

Research

Phenotypic Mapping of Animal Genetic Resources in Dehradun District of Uttarakhand

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ABSTRACT

Phenotypic mapping of Animal genetic resources (AnGR) refers to the systematic documentation of livestock and poultry populations within specific geographical regions. This approach aids in cataloguing all recognized breeds and populations present in the area, as well as monitoring populations that migrate over time due to their functional value or economic viability. A field survey was conducted in five blocks of Dehradun district and the nearby area (Sahaspur, Vikasnagar, Doiwala, Kalsi and Jwalapur) to document livestock composition and identify distinct populations. The survey revealed predominance of indigenous crosses of Jersey and Holstein Friesian breeds, along with the presence of Belahi cattle, Murrah and Gojri buffaloes, some non-descript goats and backyard poultry, including Aseel and Kadaknath breeds. Notably, a lesser-known cattle population was identified in the Kalsi and Chakrata blocks, *Chakrati* or *Kalsi* cattle. These animals exhibited distinct traits including small body size, white to light grey coat colour, and a prominent hump and dewlap. The identification of this population underscores the need for further phenotypic and genetic studies, and conservation strategies to safeguard livestock biodiversity in the Himalayan region. This study provides comprehensive information about the livestock and poultry populations in the Dehradun district of Uttarakhand.

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INTRODUCTION

Indigenous livestock exhibit remarkable variability and possess several desirable attributes, including disease tolerance to various diseases, tolerance to hot and humid climates, adaptability to diverse environments and production systems, and the ability to efficiently utilize coarse roughages and crop residues. Due to their adaptability and disease resistance, breeds such as Gir, Ongole, and Sahiwal have been introduced in several countries worldwide (Pundir, 2022).

Traditionally, locally adapted breeds have been selected empirically and without structured breeding programs to meet diverse objectives, focusing primarily on adaptability and resilience rather than solely on production traits. These breeds possess unique characteristics suited to their specific production environments, including resilience to harsh conditions and resistance to endemic diseases (Prakash *et al.*, 2024). They play an essential role in supporting the livelihoods of smallholder farmers and pastoral communities, as their products are well appreciated in local markets. However, many of these breeds remain at risk of extinction, necessitating urgent recognition and policy support to counter genetic erosion and promote sustainable utilization.

The effective conservation and improvement of these breeds requires accurate and comprehensive information on their phenotypic and genetic characteristics, as well as their production and marketing environments. Such data can only be generated through systematic characterization studies involving robust analysis and interpretation.

Phenotypic mapping refers to the systematic documentation of livestock and poultry populations within specific geographical regions. This approach aids in cataloguing all recognized breeds and populations present in the area, as well as monitoring populations that migrate over time due to their functional value or economic viability. In the present study, phenotypic mapping was conducted in the Dehradun district of Uttarakhand, leading to the identification of a lesser-known cattle population.

METHODOLOGY

A field survey was conducted in four blocks of Dehradun district (Sahaspur, Vikasnagar, Doiwala, and Kalsi) and one block of Haridwar district (Jwalapur) in Uttarakhand, India. Further, four blocks were randomly selected from the six blocks of Dehradun district. Within these blocks, 2 to 3 villages were also randomly selected

to explore the AnGR. The objective of the survey was to document the existing animal genetic resources and prevalent livestock management practices in these regions. Information on livestock species, breeds and management practices was collected through direct observations and farmer interviews. Phenotypic characterization of a newly identified cattle population was carried out following the standard guidelines prescribed by the ICAR-National Bureau of Animal Genetic Resources (NBAGR). Physical measurements recorded included body length, body girth, body height at withers, horn length, tail length and dewlap characteristics. Measurements were taken using a measuring tape and recorded in centimetres.

RESULTS

Livestock Composition in the Surveyed Area

The survey revealed that the majority of cattle in the region were crossbreds, primarily Jersey and Holstein Friesian (HF) crosses, maintained mainly for milk production. In addition, the Belahi cattle breed was also reared by some farmers. Among buffaloes, Murrah and Gojri buffalo breeds were most commonly observed. The goat population consisted of non-descript mixed types; however, a few white goat with uniform characters were observed in the Kalsi block. Besides large ruminants, farmers were also found maintaining chicken as backyard poultry, supplied by state livestock development agencies. In addition, Aseel and Kadaknath breeds were also found to be reared by some farmers.

Identification of a Lesser-Known Cattle Population

During the survey, a distinct and homogenous cattle population was identified in the Kalsi and Chakrata blocks of Dehradun district. These animals were characterized by a small body size, white to light grey coat colour, a prominent hump and dewlap. This cattle population needs to be comprehensively characterized to distinguish it from the registered breeds of the nearby region. The Chakrati or Kalsi cattle have been depicted in Figure 1.



Fig. 1: Lesser-known cattle population (Chakrati or Kalsi) of Dehradun, Uttarakhand

DISCUSSION

The present survey highlights the diversity of livestock resources and management practices in the surveyed blocks of Dehradun and Haridwar districts of Uttarakhand. The predominance of Jersey × Holstein Friesian (HF) crossbred cattle reflects a trend toward crossbreeding for enhanced milk production, a practice commonly adopted in hilly and lower altitude regions to improve dairy productivity (Basic Animal Husbandry Statistics, 2019). The presence of the Belahi cattle breed indicates that indigenous breeds are being maintained by some farmers, possibly due to their adaptability and lower input requirements.

Among buffaloes, Murrah and Gojri types were the most frequently observed. Murrah buffaloes are well known for their superior milk yield and adaptability, while Gojri buffaloes, a regional type, may possess traits related to disease tolerance and resilience in local environmental conditions. The goat population largely consisted of non-descript types, which is consistent with previous reports from similar agro-climatic zones (Bhateshwar *et al.*, 2018). However, the occurrence of a few uniform white goats in the Kalsi block suggests the potential presence of a homogenous or locally adapted population that warrants further investigation and characterization.

The practice of maintaining backyard poultry with improved strains provided by state livestock development agencies demonstrates efforts toward nutritional security and income diversification in rural households. The presence of Aseel and Kadaknath breeds further indicates a growing interest in native poultry breeds, likely due to their better meat quality and higher market demand.

A significant finding of this survey was the identification of a distinct cattle population in the Kalsi and Chakrata blocks, referred to as “Chakrati” or “Kalsi” cattle. These animals exhibit unique phenotypic traits such as small body size, white to light grey coat colour, and a prominent hump and dewlap, differentiating them from other recognized indigenous breeds of Uttarakhand. The recorded morphometric values indicate that these animals are smaller than most standardized Indian zebu breeds (e.g., Gir, Sahiwal), suggesting their suitability for low-input systems in hilly terrains. The presence of such a population highlights the importance of systematic documentation and conservation of unexplored genetic resources, as these animals may possess adaptive traits such as disease resistance, heat tolerance, and efficient feed utilization, which are critical under changing climatic scenarios.

Further genetic and molecular studies are needed to confirm the distinctness of this population and to

understand its evolutionary relationship with other recognized breeds. Recently developed technologies, such as sequencing technologies and SNP genotyping, would help in aiding conservation efforts and improving livestock development strategies (Chaudhary *et al.*, 2022). Establishing breed status and conservation strategies for this cattle population would contribute to the preservation of livestock biodiversity in the Uttarakhand region.

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