



E-ISSN: 2278-4136
P-ISSN: 2349-8234
www.phytojournal.com
JPP 2022; 11(6): 85-89
Received: 22-07-2022
Accepted: 23-08-2022

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Development and conservation of indigenous cattle breed Kenkatha (Kenwariya)

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Abstract

Kenkatha breed of Indian zebu cattle (*Bos indicus*) Kenkatha or Kenwariya breeds hail from the provinces of Bundelkhand in Uttar Pradesh along the bank of the River KEN and the Vindhya ranges in Madhya Pradesh. This breed is named after the river Ken; its breeding tract lies along the bank of River Ken in Panna, Chhatrapur and Tikamgarh districts of M.P. and in Lalitpur Hamipur and Banda District of Uttar Pradesh. As per 19th Livestock Census, India has 190.9 million cattle, which is a major livestock species; represent about 37.3% of total Indian livestock population and 14.7% of total world's cattle population (Anonymous, 2012). 190.9 M cattle and so far 43 registered native cattle breeds. These cattle breeds are specially adapted to different agro-climatic conditions of India and their genetic diversity is due to the process of domestication over the centuries. There is a decrease of 4.10% in cattle population and 3.14% in cattle genetic resources of India as compared to the quinquennial livestock census. The exotic / crossbred population has been increased by 20.18% during the period of last census while population of indigenous cattle has been decreased by 8.94% during the same duration. The reasons for depletion of native breeds include crossbreeding with exotic breeds, economically less viable, losing utility, reduction in herd size and the large scale mechanization of agricultural operation. The native breeds need to be conserved for genetic insurance in future, scientific study, as a part of our ecosystem, cultural and ethical requirements and for energy sources in future. The indigenous breeds of cattle possess various unique characteristics such as the presence of unique genetic variation in HSP70 gene family, carry a 'thermometer gene' and presence of A2 allelic variant in cow milk, which makes them well adapted to the tropical climate.

Keywords: Zebu cattle, indigenous cattle breeds, characterizations, conservation, native

Introduction

Kenkatha breed which is known for its ability to survive in rough environments due to the hilly nature of the region and poor feed resources. Only an animal that can cover long distance and have strong feet can thrive in this region. The bullocks are small but sturdy and are good for cultivation in rocky areas. They are also popular for light draught on road. Nevertheless, the Kenkatha cattle is seen to be good enough for meeting consumption requirements of small families. The different indigenous breeds of farm animals are essentially the result of evolutionary processes; they have adapted to the harsh climatic conditions with low management inputs in terms of feeds, fodder and health care, capable to convert low quality feeds and fodder more efficiently into animal products and better adapted to withstand tropical diseases. They are an integral part of agriculture. These breeds are now subject to fast genetic degradation and dilution because of unplanned breeding and introduction of exotic germplasm through cross breeding (Groeneveld *et al.*, 2010) [19]. As a consequence, some indigenous breeds are becoming endangered and there is depletion of good native germplasm which was having unique quality of disease resistance and heat tolerance.

Characteristics of Kenkatha breed

These animals are small but compactly built with sturdy and powerful bodies. The complexions contain various shades of gray and black and rarely, white, ranging from grey on the barrel to dark grey on the rest of the body. The head is short and forehead is dished. The ears are sharply pointed and do not droop. The horns emerge from the outer angles of the poll in forward direction and end in sharp points. The limbs are short and powerful and the feet are hard. The humps are well developed.

The sheath is somewhat pendulous and ends with a black tip. The dewlap is moderately heavy, the tail is medium length with a black switch reaching below the hocks. Average body height at withers of male is 127 cms and female is 120 cms. Average body length of a male is 119 cms and of a female is 114 cms.

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Table 1: List of Indigenous breeds of cattle showing endangered level

Sl. No.	Breed	Breeding Tract	Pure Breed	Graded	Total	Status of Breed	Sl.	Breed
		Female	Total	Female	Total	Female		
1	Kenkatha U.P.	1019	1065	1182	1414	2194	2479	Critical
2	Rathi A.P.	1849	2772	56	56	1905	2828	Endangered
3	Krishna Valley Karnataka	2683	3462	6189	10919	8872	14381	Endangered
4	Pulikulum T. Nadu	4039	7352	1794	2733	5833	10085	Vulnerable
5	Siri W.B	7933	12171	3143	5578	11076	17749	Vulnerable
6	Bargur T. Nadu	11239	14154	555	2153	11794	16307	Vulnerable
7	Mewati U.P.	11275	14773	12083	18167	23358	32940	Vulnerable
8	Ponwar U.P.	14613	20067	6485	7900	21098	27967	Insecure

Source: Estimated Livestock Population Breed-wise based on Breed Survey-2013

The indigenous breeds of cattle possess various unique characteristics which makes them well adapted to the tropical climate. The negative impact of environmental heat stress on milk production fertility feed intake and growth rate of dairy animals is well known. The efforts have been made to improve the productivity of country's milk demand by introducing exotic germplasm of superior genetic merit through cross breeding that has resulted in serious erosion for indigenous breeds.

Conservation of Indian breeds of livestock

The efforts for conservation of animal genetic resources of India were started with the establishment of National Bureau of Animal Genetic Resources (NBAGR) Karnal has developed *in situ* models of conservation through providing technical input and incentives to the farmers or breeders in the breeding tract of respective breed. *in situ* models were developed for the conservation of Tharparkar and Krishna valley. Kenkatha breeds, Bull of 3 cattle breeds have been selected and trained for semen donation under *Ex situ* conservation and more than 10000 semen doses from three breeds has been conserved, National Animal Gene Bank been

established at NBAGR Karnal with the objective of maintaining the indigenous livestock biodiversity of the country, Animal Genomic resources bank has collection of genomic DNA from 120 breeds / population of livestock. There is urgent need to consider region and breed specific breeding strategies and programmes to conserve the indigenous breeds. The indigenous cattle breeds should be improved by selective breeding in their native tract. The states having large population of cross breeds further cross breeds of local cattle needs to be stopped. There has been change in agricultural production system after 1970 due to mechanization and growing of cash crop. The agricultural production system has been completely changed, hence; there has been reduction in land holding, common grazing area and also in herd size. To keep a bull for breed improvement by small farmer with poor resources is not possible and hence he is forced to depend on the bull, available in or around the village / or the semen available, which may not be of the same breed or of good genetic merit. This caused the genetic dilution and reduced performance of progeny.

Table 3: New Cattle breeds registered at NBAGR, Karnal (NBAGR, 2018)

38 Belahi Haryana and India_cattle_0532_	20000-30000	Dual	Vohra <i>et al.</i> (2012) ^[24]
39 Gangatiri Uttar Pradesh and India_cattle_2003_	364806	Dual	Singh <i>et al.</i> (2007) ^[25]
40 Badri Uttarakhand India_cattle_2400_	1600000	Dual	Pundir <i>et al.</i> (2013) ^[13]
41 Lakhimi Assam India_cattle_0200_Lakhimi_03041	7879806	Dual	19 th Livestock Census (2012) ^[11]
42 Ladakhi Jammu & Kashmir India_cattle_0700_	54000	Dual	Pundir (2016) ^[14]
43 Konkan Kapila Maharashtra and Goa India_cattle_1135_Konkankapila_03043	600000	Dual	18 th Livestock Census (2007)

The presence of large population of milch and dual purpose breeds like Gir, Sahiwal, Hariana and Kankrej in many of the states revealed their importance for milk production. Sizable population of Hallikar and Khillar found in Southern and Western part of the country indicated that there is still need of bullocks for the different agricultural operations in that area. In 2007 Census about 138.7 million (69.7%) of total cattle population was declared as non-descript, whereas in 2012 Census about 113.25 million (59.32%) has been declared as non-descript (Anonymous, 2012) ^[2]. Still, there is possibility of many homogenous populations deserving the status of breeds in this huge non-descript figure of cattle. Therefore, there is a need to explore and study the non-descript cattle populations for their description and addition as new breeds in the cattle breed list of India.

Unique Characteristics of Indian Cattle Breeds

The indigenous breeds of cattle possess various unique characteristics, which makes them well adapted to the tropical climate. The negative impact of environmental heat stress on milk production, fertility, feed intake and growth rate of dairy

animals is well known. The *Bos indicus* cattle are more thermo tolerant than the *Bos taurus* breeds due to the presence of unique genetic variation in HSP70 gene family in bovine that might be associated with regulating gene expression or protein function in response to thermal stress (Li *et al.*, 2011; Sodhi *et al.*, 2013) ^[20-21]. The dwarf cows Vechur and Kasargode carry a 'thermometer gene' that allows them to better tolerate high temperature and these dwarf breeds are less susceptible to mastitis and as per Kerala Livestock Census, in the year 2012, not a single case of severe mastitis has been reported among dwarf cows (Dash *et al.*, 2016) ^[6]. Verma and Niranjana (2014) ^[22] reported that suitability of Kherigarh breed in flooded area made the livestock farmers rear this breed despite a low milk productivity of the animals. The A1 β -casein gene is more prevalent in cow milk of exotic breeds, while the A2 allelic variant in cow milk is predominant in Indian Zebu cattle breeds with the highest frequency of 0.987 (Mishra *et al.*, 2009) ^[23] and are known as source of safe milk due to lower incidence of cardiovascular disease and Type-1 diabetes. More than of the Indian native cattle possess homozygous A2A2, the desirable genotype, rest

of the indigenous cattle are supposed to be carrier for A2 allele (Sharma *et al.*, 2014)^[26]. Conversely, the exotic cattle (*Bos Taurus*) have A2 allele in low frequency, worldwide breeds of cattle (Ramesha *et al.*, 2010)^[15]. Now, reorientation of their exotic inheritance with current breeding policy at local levels has become very difficult task.

There has been change in agricultural production system after 1970 due to mechanization and growing of cash crop. The agricultural production system has been completely changed, hence; there has been reduction in land holding, common grazing area and also in herd size. To keep a bull for breed improvement by small farmer with poor resources is not possible and hence he is forced to depend on the bull, available in or around the village / or the semen available, which may not be of the same breed or of good genetic merit. This caused the genetic dilution and reduced performance of progeny.

Small quantity of semen production affects the indigenous breed improvement program at field level. Out of total semen production of 88.55 million doses (2013-14) 30.06% was of exotic, 22.94% of crossbred, 11.19% of Indigenous cattle and 35.81 of buffalo bulls. Actually semen collection share during year 2012-13 was 83.64% and in year 2013-14 it was 82.57% for exotic/crossbred in total semen produced for cattle (Nivsarkar *et al.*, 2016)^[10]. The different breeds of farm animals served different purposes of the owner like milk and draught from cattle. The breeds which do not serve the purpose are neglected. Cattle breeds like Vechur and Punganur are in critical status because they didn't get recognition at proper time.

Majority of cattle genetic resources are currently maintained in situ by farmers and pastoralists as integral component of agricultural production system. The efforts for conservation of animal genetic resources in India were started with the establishment of National Bureau of Animal Genetic Resources (NBAGR) Karnal in 1984 under the ICAR. The ICAR-NBAGR, Karnal has developed in situ models of conservation through providing technical inputs and incentives to the farmers/ breeders in the breeding tract of respective breed. In situ models were developed for the conservation of Tharparkar and Krishna valley breeds. Bulls of 3 cattle breeds have been selected and trained for semen donation under Ex situ conservation and more than 10000 semen doses from 3 breeds has been conserved. National Animal Gene Bank has been established at NBAGR, Karnal, with the objective of maintaining the indigenous livestock biodiversity of the country (Gandhi and Sharma, 2016)^[8]. Animal Genomic resources bank has collection of genomic DNA from 130 breeds/ population of livestock and poultry. Under the Network project on Animal Genetic resources, the characterization (phenotypic and genetic) and development of breed descriptor for 11 breeds of cattle – Deoni, Ongole, Gir, Umblacherry, Bachaur, Dangi, Amritmahal, Khillar, Gaolao, Tho-Tho and Gangatiri has been done. Besides this conservation activities have been undertaken by NBAGR for seven cattle breeds - Krishna Valley, Ponwar, Kherigarh, Kangayam, Nagori, Bargur and Ongole.

In National Livestock Policy, 2013, reorientation of breeding policy for livestock has been suggested to encourage the states to review their breeding policy for different livestock species. There is urgent need to consider region and breed specific breeding strategies and programmes to conserve the indigenous breeds. The indigenous cattle breeds should be improved by selective breeding in their native tract (Niranjan *et al.*, 2018)^[9]. The production levels of defined indigenous

milch cattle breeds (e.g. Gir, Kankrej, Sahiwal, Tharparkar, Rathi, Red Sindhi etc.) ranged between 2000 -2500 kg per lactation. The average 1st lactation milk yield and first lactation length of Kankrej cows maintained at germplasm unit, SDAU, Sardarkrushinagar were 2759 kg and 321 days, respectively (Patel *et al.*, 2016)^[12].

Improvement Programmes

For strengthening the dairy sector, the Government of India has started various central sector schemes like National Programme for Bovine Breeding and Dairy Development (NPBBDD), National Dairy Plan and Dairy Entrepreneurship Scheme. NPBBDD was launched by merger of four existing schemes including Intensive Dairy Development Programme (IDDP) and will have two components namely National Programme for Bovine Breeding (NPBB) and National Programme for Dairy Development (NPDD) (Sharma and Niranjana, 2016)^[27]. The NPBB dedicated for genetic improvement and conservation of indigenous bovine breeds

Results and Discussion

A total of 33 cattle and 7 buffalo breeds are proposed to be covered under the programme. Similarly 6 cattle breeds– Gir, Kankrej, Rathi, Tharparkar, Sahiwal and Hariana have been covered under National Dairy Plan-1 for implementation of progeny testing and pedigree selection (Niranjan *et al.*, 2018). National Kamdhenu Breeding Centre for development and conservation of indigenous cattle (43 breeds) and buffalo (13 breeds) being setup with the objective to conserve and preserve indigenous bovine breeds; and to protect threatened bovine breeds from extinction. The core activities include establishment of nucleus herd of indigenous bovine breeds, establishment of state-of-art semen station and embryo transfer laboratories along with peripheral activities like providing AI and Veterinary facility, fodder production silage and compact feed block making, studying genomics and biology of bovines, creating milk processing facilities and strengthening, training and extension facilities. It is proposed to establish two National Kamdhenu Centers in the country one in North and other in South (Gandhi and Sharma, 2016)^[8]. National Gokul Mission has been sanctioned in XII plan with an outlay of Rs. 500 Crore with the aim to conserve and develop indigenous breeds in a scientific and focused manner (Gandhi and Sharma, 2016)^[8]. The objectives of the scheme are to undertake breed improvement program for indigenous cattle breeds so as to improve the genetic makeup and increase the stock; to enhance milk production and productivity of indigenous bovines; to upgrade non- descript cattle using elite indigenous cattle breeds like Gir, Sahiwal, Rathi, Deoni, Tharparkar, Kankrej and Red Sindhi to distribute disease free bulls of indigenous breeds having high genetic merit for natural service. It is also proposed to establish integrated indigenous cattle centers or Gokul Grams in the breeding tract of indigenous breeds. Fifty Bull Mother Farms having requisite infrastructure for management of animals will be identified in the breeding tract of a particular indigenous breed to provide bulls for natural service. Besides this, there are provisions of establishing breeder societies, incentives to farmers keeping elite animals and award / recognition of breeder societies and farmers.

Governments had decided to increase efforts for proper management and care of indigenous cattle breed in their native tract with the establishment of Cow Sanctuary under National Gokul Mission. The Country's first and unique

Kamadhenu cow sanctuary has been started from 24, December, 2012 at village Salriya in Susner Taluka of Shajapur district, Madhya Pradesh. The objectives of cow sanctuary is to provide shelter to weak, disabled and stray bovine animals; conservation and augmentation of indigenous species, nourishing calves given birth by females of bovine animals in the sanctuary for 36 months and making them available to willing Gram Panchayats or farmers, and production, marketing and management of manure made of cow dung, which is very necessary for organic farming.

For conservation, the most critical steps are to monitor the population of breeds over a time interval, identify breeds at risk, prioritize the breeds for conservation preferably for in situ strategy. National and State livestock census needs to be conducted on breeds and information on ecologies in which they perform. A complete data base should be generated on population of different breeds and identification of the factors threatening the extinction of breeds. Breed wise livestock census can be best utilized to monitor the population status and trends of the cattle breeds. After identifying the breeds that are at risk, breeds for conservation can be prioritized in view of financial expenditure and available infrastructure forces which restrict the number of breeds for conservation at certain time.

Three major strategies are normally followed for conservation of farm animal breeds. The first two i.e. in situ conservation as well as ex situ *in vivo* involves conservation of living population. The third ex situ *in vitro* (cryopreservation) encompasses conservation of living embryo, ova, semen, somatic cell or other animal tissue, DNA etc. stored cryogenically. In situ conservation of breeds is the most preferred method of conservation, by involving livestock keepers in the production system. The maintenance of a breed in its tract also satisfies the requirements of article 8 of the Convention of Biological Diversity, which gives first priority to in situ conservation (Niranjan *et al.*, 2018) ^[9]. Village-based breed improvement programs must be complementary to in situ livestock conservation objectives with the concept conservation through sustainable utilization (Alemayehu, 2013) ^[29]. Ex situ *in vitro* should complement in situ conservation. One of the most useful aspects of cryopreservation is its supportive role in genetic up-gradation of breeds. Realizing that no clear-cut guidelines are available within present

It is necessary that identification, characterization, evaluation and documentation of the genetic resources are completed in next 5-10 years. A complete set of description of every breed should be generated on the basis of various profiles, including their distribution, habitat, body conformation, adaptation, production, reproductive ability and socio-economic aspects. In next 20 years, there is possibility to identify at least 30-50 new breeds of livestock. About 10 new breeds may be identified for each five year (Sharma and Niranjana, 2016) ^[27].

There may be situations where there is need for up-gradation of non-descript of cattle to be done. Under such circumstances grading-up of local cattle with milch breeds (Sahiwal, Gir and Red Sindhi) and dual purpose (Kankrej, Hariana and Ongole) breeds may be undertaken. However a well-defined breeding plan should be developed in concurrence of futuristic need, availability of resources in different regions with avoiding problems of future degeneration of Indigenous livestock.

Sincere efforts should be made to ensure that the livestock farming should be a financially viable livestock enterprise than subsistence farming. Most creative and productive

activities of individuals or groups in every society take place in communities; hence community-based conservation is receiving increasing attention from the stakeholders (Tesfa *et al.*, 2017) ^[28]. Farmers should get access to finance on low interest rate from Financial Institutions and Breeder's Association should made arrangements should to provide services and goods as required as well as suitable and sustainable market for the animal products. If a breed is identified as vulnerable or endangered, the farmers who maintain the animals of this breed should get appropriate compensation at the rate of profit earned through the crossbreds. The village association/ society should also arrange to take up the marketing of animal products. Value addition of the product of indigenous cattle is new possibility for improving our conservation efforts. Efforts like identifying unique biomolecules, producing high quality products with value addition, better marketing and branding could be more important to conserve our indigenous germplasm for longer time. Recently, AMUL has started procurement of Kankrej milk from dairy farmers in North Gujarat and selling as A2 milk at premium price. Further, it is highly desirable to generate adequate information on draft ability of indigenous.

Conclusion

Although indigenous cattle breeds are best suited to their production system, the financial worth, as a whole, of these native breeds and population is not assessed properly. A National watch list should be prepared for indigenous cattle breeds at risk and those requiring conservation they should be conserved in native habitats by adopting participatory approach by involving breeders, communities, gaushalas, NGOs and other relevant stakeholders in conservation programs. Further, increasing productivity through selective breeding or upgrading would help in averting the declining trends of population of indigenous cattle breeds and their sustainable utility. For effective conservation proper coordination among various agencies and formation of "National Consortium of Partners" with a holistic approach is the need of hour.

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