



# Strategies for conservation and improvement of indigenous cattle breeds in Gaushalas

Kalyan Mandi, S. Subash and M.C.A. Devi

**ABSTRACT :** Gaushalas in India are synonymous with the protection of cows and cattle wealth of the country. It is primarily occupied with providing shelter to cows and is catering mostly the needs of non-lactating, weak, unproductive and stray cattle. However, a few fore front Gaushalas are striving to maintain nucleus herd for *in-situ* conservation of indigenous purebred cows and produce quality males so as to enhance productivity of indigenous breeds. Indigenous cattle are suited to tropical climatic conditions, are able to resist the heat stress, need less water, can walk long distances, survive on local grasses and resist tropical diseases. However, genetic erosion of indigenous cattle breeds is a problem of national concern and a number of local breeds are at a risk of extinction. Currently, the indigenous/non-descript cattle contribute about 21 per cent of total milk production in the country. However, given proper attention, the contribution of these animals can be increased substantially. In this regard; recently, several measures have been initiated by the Gaushalas to increase the productivity of milch animals in their native tracts. Under this background, various breeding and reproductive technologies for selection and faster multiplication of genetically superior cattle have been adopted by few progressive Gaushalas to conserve our elite indigenous germplasm. Therefore, an integrated approach with due consideration to proper feeding, breeding, healthcare and improved management practices are recommended to address the future challenges in Gaushalas and exploit potential for sustainable conservation of our native breeds.

**KEY WORDS :** Gaushalas, Indigenous cattle, Conservation, Sustainable

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## INTRODUCTION

India is having a vast reservoir of cattle genetic resources not only in terms of population but also in genetic diversity represented by 40 recognized indigenous cattle

breeds (Anonymous, 2012). As per the Livestock Census (2012), India is having about 190 million cattle population, 79 per cent of which are indigenous and the rest 21 per cent constituted as crossbred. A decrease of about 4.10 per cent in the total cattle population of the country was registered as compared to 2007. Also during this period, the indigenous cattle population decreased by about 8.94 per cent (Livestock Census, 2012). The major factors for decrease in cattle population are attributed to uneconomical returns due to low productivity and replacement of draft power in agriculture by mechanization. Further, due to several reasons including

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neglect of their genetic strengths (disease resistance, heat tolerance, work-capacity, ability to withstand natural calamities, tolerance to and conversion of low-quality forages, utilization of bio-mass, suitability and contributions to organic and natural farming, adjustment to local ecosystems) and their genetic dilution through uncontrolled crossbreeding and interbreeding. As a result cattle (particularly unproductive, old and stray) find shelter in the Gaushalas instead of individual households. The Gaushala movement in India is synonymous with the protection of cows and cattle wealth of the country. During the 1<sup>st</sup> five year plan there were nearly 3000 Gaushalas spread over the whole country. As per statistics by the Animal Welfare Board of India (AWBI), India has 1837 Gaushalas. Official recognition comes when a Gaushala receives AWBI funding. At present India is having more than 4,500 Gaushalas spread over in its length and breadth. In this direction the Govt. of India through Rashtriya Gokul Mission (2015) emphasized special attention to develop and conserve the indigenous bovine breeds. The mission envisages establishment of integrated cattle development centre “Gokul Grams” and “Gaushalas” to develop indigenous cattle breeds.

#### **Role of Gaushalas in improving indigenous breeds:**

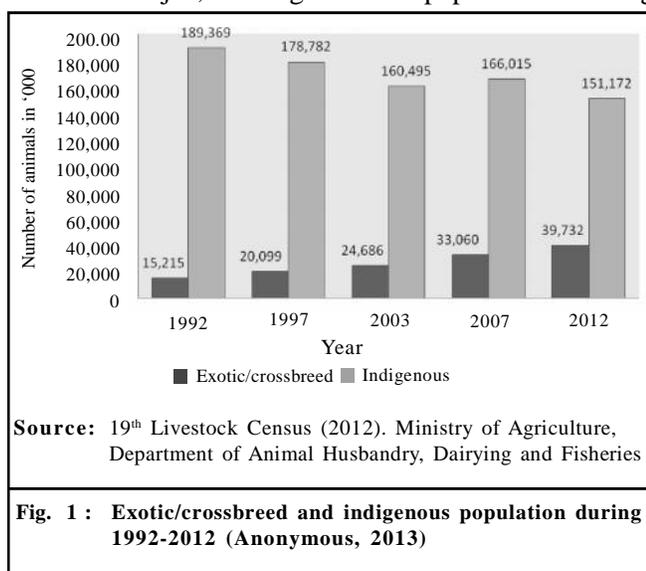
A few fore front Gaushalas are striving to maintain nucleus herd for *in-situ* conservation of indigenous purebred cows and produce quality males so as to enhance productivity of indigenous breeds. Sadana (2009) in the study at NBAGR reported that several Gaushalas (cow-herds) have been noted as potential centers for breed conservation and improvement. It has been recorded that purebred animals of several breeds (Sahiwal, Kankrej, Tharparkar and Hariana) are maintained in Gaushalas. Kumar (2009) observed that there was substantial improvement in the growth, milk production and reproduction traits obtained during the period of 1994 to 2008 due to better management and scientific breeding practices adopted in the Gaushalas in Hariana breeds. Kachhawaha *et al.* (2015) noted that in some parts of Rajasthan Tharparkar bull was used for the Gaushala cows to improve the non-descriptive breed through grading up of area specific indigenous breeds. Vij and Yadav (2010) emphasized that through proper planning and intervention of Gaushalas can become potential centre for *in-situ* conservation of indigenous breeds and for progeny testing of large number of bulls. Rashtriya Gokul Mission (2015) also focuses to upgrade nondescript cattle

using elite indigenous breeds like Gir, Sahiwal, Rathi, Deoni, Tharparkar, Red Sindhi and to enhance milk production and productivity of indigenous bovines through Gaushalas or Gokul Grams. Gupta and Yadav (2005) delineated ten goals for ‘Gaushala Development’ emphasizing on the roles of district administration and R and D agencies.

#### **Need for conservation of indigenous breeds:**

The productivity of indigenous cow and crossbred cow is 3.41 and 7.33 kg/day in the year 2015-16, respectively (Ramesha *et al.*, 2017). The difference in milk production of crossbreds and indigenous milch breeds do not seem to be substantial considering the fact that not much selection has gone into the improvement of indigenous breeds for milk yield. In this regard, recently, several measures have been initiated by the government to increase the productivity of milch animals. Among indigenous breeds, cows producing good quality milk in lactation have been recorded under Central Herd registration Scheme for breed like Gir (3038-3263kg), Ongole (2000-2544kg) and Hariana (1671-4015 kg). Even among Malnad Gidda-dwarf cattle with body weight of 80-120 kg, many cows give 3-4 kg of milk per day with regular calving under low input production system. This indicates that there exists genetic potential for high milk production in indigenous breeds. Our country has some of the best indigenous breeds of cattle with traits for dairy, draught power and dual purposes. Indigenous breeds are well suited to tropical climatic conditions, are able to resist the heat of summer, need less water, can walk long distances, live on local grasses and resist tropical diseases. They have the ability to survive and perform even under stressful conditions and low input regimes. Indigenous cattle have lower basal metabolic rate, better capacity for heat dissipation through cutaneous evaporation and thus adaptation to tropical heat and resistance to diseases especially the tick borne diseases than taurine cattle. They can be also turned into high milk producers given the right kind of feed and environment. The world’s best Gir cows today give 5500 litres of milk on an average per lactation of 307 days. With looming climate changes, the adaptive characteristics of the local breeds would become more important in future. Maintaining genetic diversity allows choosing breeds in response to changes in environment, threat to diseases, changes in feed and water supply, etc. Loss in genetic diversity erodes their ability to respond to changing conditions. The present

challenge is the low productivity of the indigenous cows. The average productivity of in-milk indigenous cattle, crossbred cattle in 2012 was estimated at 2.36 kg and 7.02 kg, respectively. The locally adapted cattle breeds are under different levels of endangerment. The 2012 livestock census observed that the number of indigenous adult female cattle declined by 0.22 per cent annually between 1992 and 2012, whereas that of crossbred cattle increased by 6.16 per cent per year during the same period. This means local cattle have been replaced by crossbred quite rapidly. For instance breeds like Punganur, Vechur and Krishna Valley are rapidly declining warranting immediate attention. In some progressive states like Punjab, the indigenous cow population is nearing



zero level. Therefore, in better resource areas, unless local breeds provide better income than crossbred cows, they will gradually be replaced by crossbreds.

### Advanced strategies for conserving indigenous breeds:

#### (10 P Model):

For genetic improvement of cattle a new intervention (10 P Model) has been developed and implemented in some Gaushalas. Under this simple model, best few (around 10%) cows from within the Gaushala herd are to be selected out into a separate barn; it was noted in the study that each Gaushala has around 10 to 15 per cent cattle of local pure breed. The 10P Barn is to be kept open in a controlled manner (on the pattern of Open

Nucleus) – bringing in the best few true to type cattle from the remaining Gaushala and taking the poorest few from the nucleus to the main Gaushala in a periodic manner (once in 6 months). Also, special provision of good quality bull needs to be made in the 10P Barn (Sadana, 2008).

#### Genetics and breeding:

The knowledge of Genomic and Bioinformatics tools are very important for the Scientist in Veterinary and Animal Science. By using these tools, the improvement of productivity and conservation of Indigenous breeds in Gaushalas will be possible in future. The following methods and techniques embarking on improving the desirable genetic traits in indigenous breeds are:

#### Selective breeding:

Our native breeds are evolved by the principle of selective breeding. It relies on the selection of individual animals which show the most desirable characteristics as the parents for the next generation in the breeding programme and repeating the process over many generations. Mishra *et al.* (2010) suggested that non-descript cattle constituting more than 75-80 per cent of the total cattle population can be genetically improved by grading up using high genetic merit pedigreed and preferably progeny tested proven bulls of well known indigenous cattle breeds like Sahiwal, Tharparkar, Red Sindhi, Gir, Deoni, Hariana Ongole, Kankrej etc available in their native breeding tracts.

#### Artificial insemination (AI):

AI is the first method developed and underpins the application of other assisted reproductive technology (ARTs) applied to livestock. This procedure involves the collection of semen from males which is then used to impregnate females and has been applied in dairy cattle for over 65 years.

#### Multiple ovulation and embryo transfer (MOET):

MOET is the hormonal manipulation of females undertaken to induce multiple ovulation prior to insemination which is then combined with the transfer of embryos into hormonally primed surrogates. This also allows offspring and milk to be produced outside usual seasons and has been shown to increase the rate of genetic improvement (Gibson, 2005).

**Cloning:**

It is the technique of production of offspring by embryo splitting (naturally or artificially induced to form 2 or more genetically identical animals) or nuclear transfer creation of an animal from a reconstructed embryo made by transferring the nucleus of a donor cell into an oocyte from which the genetic material has been removed.

**Genomic selection:**

Genomic selection offers many advantages with regard to improving the rate of genetic gain in dairy cattle breeding programmes. In practice, genomic selection refers to selection decisions based on genomic estimated breeding values (GEBV). These GEBV are calculated by estimating SNP effects from prediction equations, which are derived from a subset of animals in the population (*i.e.*, a reference population) that have SNP genotypes and phenotypes for traits of interest.

**Ovum pick up and in vitro fertilization (OPU-IVF):**

With the breakthrough technology of IVF and ET, we can multiply genetics of the superior females, keeping the male side also very strong with usage of semen of superior bulls. Ultimately we can produce 10-25 calves from a single donor cow in a year through surrogacy which is not possible with traditional breeding methods. Thus, selective breeding programme for milk productivity enhancement of the indigenous cattle can be achieved at a very faster rate.

**Challenges:**

Kothari and Mishra (2002) revealed that 57 per cent of respondents conveyed dissatisfaction regarding provision for veterinary aid to Gaushalas, 75 per cent affirmed about poor fodder arrangement, 66.7 per cent responded that there was no provision for water supply to Gaushalas at concessional rates and 46.5 per cent

Gaushalas informed that there was no financial assistance from the state govt. in regard to availability of bulls of good indigenous breeds. In a similar study, Sharma (2005) affirmed that lack of adequate balanced nutrition, unavailability of timely expert veterinary help, irreversible/untreatable conditions of the animals and indiscriminate treatment given by lay help hired by the Gaushalas were the major underlying constraints. Yadav (2009) observed that there was poor supply of electricity in Gaushalas falling in remote areas and most of them suffered from losses due to improper utilization of resources. Vij and Yadav (2008) reported that due to lack of scientific record keeping and exchange of information among Gaushalas and between Gaushalas and development/research agencies, has limited their utility in the past in the breed improvement programmes of the state and central govt. Sethi (2010) revealed that outsourcing of large number of bulls/bull calves, selected on the basis of performance of elite pedigreed dams and progeny performance, is an uphill task in the absence of animal performance recording system under field conditions. The other major challenges in Gaushalas include lack of financial aid from governments, inadequate fodder supply, lack of veterinary personnel and AI centre, poor infrastructure, inadequate grazing land, shortage of labour supply and improper management practices etc.

**Recommendations:**

Gaushalas or Gokul Grams should be established as an Integrated Cattle Breeding Centre for development of indigenous breeds and a source for supply of quality breeding stock to the farmers in the breeding tract. Some Gaushalas would also be established in the vicinity of Metropolitan and large cities to house urban indigenous cattle.

Herds of indigenous cattle can be set up with a viable composition of economic and unproductive animals in the

**Table 1: Breeding strategies for bovines as recommended by the Government of India**

(Anonymous, 2012)

Sr. No.	Type of animal	Breeding policy	Purpose
1.	Indigenous dairy breed of cattle	Selective breeding	Milk production
2.	Indigenous drought breed of cattle	Selective breeding	Draught power
3.	Indigenous dual purpose breed of cattle	Selective breeding	Milk production and draught power
4.	Non-descript cattle	Grading up with improved indigenous cattle breeds	Milk production/draught power
		Crossbreeding with exotic dairy breeds followed by selective breeding	Milk production

ratio of milch: unproductive :: 60:40.

Gaushalas can be established by the State Implementing Agency/End Implementing Agency or under a Public Private Partnership.

Productive animals of high genetic merit may be purchased by State Implementing Agency/ End Implementing Agency and managed along with 40 per cent unproductive stray animal.

Gaushalas should be established in the Native Breeding Tract to house indigenous cattle in the rural areas; while Gaushalas established in the urban areas would house urban cattle.

Infrastructure facilities such as establishment of AI centers, Animal Health Centres, milk procurement and extension centers fully equipped with trained man power can be provided in Gaushalas to enlarge network of breeding facilities for covering large number of breedable bovine animals in the operational area.

Integration of *in-situ* and *ex-situ* conservation programmes with breed improvement and development programmes. Establishment and strengthening of breed nucleus herds/bull mother farms, young bull rearing centers, semen collection and cryo storage banks (Sreenivas, 2013).

Establishment of data bank to carry out activities on animal identification and performance recording linked progeny testing programme for selection of large number of high genetic merit bulls.

**Proper nutrition:**

Balanced nutrition should be made available to animals. Green fodder and dry fodder produced at the Gaushalas and should also have provision of block making units to produce balanced dry fodder blocks. Area specific mineral mixtures should be given to the cattle for improving growth and reproductive performance.

**Health care:**

Animal health care and fertility should be taken care of by Veterinary Dispensary. The dispensary should have the facility for first aid, vaccination, artificial insemination, de-worming etc. Gaushalas should conduct regular animal healthcare camps to create awareness among other farmers and stakeholders. Yadav (2007) indicated that Gaushalas should endeavor two prolonged strategy *i.e.* separating the old, infirm and unproductive cattle from the productive heard and integrating ethno-veterinary

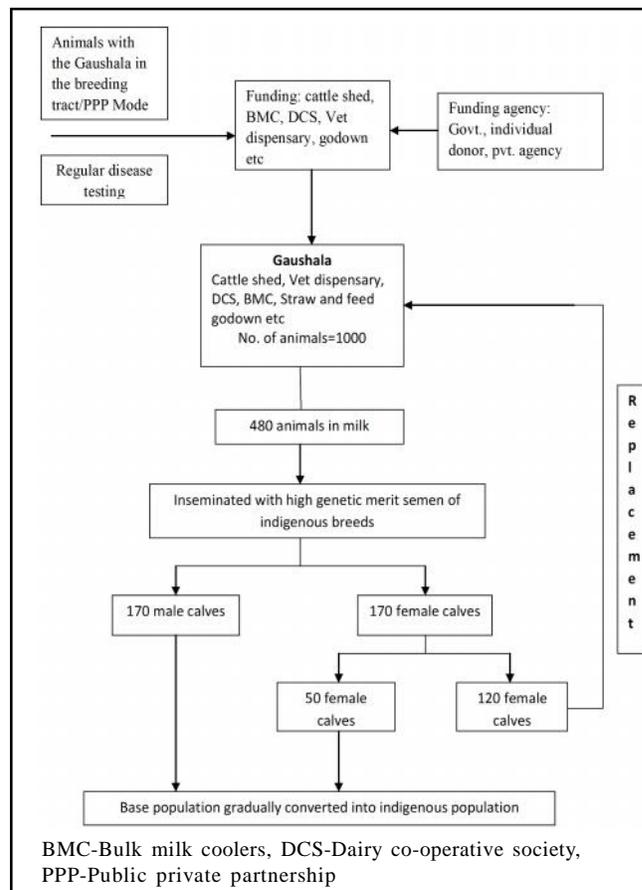


Fig. 2 : Model technical programme for an ideal Gaushala (Anonymous, 2016) (For 1000 animals 60% productive and 40% unproductive)

treatment with the conventional animal health care system.

**Conclusion:**

Gaushalas in India play a pivotal role in sustainable conservation of our indigenous cattle wealth. It can act as a potential centre for in-situ conservation of the nucleus herd in their native tracts. Due to decline in the population and productivity of indigenous breeds over the past few decades, it has posed a major challenge to our country. The need of the hour demands productivity enhancement in Indigenous cattle, which could be achieved by adoption of various modern technologies for selection and faster multiplication of genetically superior germplasm and adoption of improved animal management strategies. Therefore, the pre-requisite for the success of genetic improvement in Gaushalas are: well-defined breeding goals, suitably designed breed improvement programmes, a user friendly information system, active participation

of all stakeholders including state govt. agencies and NGOs, efforts in developing common grazing lands and improving production environment and appropriate health care and management systems. Efforts thus must be directed towards intensification and scientific intervention in terms of selection, breeding policy and managerial practices etc. in Gaushalas for operative improvement and conservation of the indigenous germplasm.

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