

## Breeding Strategies for the improvement of Cattle & Buffalo

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### *Abstract*

As a result, suitable animal breeding techniques of selection and multiplication of superior germplasm have been developed, besides expansion of infrastructure development on network of A.I., animal health care, improved management practices and milk marketing facilities which have encouraged the farmers of the country

### **Third Five Year Plan (1961-66)**

More emphasis was given on milk production in breeding tracts of draught breeds, replacing one or other existing draught breeds with dual purpose breeds; Grading up of nondescript cattle with recognized dual purpose or dairy breeds; •ICDP was launched in 15 centers of 10 states (1965)

•Crossbreeding with exotic breeds in hilly areas using Jersey exotic bull. Fourth Five Year Plan (1969-74)

### **Findings**

- The non-descript cattle are about 80% of Indian cattle population and hence these should be the target population for improvement. About 60% of the total buffalo population of the country is non-descript and the rest 40% is descript
- As a result, suitable animal breeding techniques of selection and multiplication of superior germplasm have been developed, besides expansion of infrastructure development on network of A.I., animal health care, improved management practices and milk marketing facilities which have encouraged the farmers of the country
- The indigenous species are well adapted to local conditions



- The genotype gives rise to the genotypic value of a trait which is modified by the environment experienced by the animal during development and expression of the trait
- The improvement of local non-descript cattle which are very low milk producing can be made by infusion of superior germplasm from well recognized breeds of *Bos indicus* and *Bos taurus*
- Two breeding strategies are recommended for improvement of buffaloes

## **Introduction**

### **Breeding Strategies for Cattle and Buffalo in India**

Cattle and buffalo play a vital role in the Indian economy, providing milk, meat, and draft power. In India, the majority of milk production comes from cows and buffaloes. The production of milk is largely dependent on the genetic makeup of the animal, which can be improved through the use of breeding strategies. In consequence, the development of efficient breeding strategies is essential for the enhancement of the productivity of cattle and buffalo in India. In this review, we will consider breeding strategies that have been documented as useful for the improvement of cattle and buffalo productivity in India.

### **Classification of Breeding Strategies**

Breeding strategies can be classified as conventional or advanced. Conventional breeding methods include breed improvement, selection, crossbreeding, grading up, and upgrading. Advanced breeding strategies include marker-assisted selection, genomics, proteomics, and metabolomics.

### **Conventional Breeding Strategies**

**Breed Improvement:** Breed improvement is a frequently used breeding strategy for cattle and buffalo in India. The primary aim of this strategy is to improve the overall characteristics of a particular breed. The choice of a specific breed is based on numerous factors, including the environment, production traits, and management practices. Indian breeds such as Sahiwal, Gir, and Red Sindhi have been considered for breed improvement. The selection of genetically superior animals is essential for this strategy. Therefore, the identification of superior animals is an essential task before implementing this strategy.

**Selection:** Selection is a method in which animals are chosen based on their superior genetic traits. Traits such as milk production, growth rate, and disease resistance are considered. The genetic progress achieved through this strategy depends on the accuracy of phenotypic evaluation, the heritability of the trait, and the intensity of selection pressure. Farmers tend to choose animals based on their past performance or the performance of their progeny. Selection strategies should also consider other components of productivity such as reproduction, health, and behavior.

**Crossbreeding:** Crossbreeding is a technique of mating purebred animals of different breeds. The aim of this strategy is to exploit the complementarity between different breeds. This strategy has been used to improve



milk production in India's indigenous cattle breeds. The crossbred animals, usually a European breed crossed with an indigenous breed, are more productive than purebred animals.

**Grading up:** Grading up is a method in which animals are bred to improve the genetic stock of the indigenous breeds. The primary objective of this method is to increase the frequency of desired genes in the herd. The crossbred offspring are selected for breeding that have the desired phenotype. The progeny from this cross are mated to purebred animals of the indigenous breed, which increases the frequency of desired genes in the herd.

### **Advanced Breeding Strategies**

**Marker Assisted Selection (MAS):** Marker-assisted selection is a breeding strategy that uses DNA markers to select animals with the desired traits. DNA markers can be used to identify genetic variations that are associated with traits such as disease resistance, milk production, and growth rate. The identification of genetic markers can make the breeding process faster and more accurate. This process can have a significant impact on the productivity of the animal. MAS has been useful in the identification of markers that are important for improving reproductive traits in cattle and buffalo.

**Genomics:** Genomics is a breeding strategy that uses DNA sequencing to identify genetic variations in animals. This technique provides detailed information about an animal's genetic makeup, which can be used to select desirable traits. This strategy can be useful in the selection of breeding animals whose offspring have desirable characteristics.

**Proteomics:** Proteomics is the study of the protein composition of cells, tissues, and organisms. This strategy is useful in identifying proteins that are associated with desirable traits such as milk production and disease resistance. Proteomics can also be used to examine the effects of different management practices on animal health and productivity.

**Metabolomics:** Metabolomics is the study of the metabolites produced by an organism. It can be used to identify metabolic pathways associated with desirable traits such as milk production and disease resistance. Metabolomics can also be used to identify specific nutritional requirements for different breeds and physiological conditions.

The improvement of local non-descript cattle which are very low milk producing can be made by infusion of superior germplasm from well recognized breeds of *Bos indicus* and *Bos taurus*.

The grading up of non-descript low producing cattle with well recognized breeds is the recommended breeding policy.

## **Results**

The recognized zebu breeds recommended for grading up programme of non-descript cattle are different for different states and these can be summarized as: -



### **Grading up or crossbreeding of non-descript cattle with exotic breeds: -**

Crossbreeding of non-descript low producers with exotic breeds stabilizing 50-75% exotic inheritance in areas of plenty of feed, fodder and adequate milk marketing system.

Grading up of non-descript cattle with bulls of indigenous breeds of the area.

The non-descript buffaloes of the different parts of the country should be upgraded by mating them with superior bulls of high genetic merit belonging to Murrah, Nili Ravi, Mehsana and Surti breeds.

The selective breeding under progeny testing programme for buffaloes on large scale needs to strengthen the existing organized farms of well-known breeds like Murrah, Nili Ravi, Mehsana, Surti, Nagpuri, Bhadawari and Jaffarabadi and some more farms should be developed for the production of breeding bulls.

More emphasis was given on milk production in breeding tracts of draught breeds, replacing one or other existing draught breeds with dual purpose breeds; Grading up of nondescript cattle with recognized dual purpose or dairy breeds; ICDP was launched in 15 centers of 10 states (1965) Crossbreeding with exotic breeds in hilly areas using Jersey exotic bull

### **Conclusion**

AICRP on cattle was launched (1968); Launching of Operation Flood I (July, 1970); P.T. programmes sponsored by Agr. Ministry for production of superior bulls.

Propagation of superior germplasm of recognized breeds by financing the State Govt.

This scheme was launched in 1951 (First Five Year Plan) on all India scale taking a key village unit covering an area having a population of 1000 cows and buffaloes.

To improve indigenous breeds of cattle for milk and draught through progeny testing in collaboration of already existing organized herds and farmer's animals.

