

Research

Documentation of Animal Genetic Resources and Identification of Potential Populations in Arunachal Pradesh

Saket K Niranjana^{1*}, A. K. Mishra, Amod Kumar, Bina Mishra, J. K. Singh², G. B. Garam³ and Taba Heli³

¹ICAR-National Bureau of Animal Genetic Resources, Karnal - 132001, Haryana, India

²Krishi Vigyan Kendra, Tawang - 790104, Arunachal Pradesh, India

³Department of Animal Husbandry, Veterinary & Dairy Development, Govt. of Arunachal Pradesh, Itanagar - 791109, Arunachal Pradesh, India

ABSTRACT

Arunachal Pradesh is the largest state in the North East region of India; a large part of the state's territory falls within the temperate and sub-temperate climate zones. The state is a hotspot of the floral and faunal diversity, including Animal Genetic Resources (AnGR) for food and agriculture. Arunachal Pradesh, although it has the highest number of animals per capita in the country, has a large proportion of non-descript livestock. To document all AnGR and identify homogenous potential breeds, we surveyed five different regions of the state. Among the 12 farm animal species in the state, a pattern of region-specific species was observed. Further, livestock distribution across regions is uneven; two-thirds of the population was concentrated in seven districts of the state's lower belt. Five new homogeneous populations, namely Monyul Bah and Subansiri cattle, Arunachali goat and chicken, and Eki dog, were identified in various regions of the state. This documentation would be important for assessing AnGR diversity and for formulating a suitable policy for the state's genetic improvement programmes. Further, newly identified indigenous populations may be recognised as indigenous breeds, thereby strengthening the country's sovereignty over native germplasm.

Keywords: AnGR, Arunachal Pradesh, Documentation, Indigenous livestock

*Corresponding author: saketniranjana@gmail.com

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INTRODUCTION

Arunachal Pradesh is the largest state of the North East region of India, and is well known for its natural flora and fauna. Owing to its rich biodiversity, it is recognised as one of 36 global biodiversity hotspots (www.conservation.org). A significant geographical region of the state is covered by temperate, sub-temperate, and alpine climates, with stratification by altitude. Because of its mild climate, more than two-thirds of the area is covered with forests. The state receives substantial annual rainfall of 200 to 500 cm. The state is administered through two divisions – East and West – comprising a total of 25 districts and 3,863 villages. Monpa, Tani, Tai and Naga are major communities, and Christianity, Hinduism, Donyi-Polo and Buddhism are major religions in the state (www.arunachalpradesh.gov.in). With 17 people and 14 livestock per square km, the state is the least densely populated region.

Arunachal Pradesh is an Agrarian state, with 70% of its population dependent on agriculture (<https://agri.arunachal.gov.in>). Most of the state's agrarian society depends on animal husbandry (Sasmal *et al.*, 2025). The state had 1.16 million livestock and 1.59 million poultry in 2019 (20th Livestock Census, 2019). The state

possesses a sufficiently large number of livestock and poultry species compared to other states in the country. The state has the highest per-capita animal share in the country. A major decline in livestock and poultry genetic resources has been observed in the state during the last two censuses, 2012 and 2019 (20th Livestock Census, 2019). Nearly two-thirds of the livestock population is concentrated in the seven districts of the lower region. The state has only three indigenous livestock breeds: the Arunachali yak, Tibetan sheep, and Bhutia horse (www.nbagr.res.in). At present, the population of recognised livestock breeds comprises only 2 per cent of the total livestock population. In contrast, the remaining livestock (98%) are of a non-descript type (20th Livestock Census 2019). Owing to a large proportion of undocumented AnGR and the high likelihood of unique populations and potential breeds of livestock, poultry, and dog species in the region, this study was undertaken.

MATERIALS AND METHODS

Surveys were conducted in field areas across 16 districts in five major sub-regions of Arunachal Pradesh (Fig. 1). These regions are as follows: i) Kameng sub-region: Tawang and West Kameng districts; ii) Subansiri

sub-region: Lower Subansiri, Kra-Daadi, Pampumpare districts; iii) Siang sub-region: Upper Siang, East Siang, Siang districts; iv) Lohit sub-region: Lower Dibang valley, Lohit, Namsai districts; and v) Tirap sub-region: Changlang, Tirap and Longding districts. The

survey covered two to three blocks (based on livestock population density) in each representative district. During the surveys, we documented all available AnGR in the sub-regions, and further explored homogenous native population(s) as potential breeds.



Fig. 1: Districts of the Arunachal Pradesh surveyed under the study

All kinds of native livestock, poultry, and dog genetic resources were documented and confirmed for the population /breed types. Changes in the population dynamics of various species were also assessed. Information on their utility, uniqueness and distribution for native livestock species was gathered from stakeholders. Information from native livestock keepers and other stakeholders was corroborated to assess the new population.

RESULTS AND DISCUSSION

AnGR distribution

Surveys across the regions revealed that 11 livestock and poultry species were reared in Arunachal Pradesh. These farm animal species included cattle, mithun, yak, buffalo, goat, sheep, pig, horse, chicken, duck, and Muscovy duck. Cross-hybrids of cattle x yak and cattle x Mithun also existed in different parts of the state. All these species and selected hybrids were reared by the local people in rural areas under extensive and semi-intensive systems. Apart from these, dogs and cats were also kept as pets by nearly every household.

Based on the 2019 Livestock Census data, nearly two-thirds of the livestock population was concentrated in the districts of Papumpare, Kurung Kumey, Lohit, Changlang, East Kameng, East Siang, and West Siang.

Cattle, mithun, goats, pigs and chickens were reared across all the districts of Arunachal Pradesh. A high cattle density was observed in Lohit district, followed by Lower Subansiri and East Sing. Mithun were prevalent mainly in Papumpare, Kurung-Kumey, Lower Subansiri, East Kameng, Upper Subansiri, West Siang and Upper Siang. Yak, Dzo-Dzomo, and sheep were reared mainly in high-altitude alpine and temperate pastures and grazing lands of the Tawang and West Kameng districts of Arunachal Pradesh. The buffalo population was restricted to the warm climate of the Lower Dibang Valley, Tirap, Lohit, Changlang, and East Siang districts. Cross-hybrids of cattle with mithun and yak were also abundantly present in various parts of the state. However, cross-hybrids of yak and mithun were rarely observed, possibly due to separate geographical distributions with separate altitude, although interbreeding between these two bovine species has been reported.

Species-wise AnGR documentation

Cattle

Native cattle of Arunachal Pradesh were, in general, small to medium-sized; with two types of major coat colours: 1) White-creamish to reddish-brown, 2) solid black, or black with white patches (Fig. 2). The White-creamish to reddish-brown cattle were found to be

distributed across the state, however, predominant in Upper Subansiri, West Kameng, and the upper parts of Changlang, East Kameng, West Siang, and Siang districts and other lower regions of the state (Fig. 1a). These cattle were found to be phenotypically close to Lakhimi cattle of Assam. Cattle with black solid or with white patches were predominantly distributed in the Temperate region of Tawang and the Sub-temperate region of West Kameng district. The cattle population of the region was phenotypically much similar to, but

smaller than, the Siri cattle of Sikkim (Pundir *et al.*, 2016). Hump in indigenous cattle was found to be less developed in all cases, especially in females. Appearance of hump in breeding bulls indicated its indicus lineage, specially in black cattle of Twang and West Kameng (Fig. 1b). Horns were short and stumpy in females and medium in size in males in both types of cattle. The tail was extended beyond the hock joint. These cattle were reared by the native peoples for milk, manure and draught purposes.



Fig. 2: Cattle genetic resources of Arunachal Pradesh

Yak

Yaks of Arunachal Pradesh are recognised as 'Arunachali' breed were found to be distributed mainly in the West Kameng and Tawang districts of Arunachal Pradesh (Fig. 3; Pandey *et al.*, 2020). These were reared in high-altitude areas (above 3000 meters) under a pastoral system. Arunachali yaks were reared Monpa peoples of high-altitude areas (above 3000 meters) for milk, hair & fibre, and are also used for transportation and as manure. Milk production was found to be 0.5 to 1.0 kg per day, slightly lower than Ladakhi yak (Niranjan *et al.*, 2025). Yak milk is used to make butter, ghee, and churpi.



Fig. 3: Arunachali yak

Mithun

Mithun was found distributed across all regions of Arunachal Pradesh and reared mainly as a meat animal (Fig. 4). Arunachali mithun seems different from the Nagami mithun, a registered breed in the

country. Milking of mithun was also practised in some of the regions. It has great social, economic, and cultural importance for the local tribes inhabiting the North-eastern region. The species seems to be close to wild gaur (Bison) and has been described as semi-domesticated (Gupta *et al.*, 1996). However, the species is sufficiently domesticated, although its management and production systems are well integrated with forest areas. Shivaji *et al.*, (2018) also suggested the domestication of the mithun in the present scenario, acknowledging mithun husbandry. Milk productivity is very low compared to other bovines, ranging from 1 kg to 1.2 Kg per animal. The species might be having high potential for meat and milk production if fully domesticated.



Fig. 4: Mithun genetic resources of Arunachal Pradesh

Bovine Cross-hybrids

Mithun and cattle Cross-hybrids generally existed in the transition regions of native cattle and mithun populations (Fig. 5). Most of the time, these hybrids were developed through natural breeding. As an estimate, the hybrids may be about 10-20% of the total yak and mithun population. People's preference for cross-hybrids of yak and local cattle for increased milk production is also a major cause of the decline of

the yak population in the region. It is estimated that about 30 to 40 per cent of yaks in the region are cross-hybrids. Hybrids of yak and cattle were distributed in the upper and middle parts specially Tawang and West Kameng districts of Arunachal Pradesh. These hybrids were also found to be preferred for improving milk

production and better adaptability to temperate and sub-temperate climate, compared to the yak. Most of the hybrids were produced through interbreeding using yak as a sire and a native cow as dam. Cattle and yak, both having 60 chromosomes; however, only female hybrids were found to be fertile.



Fig. 5: Bovine hybrid populations in Arunachal Pradesh. a) Yak-cattle hybrid, b) Mithun-cattle hybrid

Goat

Indigenous goats were distributed across the regions of the state. Goats in the lower parts of the regions, especially in areas sharing the boundary with Assam, were found to be more phenotypically similar to the Assam hill goat. The goat population in temperate and

alpine regions of Arunachal Pradesh, such as in Tawang district, were having more hairy coat with a distinct coat pattern (Figure 6). Hairy coat in these goats might be associated to its adaptiveness to high-altitude region. Across the regions, the goats were utilised for meat and manure and reared in a semi-intensive system.



Fig. 6: Goat genetic resources of Arunachal Pradesh

Sheep

Tibetan sheep, also known as Luk/Behrlung, is a registered indigenous sheep breed from the region. The breed's name derives from its place of origin, the Tibetan Plateau in the Himalayas (Fig. 7). The breed is distributed in the upper reaches of North Sikkim (Phalung and Donkong valley). The community responsible for developing the breed is the Dokpa (Bhutia) tribe, of Tibetan origin. Much of the native sheep population seems crossbred of Merino/Rambouillet exotic germplasm. These animals possess prominent white coat colour with black or dark brown neck and face. The face is black or brown, spotted with white or completely white, with black eyes; brown and black spots are often observed on the body. The nose line is convex; some animals have a typical Roman



Fig. 7: Sheep of Arunachal Pradesh

nose shape. Tibetan sheep are medium in size, with a well-proportioned, rectangular body shape and conformation. Ears are medium in size and drooping. The ewes are polled, while rams have horns. The horns curved downward and forward. Head, face and legs are bare while the belly is covered with wool. The fleece colour is creamy white. The tail is short and thin. Tibetan sheep are prized for their meat, and their wool is known for its high-quality carpeting. The adult body weight of males varied from 39 to 50 kg, and of females

from 37.49 kg. Annual greasy fleece production is 700g (550 to 800) with a fibre diameter of 26 to 33 microns.

Other minor populations

Buffalo: Small number of buffaloes are present in lower regions of Arunachal Pradesh. These buffalo seem to be swamp type, more similar to Luit (swamp) buffalo of Assam, which needs to be confirmed through the cytogenetic studies (Fig. 8).



(a)



(b)

Fig. 8: Minor livestock species of Arunachal Pradesh. a) Buffalo, b) pony

Pony: The Bhutia ponies are distributed in the Middle/ Eastern Himalayas, along the Tibet border in Sikkim, Darjeeling, and Arunachal Pradesh, in the area adjoining Bhutan (Fig. 8). The main coat colours are usually grey and iron grey, occasionally chestnut and roan. The manes are large and thick. The Bhutia ponies have a comparatively larger head, a pronounced jaw, and a straight profile. These ponies have short necks, a straight back, sloping quarters and a deep chest. They are low at the withers, with a mean height of 127 cm

(114-134 cm). The Bhutia ponies have strong muscular legs. Their feet are fairly open at the hoofs. They are used for riding and carrying packs. They usually keep to the extreme edges of the mountain tracks to avoid bumping the pack against the cliff wall.

Pig: The pig population in Arunachal Pradesh is scattered across the region. A smaller number of pigs were found in the Eyek pig of the Siang valley, which may be unique and warrant further characterisation (Fig. 9).



Fig. 9: Pig genetic resources of Arunachal Pradesh

Poultry

Native poultry includes Perok chicken and Pejab-Pakkam duck, which are distributed across the region. Chicken is the main poultry species in the region, with most of the indigenous types. The Red Jungle Fowl is present in appearance; however, it is completely

domesticated and densely distributed across the state, possibly originating in the Tirap and Longding districts of Arunachal Pradesh (Fig. 10). Indigenous duck is also available in small numbers in the lower regions of these districts; however, it is more continuous with the duck population of Assam (Fig. 10).



Fig. 10: Poultry genetic resources of Arunachal Pradesh

Region-wise AnGR documentation

Tawang and West Kameng region:

Cattle and yaks were the major livestock species in the region, reared mainly for milk and manure. Cross-hybrids of yak-cattle and mithun-cattle are also evident and preferred for milk over other species. Native populations of goat, sheep, chicken and duck were also found; these populations were highly sporadic and very low in number. Crossbred cattle of Jersey and HF lineages were also present in some regions and were preferred over native cattle for higher milk yield. The yak population was distributed mainly in the high-altitude region of Tawang district. Native goats were found to be slightly different to the Assam Hill goat. The goat population was sparsely distributed; therefore, its uniqueness and potential as a breed could not be ascertained. Native sheep were either Tibetan or their grade and were thinly distributed. Bhutia horses were available but were declining in utility, which affected the overall population in the region. Red Jungle fowl were also available in very small numbers in the region. Native duck was found to be quite distinct from extant duck breeds; however, the population was very sparse in both districts.

Siang and Dibang region

Mithun, humped cattle, goats, and pigs are major livestock species in the region, reared mainly for meat. However, these populations were highly sporadic and very low in number. Mithun, with high homogeneity, was distributed all along the regions of Siang and Lower Dibang. Coat colour was dark grey to black with white stockings in 90% of the animals. There was no evidence of cross-hybridisation between mithun and cattle.

Cattle were found to be mixed breeds in all visited regions. Most of the cattle were medium-sized, with mixed coat colours (reddish/ grey/ white). In the lower regions of East Siang, the cattle were found to be close to the Lakhimi cattle of Assam. Crossbreeding was not practised generally. Native goats were also found to be homogeneous. These are medium-sized, with a distinctive coat pattern, and are distinct from the Assam Hill goat. Although sparsely distributed, similar goats were also distributed in the Tawang region. The native goat may be a potential population for further characterisation. The native pig is small and unique; however, its population is very low. Further, it is being replaced by medium- and large-sized pigs in Assam. Poultry species included mainly chicken and Muscovy duck. Native chicken is much more like the Red Jungle Fowl in appearance; however, it is distributed sparsely.

The Muscovy duck has been introduced in the region from Assam.

Subansiri region

The population of Mithun in Lower Subansiri and Kra Daadi districts was very low. Native Arunachali goats from all regions have a peculiar brown-and-fawn coat with dark-coloured stripes on the back and face. These medium-sized goats are distinct from the Assam Hill goat and are homogenous. Although sparsely distributed, similar goats were also distributed in the Tawang region. The native goat may be a potential population for further characterisation. Subansiri cattle look quite different from other native cattle of the state.

Namsai, Lohit, Changlang, Tirap and Longding region

Cattle in the region are mostly small, with reddish or creamish coat colour across all five districts, very similar in appearance to Lakhimi cattle. In the lower regions adjoining Assam in these districts, the cattle are slightly larger and of the Lakhimi type. Milk production is 1-3 kg/day with a lactation length of 6-8 months. Crossbreds are also available in all districts; however, the population is increasing in the Namsai and Lohit districts. It has been observed that the crossbreds are larger in size and seem hesitant to graze in sloppy terrains. Indigenous cattle rearing is also being banned in some regions of Tirap and Longding districts due to damage to agricultural crops caused by cattle reared under the free-range/extensive system. No new potential cattle population appears in these districts. A number of swamp buffaloes were observed in the Tirap district, introduced from the adjoining Assam region.

Native goats are homogeneous in appearance across most regions in these districts. However, the population is declining in Tirap and Longding districts due to

damage to free-range agricultural crops. These are medium-sized, with a peculiar brownish coat and a black topline. Twining is common. Reared under an extensive system, this population is similar in appearance and in continuity of the geographical distribution of the '*Arunachali*' goat available in other districts. In one region of Namsai district, a highly prolific goat population capable of producing 4-5 kids is available, though in small numbers. Although sparsely distributed, similar goats were also distributed in the Tawang region. The native Arunachali goat is a potential population for further characterisation in continuity. Assam Hill and Black Bengal goats, along with their grades, are also available in the lower parts of these districts. These goats are more prone to respiratory ailments, and high mortality has also been observed. The native pig, small in size and black in colour, is now scarcely available. Most of the pigs are now being procured from Assam. These pigs are mainly crossbreds of Large Black and White Yorkshire. In the near future, native pigs may be completely wiped out. *Chicken* is the main poultry species in the region, with most of the indigenous types. Much of the Red Jungle Fowl is in appearance; however, it is completely domesticated and densely distributed in the Tirap and Longding districts. It is a potential chicken population originating in Tirap and Longding districts and distributed across a large part of Arunachal Pradesh. Indigenous duck is also available in small numbers in the lower regions of these districts; however, it is more continuous with the duck population of Assam. Native "*Eki*" dog is also available across the region (Fig. 11). Physical appearance and morphometric characteristics are also similar. Almost every household rear 1-3 Eki dogs. Coat colour is mainly reddish or cream. The small, tapering, triangular face has a peculiar appearance with erect ears. It is trained for guarding the house.



Fig. 11: Native dogs of Arunachal Pradesh

Identification of new populations

Five homogenous populations were identified in different regions of Arunachal Pradesh. Monyul Bah cattle were explored in the Tawang and West Kameng districts of the state's temperate region.

The homogenous native dog "*Eki*" was identified as a potential breed in the region. It is distributed across the Upper Siang, East Siang, and Siang. Lower Dibang Valley districts. Native Arunachali goats were also found to be homogenous in nature, distributed across the state. These are medium-sized, with a distinctive coat pattern,

and are distinct from the Assam Hill goat. Subansiri cattle of Lower Subansiri and Kra Daadi districts have been identified as a potential population. It is small-sized cattle with a uniform reddish-white coat. Subansiri cattle are phenotypically different from other native cattle (Monbah) of the state. The indigenous chicken population closely resembles the Red Jungle Fowl in appearance in the Tirap and Longding districts. In conclusion, all kinds of AnGR at the state, species, and region levels were documented. The state has shown a region-specific trend in livestock populations. Further, identification of five new potential populations would be important for recognising them as potential breeds in the state.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

REFERENCES

- Gupta N, Gupta SC, Verma ND, Pundir RK, Joshi BK, Nivsarkar AE, and Sahai R. 1996. Mithun: An Important Bovine species of Indian origin. *Animal Genetic Resources Information Bulletin*, 18: 41-48.
- Pundir RK, Singh PK, Dangi PS, and B Singh. 2016. Siri cattle – An endangered breed of Sikkim, India. *Indian Journal of Animal Sciences*, 86 (8): 947–949.
- Pandey NK, Somvanshi SPS, Kumar S, Prakash B, and Singh CK. 2020. Yak rearing practices by (Brokpa) pastoralist of Tawang Arunachal Pradesh. *Journal of Entomology & Zoology Studies*, 8(3): 1067-71.
- Sasmal D, Khoisnam N, Singh SP, Sangwan U, Singale P, Yadav S, Gogoi K, and Namchoom I. 2025. Hurdles and hindrance in livestock and pastoralist farming in Anjaw district of Arunachal Pradesh. *Agritech Today*, 3(6):25-27).
- Shivaji C, Mothilal Y, Hirendra NS. 2018. *Bos Frontalis* (Mithun): A Flagship Semi-Domesticated Mammal and Its Potential For 'Mithun Husbandry'. Development in Arunachal Pradesh, India. *Con Dai & Vet Sci* 1(5)- 2018. DOI: 10.32474/CDVS.2018.01.000122.