



## Sustainable Development of Indigenous Dairy Cattle in India

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The dairy cattle are part of the society since their domestication. In India, about 58 per cent of the population is engaged in agriculture and rearing of livestock. According to 19th Livestock Census (2012), Govt. of India, the total livestock population in India was estimated as 512.05 million of which, 190.90 million are cattle, constituting about 37.28 per cent of total livestock population. Of the total cattle population, 151.17 million (79.19 per cent) are indigenous cattle and 39.73 million (20.81 per cent) are crossbred cattle. The indigenous cattle population in the country has been broadly classified into two groups. About 113.25 million (74.92 per cent) indigenous cattle are defined as non-descript cattle while 37.91 million (25.06 per cent) indigenous cattle are known as descript cattle. Till today, 40 indigenous cattle breeds whose breed characteristics are well defined have been listed as descript cattle in the country. The growth trend in cattle population (1992-2012), shows that the indigenous cattle declined from 93 per cent to 79 per cent where as the exotic/crossbred cattle increased from 7 per cent to 21 per cent during the same period though the indigenous cattle are more sustainable in comparison to crossbred cattle. Indigenous dairy cattle are known for more heat tolerant, comparatively resistant to many diseases, low maintenance cost and higher feed conversion efficiency. Of late, the indigenous cattle are also getting importance due to presence of A2 allele in milk. Therefore, it is required to improve the production capacity of our indigenous cattle in a sustainable manner.

### Goal of Animal Improvement

In India, the conventional breeding goal for genetic improvements of high yielding animals and the evaluation of bulls over the decades is for milk production only. With rapid increase in global human population and looking into the demand of milk and milk products, the major goal for improvement of dairy animals and evaluation of breeding bulls in many countries was only to improve the milk production and milk quality. The demand of milk and milk products is increasing to cope up the continuous growing human population, increasing income over the years, changing lifestyles including food habits of people in our country. Analysis of trend of milk production over six decades shows that the milk production increased more than eight times from 17.0 million tonnes in 1950-51 to 146 million tonnes in 2014-15 and the country was recognized as the largest producer of milk in the world.

### Alarming situation

The intense selection of dairy animals for higher milk production and milk quality has shown the decline on reproductive performance including fertility of dairy animals in almost all countries. The trend of deterioration of reproductive performance including fertility was found more in high producing animals irrespective of breed. Fertility defines the ability of the female to become pregnant and produce a living calf. Fertility is one of the most efficient measures of reproduction, being influenced by genes and environment but negatively related

with milk yield and milk quality. The unfavorable negative genetic correlation mostly indicates that selection of dairy animals for higher milk yield and quality would lead to poorer fertility. Globally, it is reported that under artificial insemination programme, dairy bulls selected for milk yield only, increases more genetic gain in milk yield but accompanied with a severe decline in reproductive performance. Fertility is usually assessed through conception rate, pregnancy rate, service period (interval between calving to date of successful service) or the calving interval (interval between two calving). It is reported that in countries that used American Holsteins animals extensively, the use of breeding bulls, selected mainly for increased milk production without giving importance to reproductive traits, has led to a significant decline in reproduction performance. The level of fertility has been very low indicating a major problem for milk production management. The impact of increased milk production also reflected in reducing the duration of length of estrus, a key parameter for successful artificial insemination.

### **Sustainable Goal for Dairy Development**

The economics of any dairy cattle herd is influenced by the production, reproduction and health status of the livestock. Lifetime performance and longevity of breeds is a highly Red Sindhi desirable characteristic that immensely influences the overall profitability of a dairy animal. It has been observed that genetic improvement for higher milk production decreases the reproduction performance and dairy animals are often associated with increased susceptibility to mastitis and other milk related metabolic diseases. The increased disease incidence that accompanies genetic improvement for milk yield is therefore increasing the cost of milk production. To make dairying a successful and profitable business, the indigenous breeds should not only be high producing, but also sound in reproduction and healthy. The time has come to take urgent measures for the multiplication and development of indigenous breeds in more sustainable manner.

### **Short-Term Strategies**

(i) **Manipulation of ovulation:** Manipulation of ovulation is a good short-term strategy as it is quick and needs hormonal manipulation. This strategy is adoptable in different breeds and for that, skill and infrastructure are to be improved. The Ministry of Agriculture and Farmers Welfare, Government of India has taken initiative to implement Multiple Ovulation and Embryo Transfer on a large scale for multiplication of superior germplasm of different indigenous dairy breeds in the country.

(ii) **Management of dry period:** The dry period is the interval between the date of drying of animal in a particular lactation to the next date of calving. Shortening the dry period may be considered as another short-term strategy for quickly enhancing fertility in dairy animals. However, the adoption of this strategy may lead to negative effects on udder health and total milk yield of animal in next lactation.

### **Medium-Term Strategies**

(i) **High-fertility bulls in A.I. programme:** The use of quality semen of breeding bulls under A.I. programme is the medium strategy. The strategy is easy however; it demands to incorporate fertility traits along with higher milk production in order to select dairy bulls for breeding programme. Many countries have incorporated fertility trait like Pregnancy Rate (PR) for genetic evaluation of their male and female animals. Pregnancy rate is defined as the percentage of non pregnant cows that become pregnant during each estrous cycle. The higher pregnancy rates will reduce the usage of frozen semen.

(ii) **Grading up of Non-descript Indigenous dairy cattle:** The adoption of grading up for genetic improvement of low producing non-descript indigenous dairy cattle using quality

semen of descript indigenous dairy breeds should be a very good medium-strategy for balancing milk production and fertility.

### **Long-Term Strategies: Future Prospects**

**(i) Assigning appropriate weightage to traits** This should be one of the important long-term strategies for the existing genetic evaluation programme of indigenous dairy breeds in the country. The breeding goal should be reoriented assigning the relative weightage/importance for milk production, reproduction, longevity and health for the selection of high producing animals and breeding bulls of indigenous dairy breeds. The rationale behind the strategy is that despite the low heritability of fertility and health traits, there is yet a significant genetic variation and thus, a chance to balance the genetic gain for production and reproduction. Several countries in the world, of late, have adopted and developed their national genetic evaluation assigning the relative importance for production, reproduction and longevity and health. This long-term strategy has proven very much successful in dairy development of the Nordic countries.

**(ii) Genetic selection strategy:** Over the past decades, several genetic markers for milk production, milk quality, health and fertility traits have been identified. Genomic selection strategy should be developed and standardized using identified genetic markers for production, health and fertility traits, so that conventional long duration breeding programme like progeny testing, be gradually replaced for selection of high genetic merit young dairy animals particularly young breeding bulls (which do not have any phenotypic records). The strategy will help to reduce substantially the cost of selection of animals for breeding and ensuring sustained milk production and fertility of dairy animals in India. The Ministry of Agriculture and Farmers Welfare, Government of India has taken initiative to develop the genetic selection strategy for the selection of indigenous dairy breeds for higher milk productivity and other performance traits in sustainable manner.

### **Conclusion**

Indigenous dairy cattle are more sustainable in comparison to crossbred cattle as Indigenous cattle are known for more heat tolerance, resistant to many diseases, low maintenance cost and higher feed conversion efficiency. Of late, the indigenous cattle are also getting importance due to presence of A2 allele in milk. It is required to improve the potential of our indigenous cattle in sustainable manner. Analysis of trend of milk production shows that India, for many years, is the largest producer of milk in the world. The country has also laid down the projected demand of milk production about 240 million tonnes by 2025. As the demand for milk and milk products increased, the breeding policy and programme have focused globally for the genetic improvement of dairy animals for milk yield and milk quality and particularly for milk yield in India. The continuous selection pressure under breeding programme in most of the countries including India was applied for increasing the milk yield only which leads to the deterioration of reproductive performance of high producing dairy animals due to the negative genetic associations between milk yield with fertility, mastitis and other diseases. The dairy stakeholders in India always demand more milk from defined indigenous dairy breeds but are not much aware about its negative impact on fertility.