



Indigenous Cattle Breeds and Their Economic Importance

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Indigenous cattle breeds are valuable livestock genetic resources that contribute significantly to agricultural sustainability, rural livelihoods and the preservation of biodiversity. These breeds possess important adaptive characteristics, including heat tolerance, disease resistance, hardiness and the ability to survive under low-input management systems. In India, indigenous cattle support rural economies through milk production, draught power, manure, income generation and employment. They also serve as a reservoir of genetic diversity for future livestock improvement programmes. However, these breeds face several challenges, including population decline, indiscriminate crossbreeding, inadequate nutrition, limited veterinary services, weak breeding programmes and reduced demand for draught animals due to mechanization. Effective conservation and sustainable utilization require systematic breed characterization, planned breeding, improved husbandry practices and better market support. This article highlights the characteristics, economic importance and major challenges of indigenous cattle, emphasizing the need to conserve their genetic diversity while improving their productivity and long-term sustainability.

Introduction

Indigenous or native cattle breeds are locally adapted cattle populations that have developed their distinctive characteristics over generations through domestication, natural environmental selection and traditional management practices. In India, these breeds are distributed across diverse agro-climatic regions and possess several adaptive characteristics that make them suitable for livestock production under tropical conditions. Their ability to tolerate heat, withstand certain diseases and survive under challenging environmental and management conditions makes them an important component of India's livestock resources (Srivastava, 2019). India possesses considerable cattle genetic diversity, with 43 registered native cattle breeds, reflecting the wide range of genetic resources that have evolved under different ecological and production systems across the country.

Cattle play a significant role in Indian agriculture and rural economies by providing a range of products and services, including milk, meat, manure and draught power. These contributions support agricultural operations as well as the livelihoods and income of rural households. In addition to their economic functions, indigenous cattle have considerable cultural and religious significance in India. They are closely associated with traditional practices, customs and community life, further increasing their importance within rural society (Sukanya.P *et al.*, 2025).

Despite their importance, indigenous cattle breeds face several challenges that threaten their population and genetic diversity. Crossbreeding with exotic cattle, declining economic viability, reduced utility of traditional draught animals and increasing mechanisation of agricultural operations have been identified as major factors contributing to the decline of some native cattle populations. The conservation of indigenous cattle is therefore important for

maintaining valuable genetic resources and adaptive traits that may contribute to future livestock breeding programmes. Traits associated with heat tolerance, disease resistance, adaptability and survival under stressful environmental conditions may become increasingly valuable in the context of changing climatic conditions (S. Sarang *et al.*, 2024).

Effective conservation requires a balanced approach that combines genetic conservation with scientific improvement and sustainable utilization. Breed characterization, planned breeding programmes, appropriate management practices and active participation of breeders and local communities can contribute to the long-term conservation and development of indigenous cattle breeds.

Characteristics of Indigenous Cattle Breeds

Indigenous cattle breeds are generally recognized for their strong adaptation to the climatic conditions, production systems, and management practices of their native regions. They possess several characteristics that enable them to survive and perform under challenging environmental conditions, including heat tolerance, disease resistance, hardiness and adaptability to extensive production systems. However, their productive performance, particularly milk yield and other economically important traits, varies considerably among breeds. Indian native cattle have evolved under diverse agro-climatic conditions, while indigenous cattle of Africa have similarly developed adaptations to a wide range of local environments. A. Srivastava, 2019.

One of the major characteristics of indigenous cattle is their ability to withstand harsh climatic conditions, including high temperatures and drought. These animals have developed adaptive mechanisms that allow them to maintain survival and production under environmental stresses and limited management inputs. Such adaptability is particularly important in tropical and semi-arid production systems where climatic conditions may impose considerable stress on livestock. Indigenous cattle also possess several traits associated with resistance or tolerance to diseases and parasites. Reported adaptive characteristics include resistance to diseases, ticks, tick-borne diseases, parasites, and, in some Southern African breeds, trypanosomosis. These traits make indigenous cattle valuable genetic resources for developing livestock populations with greater resilience to biotic stresses. Alok R. Rai *et al.*, 2023.

Hardiness and relatively low nutritional requirements are further important characteristics of indigenous cattle. They can often survive and maintain their productive functions under extensive, low-input management systems where the availability and quality of feed are limited. Ethiopian indigenous cattle, for example, have been reported to utilize limited quantities of poor-quality feed resources. Nevertheless, inadequate feed availability remains an important constraint to their overall productive performance. A. Shabtay, 2015. Breed-specific adaptations further demonstrate the environmental resilience of indigenous cattle. Gassara cattle are reported to tolerate harsh environmental conditions and drought, whereas Baladi cattle are noted for their adaptability and efficient utilization of Mediterranean pasture resources. Such characteristics highlight the importance of indigenous breeds in production systems where environmental and nutritional limitations are common. Mohamed Ibrahim Abdi - Soojeede *et al.*, 2024.

Indigenous cattle also have multipurpose utility and contribute to livestock production through milk, meat, manure and draught power. In India, native cattle include both draft and dual-purpose breeds, reflecting their diverse roles in traditional agricultural systems. However, the available sources provide limited information regarding workability and do not offer sufficient comparative data to accurately assess draught performance among individual breeds. Sukanya.P *et al.*, 2025. Milk production also varies considerably among indigenous cattle breeds. Somali Boran and Saywal are described as milk-producing breeds, whereas Dawara has been reported to have comparatively lower milk yields than some other breeds. In Indian indigenous cattle, milk is also associated with the A2 allelic variant, which has generated considerable scientific and commercial interest in native cattle milk. Mohamed Ibrahim Abdi - Soojeede *et al.*, 2024.

Overall, indigenous cattle are characterized by a combination of environmental adaptability, hardiness, disease resilience, efficient utilization of locally available resources and multipurpose utility. These characteristics make them particularly suitable for extensive and low-input livestock production systems. At the same time, considerable variation exists among individual breeds in their productive performance. The available literature does not provide sufficiently consistent breed-wise data to permit precise comparisons of milk yield, milk quality, feed-use efficiency, or draught capacity. Therefore, the evaluation of indigenous cattle should consider not only production performance but also their adaptability, resilience, resource-use efficiency and suitability to local production environments. These attributes make indigenous cattle valuable genetic resources for sustainable livestock production and future breeding programmes.

Economic Importance of Indigenous Cattle

Milk Production

Indigenous cattle make an important contribution to household milk availability, particularly in rural and smallholder farming systems where livestock are maintained as a source of regular food and income. A study involving Amrit Mahal, Hallikar, and Malnad Gidda cattle in Karnataka reported an average household milk production of 1.22 litres per day. In addition to meeting household consumption requirements, milk and dairy products can provide an important source of supplementary income. The development of organized markets for products derived from Sahiwal milk has been suggested as a potential approach to improve economic returns to cattle keepers while simultaneously supporting the conservation of the breed. Furthermore, the relatively low maintenance requirements and strong adaptability of indigenous cattle may make them suitable for low-input dairy production systems. However, the available sources do not provide sufficient comparative information to establish differences in milk yield or profitability between indigenous cattle and other breeds.

Draught Power

Indigenous cattle have traditionally served as an important source of draught power for tillage, transportation and other agricultural operations. Their contribution is particularly relevant in communal and smallholder farming systems, where access to mechanized farm equipment may be limited. Cattle ownership in such systems provides practical benefits through draught power and manure, in addition to supplying milk and meat for household or local consumption. The use of cattle for agricultural work can therefore reduce dependence on external sources of farm power and support the functioning of traditional crop–livestock production systems. Nevertheless, the available sources mainly describe the agricultural role of cattle and do not provide quantitative estimates of the amount of work performed or detailed comparisons of draught value across different farm sizes and production systems J. Barrett, 1991.

Manure Production

Cattle manure represents an important agricultural resource and contributes to nutrient recycling within integrated crop–livestock farming systems. Indigenous cattle can provide farmyard manure that may be utilized for maintaining soil productivity and supporting crop production. In Karnataka, households rearing indigenous cattle were reported to produce an average of 5.98 tonnes of farmyard manure annually. The availability of cattle manure also creates a potential link between indigenous cattle production and organic or low-external-input farming systems. However, although the available sources recognize manure as an important contribution of cattle, they do not provide quantitative evidence regarding its specific effects on soil fertility or the extent to which its use can reduce dependence on chemical fertilizers.

Income and Employment

Indigenous cattle contribute to rural household income and employment through the production, utilization, processing, and marketing of livestock products and services. A study conducted in Karnataka reported an average annual cattle-derived income of ₹16,876 per household, representing approximately 24.82% of total family income, along with an average of 198 employment days per year. Beyond direct income from cattle, livestock value chains can generate additional livelihood opportunities through activities such as animal sale,

transportation, processing, marketing, and distribution of livestock products. These activities demonstrate the broader economic role of cattle within rural communities. However, the available summaries do not provide a detailed breakdown of income generated from individual livestock-related activities, making it difficult to determine the relative contribution of each component to household earnings.

Value of Indigenous Genetic Resources

Indigenous cattle represent an important reservoir of genetic diversity and possess traits that have developed through long-term adaptation to specific environmental and production conditions. Their genetic resources include characteristics associated with heat and drought tolerance, resistance or resilience to ticks, tick-borne diseases, and other livestock diseases. Such adaptive traits can be particularly valuable for livestock improvement programmes under changing climatic conditions and increasing disease pressures. Consequently, systematic breed characterization, conservation, and genetic improvement are important for maintaining these valuable resources and utilizing them in future breeding programmes. Conservation strategies can help preserve genetic potential while planned breeding programmes can support improvements in economically important traits. However, the available sources do not provide specific estimates of the future economic value of individual genes or adaptive traits. G. B. Nyamushamba *et al.*, 2016.

Challenges Faced by Indigenous Cattle

Indigenous cattle face a range of interconnected demographic, genetic, management, institutional, and market-related challenges that affect their productivity, sustainability, and long-term conservation. In several regions, the populations of indigenous animals, particularly males used for draught purposes and natural breeding, are declining due to the expansion of crossbred cattle and increasing mechanization in agriculture. This decline reduces the demand for working bullocks and indigenous breeding bulls, potentially threatening the maintenance of locally adapted breeds (Hiremath *et al.*, 2026). Although crossbreeding can improve productivity when implemented according to local environmental conditions and clearly defined breeding objectives, indiscriminate mating with exotic breeds without proper control of exotic inheritance may lead to genetic dilution and the loss of valuable indigenous characteristics. Furthermore, the comparatively low productivity observed in some indigenous cattle herds cannot be attributed solely to their genetic potential, as inadequate nutrition, limited grazing resources, insufficient veterinary services, and high disease and parasite burdens often restrict their performance (Adane *et al.*, 2021). Traditional or underdeveloped husbandry practices can further limit their productive capacity. These challenges are exacerbated by the absence or inadequate implementation of organized and sustained breeding programmes, including systematic selection, planned mating, clearly defined crossbreeding policies, and effective conservation strategies (Mekonnen *et al.*, 2020). Smallholder farmers also face difficulties in accessing quality feed, animal-health services, improved management practices, and reliable markets, which can adversely affect the productivity and profitability of indigenous cattle rearing. Moreover, changing agricultural practices, increasing mechanization, and evolving farmer preferences have reduced the economic and practical importance of indigenous cattle, particularly draught animals (Nyamushamba *et al.*, (2016). Collectively, these demographic, genetic, management, and socioeconomic constraints contribute to declining populations and highlight the need for effective conservation measures, scientifically planned breeding programmes, improved husbandry practices, and better market support to ensure the sustainable utilization and genetic improvement of indigenous cattle breeds.

Conclusion

Indigenous cattle breeds play an important role in sustainable livestock production by providing milk, draught power, manure, income, and employment while maintaining valuable genetic diversity. Their adaptability to harsh climatic conditions, resistance to certain diseases and ability to utilize locally available resources make them particularly important for smallholder and low-input farming systems. However, declining populations, uncontrolled

crossbreeding, inadequate management and changing agricultural practices threaten their long-term sustainability. Therefore, effective conservation strategies, scientifically planned breeding programmes, improved nutrition, veterinary support and better marketing opportunities are essential. Integrating genetic conservation with sustainable utilization and productivity improvement can help preserve indigenous cattle breeds and strengthen rural livelihoods in the face of changing climatic and economic conditions.

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