश सिंह, गव्य व्यवसाय प्रबंधन विभाग, संजय गाँधी गव्य प्रौद्योगिकी संस्थान, बिहार पशु विज्ञान विश्वविद्यालय, पटना (बिहार)

द्वितीय पुरस्कार:- “स्मार्ट कृषि के माध्यम से पशु पालन प्रबंधन” लेखक- बेद सिंह, बबिता मिश्र, अनुज चौहान, मुकेश सिंह, ज्ञानेंद्र कुमार गौड़ एवं अजोय दास, पशुधन उत्पादन प्रबंधन अनुभाग, भाकृअनुप-भारतीय पशु चिकित्सा अनुसंधान संस्थान, बरेली (उत्तर प्रदेश)

तृतीय पुरस्कार:- “भारत में याक: इसकी अनूठी विशेषताओं और भूमिका का खुलासा” लेखक- करण माहर, पवन कुमार, अपर्णा राज, रंगा साई चन्द्र गोली एवं महेश डिगे, भाकृअनुप- राष्ट्रीय डेयरी अनुसंधान संस्थान, करनाल (हरियाणा)

हिंदी पखवाड़े का आयोजन

प्रत्येक वर्ष की भांति इस वर्ष भी संस्थान में हिंदी पखवाड़ा 16 से 30 सितम्बर 2025 तक उत्साहपूर्वक मनाया गया। इस आयोजन में विभिन्न हिंदी की लिखित एवं मौखिक प्रतियोगिताएं आयोजित की गईं। इस पूरे आयोजन की देख-रेख विधिवत रूप से गठित आयोजन समिति द्वारा की गई जिसके अध्यक्ष डॉ अनिल मिश्र, प्रधान वैज्ञानिक थे। समिति के अन्य सदस्यों में डॉ. रेखा शर्मा, प्रधान वैज्ञानिक, डॉ. संजीव सिंह, प्रधान वैज्ञानिक, डॉ. महेश डिगे, वरिष्ठ वैज्ञानिक तथा श्री राकेश कुमार, नामित राजभाषा अधिकारी, सदस्य सचिव के रूप में सम्मिलित थे।

दिनांक 16 सितम्बर 2025 को हिंदी पखवाड़े का शुभारम्भ किया गया। सर्वप्रथम निबंध लेखन प्रतियोगिता का आयोजन हुआ जिसका विषय “कृत्रिम बुद्धिमत्ता: लाभ एवं हानि” था। इस प्रतियोगिता में कुल 19 प्रतिभागियों ने भाग लिया जिनमें श्री असद खान प्रथम स्थान पर, श्री राम प्रसाद द्वितीय स्थान पर तथा सुश्री रीतिका गेरा एवं सुश्री विधि गर्ग संयुक्त रूप से तृतीय स्थान पर रहे।

दिनांक 17 सितम्बर 2025 को पत्र-लेखन प्रतियोगिता का आयोजन किया गया जिसका विषय था भाकृअनुप-राष्ट्रीय पशु आनुवंशिक संसाधन ब्यूरो, करनाल के मुख्य द्वार के सामने राजमार्ग पर पास देने हेतु भारतीय राष्ट्रीय राजमार्ग प्राधिकरण को पत्र लिखें। इस प्रतियोगिता में कुल 11 प्रतिभागियों ने भाग लिया जिनमें सुश्री रीतिका गेरा प्रथम स्थान पर, सुश्री मोनिका शर्मा द्वितीय स्थान पर, सुश्री नेहा तृतीय स्थान पर रहे तथा श्री विजय कुमार सुश्री श्रेया मल्होत्रा ने संयुक्त रूप से प्रोत्साहन पुरस्कार प्राप्त किया।

दिनांक 18 सितम्बर 2025 को टिप्पणी-मसौदा लेखन का आयोजन किया गया जिसका विषय “ संस्थान कर्मचारी एवं सेवानिवृत्त पेंशनभोगी तथा उनके आश्रित परिवारजनों द्वारा ली जा रही चिकित्सा सुविधा एवं चिकित्सा प्रतिपूर्ति के दुरुपयोग रोकने हेतु, संस्थान के निदेशक के समक्ष अनुमोदनार्थ टिप्पणी लिखते हुए एक परिपत्र का मसौदा प्रस्तुत करें” था। इस प्रतियोगिता में कुल 15 प्रतिभागियों ने भाग लिया जिनमें सुश्री मीना बगियाल प्रथम स्थान पर, सुश्री रीतिका गेरा द्वितीय स्थान पर, श्री विजय कुमार एवं श्री ईश्वर दयाल ने संयुक्त रूप से तृतीय स्थान प्राप्त किया।

दिनांक 21 सितम्बर 2025 को पोस्टर प्रतियोगिता का आयोजन किया गया जिसका विषय “ पशु जैव-विविधता का संरक्षण: अभी नहीं तो कभी नहीं” था। इस प्रतियोगिता में कुल 6 प्रतिभागियों ने भाग लिया जिनमें सुश्री शालिनी यादव प्रथम स्थान पर, श्री अजय सिंह द्वितीय स्थान पर, सुश्री मीना बगियाल तृतीय स्थान पर रहे तथा सुश्री विधि गर्ग ने प्रोत्साहन पुरस्कार प्राप्त किया।

दिनांक 22 सितम्बर 2025 को शब्दार्थ/अनुवाद प्रतियोगिता का आयोजन किया गया जिसमें कुल 17 प्रतिभागियों ने भाग लिया। शब्दार्थ/अनुवाद प्रतियोगिता में 25 अंग्रेजी तथा 25 हिंदी भाषा के शब्दों को क्रमशः हिंदी तथा अंग्रेजी में अनुदित करना था। सुश्री आरती प्रथम स्थान पर, सुश्री रीतिका गेरा द्वितीय स्थान पर, सुश्री मीना बगियाल तृतीय स्थान पर रहे तथा सुश्री अनीता चन्दा ने प्रोत्साहन पुरस्कार प्राप्त किया।

दिनांक 23 सितम्बर 2025 को आशु-भाषण एवं काव्य-पाठ प्रतियोगिताओं का आयोजन किया गया जिनमें क्रमशः 15 तथा

13 प्रतिभागियों ने भाग लिया। आशु-भाषण में सुश्री अनीता चंदा प्रथम स्थान पर, श्री विजय कुमार द्वितीय स्थान पर, सुश्री रीतिका गेरा तृतीय स्थान पर रहे जबकि श्री ईश्वर दयाल एवं सुश्री विधि गर्ग ने संयुक्त रूप से प्रोत्साहन पुरस्कार प्राप्त किया। काव्य-पाठ प्रतियोगिता में सुश्री मोनिका शर्मा प्रथम स्थान पर, सुश्री पूजा छाबड़ा द्वितीय स्थान पर, सुश्री रीतिका गेरा तृतीय स्थान पर रहे जबकि सुश्री उपासना शर्मा एवं सुश्री अनीता चन्दा ने संयुक्त रूप से प्रोत्साहन पुरस्कार प्राप्त किया।

दिनांक 24 सितम्बर 2025 को वाद-विवाद प्रतियोगिता का आयोजन किया गया जिसका शीर्षक था “जैविक खेती लाभदायक है”। इस प्रतियोगिता में 10 प्रतिभागियों ने भाग लिया जिनमें सुश्री रीतिका गेरा प्रथम स्थान पर, सुश्री पूजा छाबड़ा द्वितीय स्थान पर, सुश्री मोनिका शर्मा तृतीय स्थान पर रहे जबकि सुश्री विधि गर्ग ने प्रोत्साहन पुरस्कार प्राप्त किया।

दिनांक 25 सितम्बर 2025 को “उत्कृष्ट हिंदी कार्मिक वर्ष 2024-25” प्रतियोगिता का आयोजन किया गया। विधिवत रूप से गठित समिति ने वर्ष 2023-24 में प्रतिभागियों द्वारा हिंदी भाषा में किए गए राजकीय कार्यों का गहनता से निरीक्षण किया तथा श्री सतीश कुमार को प्रथम स्थान, श्री नरेश कुमार को द्वितीय स्थान तथा श्री रमेश पाल को तृतीय स्थान प्रदान किया।

ब्यूरो के निदेशक डॉ. एन.एच.मोहन ने दिनांक 30 सितंबर 2025 को सभी विजेताओं को प्रमाण-पत्र देकर सम्मानित किया।

राजभाषा विभाग स्वर्ण जयंती समारोह में सहभागिता

राजभाषा विभाग द्वारा माननीय गृह एवं सहकारिता मंत्री की अध्यक्षता में 26 जून 2025 को राजभाषा विभाग स्वर्ण जयंती समारोह का आयोजन भारत मंडपम, नई दिल्ली में किया गया। इस आयोजन में डॉ. अनिल कुमार मिश्र एवं श्री राकेश कुमार ने भाग लिया।

हिंदी में उत्कृष्ट कार्य हेतु संस्थान राजभाषा शील्ड द्वितीय पुरस्कार

वर्ष 2024-25 के दौरान राजभाषा में उत्कृष्ट कार्य हेतु राष्ट्रीय पशु आनुवंशिक संसाधन ब्यूरो, करनाल को नगर राजभाषा कार्यान्वयन समिति, करनाल द्वारा राजभाषा शील्ड द्वितीय पुरस्कार से सम्मानित किया गया। यह पुरस्कार नराकास करनाल की दिनांक 27 जून 2025 को आयोजित 81वीं 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 पन्द्रहवें अंक (वर्ष 2024) को द्वितीय पुरस्कार से सम्मानित किया।



2 ZERO
HUNGER



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.



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