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### Livestock biodiversity in India: A review

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#### Abstract

Livestock biodiversity is integral to our rural livelihood, culture, history, environment, economy and most importantly our future. Ever since, the start of animal domestication around 12,000 years ago in India and other ancient countries, several species, breeds, varieties, strains and types had evolved due to the forces of evolution, artificial selection, either for survival or desired usages in milk, meat, fibre, transport, draught power and other purposes under the specific ecological system. During the process of domestication, unique and genetically good breeds and types have evolved to suit mankind needs and agro-ecological conditions. The present review article is concerned to describe the Livestock biodiversity in India.

**Keywords:** livestock, biodiversity, pig, cattle, buffalo, goat, sheep

#### Introduction

Biodiversity broadly refers to the variety of life forms, from genes to species to broader scale of ecosystem. In other words, it means variety and variability among living organisms, their genetic differences and the ecosystem in which they live (Dogra and Thakur, 2011) <sup>[2]</sup>. This diversity is a vital resource for sustenance of mankind, both at present as well in future, through judicious exploitation, utilization and conservation to meet our food and nutritional security. The term biodiversity also refers to the wealth of the Earth i.e. the millions of plants, animals and micro-organisms that live on our earth, the genes they contain and often delicate ecosystem they formulate (Awasthi *et al.*, 2017) <sup>[1]</sup>. The biodiversity has different levels, needs and values (Verma 2015, 2016) <sup>[10, 11]</sup>. An ecosystem needs three kinds of diversity *namely* biological, genetic and functional. Biological diversity refers to the richness of species in a particular area; genetic diversity refers a way for a particular species to adapt itself to changing environments while functional diversity equates to the biophysical processes that happen within the area. The genetic diversity acts as a buffer for biodiversity (Verma, 2017a) <sup>[12]</sup>. The biodiversity helps in maintaining the ecological balance. There is a necessity of ecological balance for widespread biodiversity and human survival (Verma 2017b, 2018) <sup>[13, 14]</sup>. The climate change has a huge impact on biodiversity (Prakash and Srivastava, 2019) <sup>[6]</sup> and farmers' practices (Mandal and Singh, 2020) <sup>[4]</sup>. It is necessary for inclusive and sustainable development to conserve the biodiversity (Verma, 2019) <sup>[15]</sup>. Livestock biodiversity is not accidental, nor it is purely natural; the range of livestock is the outcome of thousands of years of deliberate selection, exposure to a range of natural condition and farmer level selective breeding (Sadana and Pandey, 2004) <sup>[7]</sup>. Thousands of livestock breeds, from relatively small genetic pools, have evolved over time to suit particular environments and farming systems. But out of thousands species of animals, only 40

species were found useful for domestication by different settlements. Fewer than 14 of these 40 species account for as much as 90 percent of global livestock production of which the major domestic animals are seven mammalian species like cattle, buffalo, goat, sheep, pig, horse and ass and four avian species like chicken, duck, geese and turkey. It is estimated that domestic animal genetic resources contribute to about 30 percent of total human requirements for food and agriculture, either directly or indirectly. They meet various requirements of human being like meat, milk, egg, fibre, fertilizer for crops, draught power etc. Besides, it also reduces farmers' exposure to risk and employs almost 8 percent of total Indian workforce.

The diversity of livestock genetic resources is very wide, both in variety and variability in terms of species, breeds, populations and unique genotypes. Judicious utilization and enhancement of the quality of these resources is important to ensure their sustainability to meet the future demands. Livestock - keeping communities have played a crucial role in the development of most of worlds local breeds and continue to be the custodians of these breeds. Livestock keepers are mixed crop - livestock farmers, pastoralists, and landless livestock keepers from indigenous and non-indigenous communities (Pan, 2010) <sup>[5]</sup>. They have either a long-standing cultural associations with their livestock over many generations and have developed their breeds in interaction with a specific territory or landscape, or they sustain their animals and the environments where these animals live, relying largely on natural vegetation or home-grown fodder and crop by products and without artificial feed activities. Traditional societies everywhere have consciously shaped breeds to their needs and wants, contrary to ethnocentric beliefs among many animal scientists that livestock in developing countries evolved without human interventions.

### Overview of Global Biodiversity

Among some 10 million species of living organisms on earth, 0.5 percent belongs to birds and mammals within this small fraction of animal biodiversity there are about 40 mammalian species that has been domesticated for food and agricultural production and another 80 species still exists as there wild relatives. Only 14 animal species are economically important, among these 14 species around 4000-5000 breeds have been developed for specific uses. However, this animal biodiversity is declining at a fast rate with some 30 percent of the total breeds evolved having got lost during the 20<sup>th</sup> century and many more breeds presently are threatened with extinction.

### Livestock Diversity of India

India is a mega-biodiversity in the world and maintains more than its proportionate share of livestock breeds (Sadana and Pandey, 2004) <sup>[7]</sup>. Approximately 6 percent of the total domestic animal biodiversity exists in India. As per the Food and Agricultural Organization (FAO), data base there are 61 cattle breed, 19 buffalo breeds, 59 sheep breeds, 29 goat breeds, 3 pig breeds, 3 ass breeds, 6 horse breeds, 8 camel breeds and 18 poultry breeds in India (Kushwaha,2017). Over the years, indigenous breeds of livestock were put under the pressure of natural and artificial selection by stakeholders for traits of their need *i.e.* disease resistance, poor roughage based feed efficiency, ability to withstand natural disaster and migration etc.

Locally breeds may produce less compared to highly specialized breeds, but they are better adapted to local climatic conditions and more efficient in use of natural resources, unfit for human consumption and more suitable for exploitation of higher production in medium and low input production system. The important factors that contributed to diversity of animal genetic resources in India are: migration, settlement pattern and sharing of genetic resources by human beings resulting in widespread distribution of most important livestock species, market forces, food habit, changing lifestyle, preferences of local population for production and services.

### Population of different Livestock Species in India

As per the 20<sup>th</sup> Livestock Census 2019, India has a total livestock population of 535.78 million showing an increase of 4.6 percent, over the livestock census of 2012, and is a home of about 11.54 percent of the total livestock population in the world. The total livestock population of Cattle, Buffalo, Sheep, Goat, Pig, Horse and Ponies, Mules, Donkeys, Camels, Mithun and Yak in the country was 512.05 million in 2012. The total number of milch animals, cows and buffaloes has increased from 118.59 million to 125.34 million, with an increase of 6.0 percent. The sheep and goat population presently is 74.26 million and 148.88 million shown an increase of 14.10 percent and 10.01 percent respectively over the previous census. In spite of huge animal resources, India's per capita consumption of animal products has remained lowest in the World. The total number of poultry in the country during 2012 was 729.21 million has reached to 851.81 million, which has shown an increase of about 16.81 percent.

### Production at a Glance

India ranks first in milk production, achieving an annual output of 176.3 million tons during 2017-2018 as compared to 137.69 million tons during 2013-2014, recording a growth of 6.62 percent. Whereas, the Food and Agriculture Organization (FAO) has reported a 3.1 percent Increase in world milk production from 765 million tons in 2013 to 789 million tons in 2014. The per capita availability of milk in India has increased from 176 grams per day in 1990-1991 to 375 grams per day during 2017-2018, which is more than the World average of 294 grams per day and 280 grams per day as recommended by ICMR. Dairying has become an important secondary source of income for millions of rural households engaged in agriculture.

### Breeds of Cattle

As per the livestock census 2019 country has 192.49 million cattle comprising of 35.94 percent of total livestock. India has 37 registered pure indigenous, cattle breeds including Shahiwal, Gir, Red Sindhi, Tharparkar and Rathiare. All these five are known as milch breeds. A few others, such as Kankrej, Ongole and Hariana, belong to dual purpose breeds that have both milch and drought qualities. The rest are poor milkers and known as drought breeds. There are several lesser known breeds. India imported several exotic cow varieties to gain a boost in milk production during last few decades. These breeds produce a lot of milk, but are not well adapted to Indian conditions. On the basis of their utility, cattle breeds are classified into five types: (1) Dairy type breed - 4, (2) Draft type-18, (3) Dual purpose-8, (4) Crossbred-6, (5) Lesser known breeds-13. About 70% of Indian cows are owned by economically poor strata of the society.

### Breeds of Buffalo

Buffalo also known as "Milk-machine" is a premier dairy animal of India and holds the greatest promise and potential for milk, meat and draught. India has inherited the great wealth and diversity of buffalo genetic resources from generations before us. Buffalo has been rightly christened as a black gold mine of India and greatly helps the country to assess their strengths and potential to harness the nature's gift. India is fortunate in terms of largest buffalo population with 109.85 million during 2019, has shown an increase of 1.1 percent over 2012 census. (56.7 percent of world's buffaloes), Buffalo germplasm diversity (13 recognized plus about 17 lesser known defined population groups) and world' best milch breeds are: Murrah, Mehsana, Jaffrabadi, Banni and Nili- Ravi.

### Breeds of Goat

Goats also known as "Poor man's cow" have been an integral component of farming system, plays a significant role in providing supplementary income and livelihood to millions of resource poor farmers and support a large population of landless labourers and migrant farmers. Goat being a key livestock species are an important part of the global agricultural economy (Swaroop *et al.*, 2014, 2019) <sup>[8-9]</sup>. According to 20<sup>th</sup> livestock census 2019, goat population of India is 148.88 millions, sharing to 27.80 percent of total livestock. Goat production system of the country is highly diverse and has been broadly divided into six zones on the

basis of Agro- climatic conditions. Western Himalayan region covering Jammu and Kashmir, Himachal Pradesh, Uttarakhand and hilly areas of Punjab has temperate climate with heavy snowfall in winter. Chegu, Changthangi and Gaddi are the major goat breeds found in this region. Eastern Himalayan region covers mountainous areas of Assam, West Bengal and north east states. Dry Northern regions cover the plains of Punjab Haryana, Delhi, Rajasthan, Gujarat, Uttar Pradesh, Northern Madhya Pradesh and Maharashtra. This zone is gifted with valuable 11 goat breeds accounting to 33 percent goat population of the country. Goats of this region are mostly of dual type and medium to large in size. Eastern region covers the states of Bihar Jharkhand, West Bengal, Assam and Orissa. Bengal and Ganjam are the major meat type goat breeds and low milk yielders. Southern arid/semi arid regions cover plateau and plain regions of M.P., Maharashtra, A.P., Tamil Nadu, Karnataka and Kerala. Osmanabadi, Sangamneri, Kannadu, Malabari and Attapaddy are major meat type goat breeds.

#### **Breeds of Sheep**

The sheep population in India is estimated to be about 74.26 million (2019 census) ranking sixth in the world. The sheep breeds have been classified on the basis of Agro-economical regions viz., (A) North temperate region (B) North Western arid and semi arid region (C) Southern Peninsular region (D) Eastern region.

Classification has also been based on major products *i.e.* (a) apparel wool (b) carpet wool (c) meat and carpet wool (d) meat types. The description of most of the breeds is based on physical conformation and body size with some indication of major products obtained from breeds. Out of the registered thirty nine sheep breeds, some of the important breeds are: Balangir, Bellary Bhakarwal, Changthangi, Chokla, Chota nagpuri, Coimbatore, Deccani, Gaddi, Ganjam, Garole, Jaisalmeri, Jalauni, Kenguri, Magra, Marwari, Mecheri, Muzzafarnagri, Nali, Nellore, Nilgiri, Patanwadi, Poonchi, Ramnad white, Shahbadi, Sonadi, Tibetan, Vembur etc.

#### **Breeds of Camel**

India has around 0.25 million camel, surprisingly the population has given decreasing trend of 37.05 percent, as the population during 2012 census was 0.40 million. The major registered six breeds of camel are Bikaneri, Jaisalmeri, Jalori, Kutchi, Malvi, Marwari, Mewari and Mewati.

#### **Breeds of Pig**

About 1.7 percent of the total livestock is contributed by pigs India has 9.06 million pigs with 1.90 million exotic/crossbreeds and 7.16 million indigenous/nondescript breeds. The total population has decreased by 12 percent over previous census 2012. Major registered breeds are Ghongro and Niang megha.

#### **Breeds of Horse, Pony, Mule and Donkey**

The total population of horses, ponies, mules and donkeys has drastically decreased by 51.9 percent over previous census 2012. Presently population of horses, ponies, mules and donkeys in the country is 0.55 million. Major registered

breeds of horse and pony are Bhutia, Kathiawari, Manipuri, Marwari, Spiti, Zanskari, and of donkey is Spiti whose home tract is Himachal Pradesh.

#### **Conservation**

The last few decades have witnessed serious erosion, and even extinction of some indigenous livestock breeds in the country. Many existing breeds are facing varying degrees of that, endangerment and are heading towards eventual decimation. In all the states, crossbreeding of cattle is now occupying a dominant position in the production programme and in the process the native cattle breeds which are well adapted have suffered willful neglect resulting in their progressive elimination from the production system. It has also been noted that indigenous breeds are more efficient in feed conversion particularly the crop residues and naturally available low quality roughages. Hence, there is an urgent need for preserving the biodiversity and conservation of breeds endangered of extinction.

#### **Conclusion**

India is a mega biodiversity in the world and maintains more than its proportionate share of livestock breeds. Though India accounts for only 1/40th of the total land area of the world it possesses around 11.54% of the world livestock population. The diversity of livestock is not accidental, nor it is purely natural, the range of livestock is the outcome of thousands of years of deliberate selection, exposure to a range of natural condition and farmer level selective breeding. Indian farmers, for centuries, have continuously modified the genetic material available to them by following simple but meticulous breeding schemes from generation to generation. Apart, from physical and biological adaptation forced by the environment, the economic, cultural, religious, and survival factors have also played a role in this diversification. Livestock proliferation and conservation are must globally.

Different livestock breeds were adapted to diverse local conditions. For instance, India has sheep breeds that are adapted to the harsh summers of the West Indian Desert and others that can survive equally harsh winters of Himalayan tracts. There are cattle breeds which thrive in humid hills of the Western Ghats, while other breeds do well in the driest regions of Rajasthan and Gujarat. India is bestowed with rich domestic animal biodiversity having around 61 breeds of cattle, 20 breeds of buffalo, 29 breeds of goats, 59 breeds of sheep, 8 breeds of camel, 6 breeds of horses, 3 breeds of pig and 18 of poultry. Besides, there are other species like Equine, Mithun, Yak, Turkey, Ducks, etc. Indigenous breeds/types are rich in variability and are endowed with many positive traits like superior disease resistance, better tolerance to high heat and humidity and other characteristics suitable to particular agro-climate environments.

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