VILLAGE LEVEL EXPERIENCES IN INDIA ON BREEDING OF DAIRY CATTLE IN MEDIUM AND LOW INPUT SYSTEMS

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INTRODUCTION

The average small land holding (0.4 Hectare) of the rural Indian farmer and his dependence on bullocks for agriculture operation necessitates maintenance of cattle for milk and draft. The geoclimatic variation, differences in village level socio cultural and religious practices and lower economic status of the farming family needing agrowaste utilization often leads to an important role of cattle in farming system of small holder.

MATERIALS AND METHODS

The majority of the cattle-owners in rural India are small / marginal farmers and landless. They are traditionally adapted to crop livestock integrated farming system as a livelihood. These artisans rear dairy cattle by extensive system of grazing on common property resources without any supplementary feed and are housed in open under the tree.

Crop residues of crops like paddy, maize, sorghum, millets, pulses of various types, sugarcane tops and sugar industry byproducts, forest grass of inferior nutritional quality etc. are the inputs given to milking and dry cattle. The average milk yield under this feeding regime is ranging from 250 to 500 kg per lactation.

In irrigated areas with better soil quality, fodders like maize, sorghum, lucerne and berseem are grown on part of land and improved indigenous dairy breeds or crossbred cattle are maintained. The concentrates given in such situations could be up to 2 kg. Such animals are housed in semi permanent or permanent byres. These thus could be medium input conditions The production in such system range from 800 kg to 2500 kg per lactation.

Lower availability of milk for human consumption, inherent low milk production of indigenous dairy breeds attract urgent attention to search for approaches in increasing milk and draft potential of Indian cattle.

Researchers have been engaged in attempting genetic improvement of cattle at institutional herds. While realizing limitations of small size of herds in genetic improvement of the dairy cattle, Gurnani (1988) and others have unanimously recommended to carry the programme directly to farmers to achieve better accuracy.

BAIF Development Research Foundation, a NGO, right from its inception in 1967 has resorted to village cattle improvement programmes involving farmers and their animals. The focus has been on income generation and improvement of quality of life of rural population. The holistic...
approach includes the one to adopt the regionally suitable cattle breeding strategy for improving sustainable production performance. Crossbreeding (using superior quality frozen semen of European breed like Jersey and Holstein-Friesian sires on local indigenous (zebu) females), selective breeding (using improved local dairy breeds), farming system modifications, suitable technology adoption, performance evaluation and monitoring and extension were/some of the tools adopted for improvement. Presently the programme covers over 900,000 farmer families spread over to more than 12000 villages in seven States of the country and caters for nearly three million cattle and buffaloes.

For the genetic improvement, the progeny testing of breeding bulls was undertaken to genetically improve the rural stock.

**Test mating population.** The test mating population was from village herds with following criteria:
1. The owner should have minimum 2 animals in milk and equal number of breedable females in the herd.
2. Animal owners should be willing to get their animals ear tagged/identified,
3. They should be willing to get their cows AI bred, and
4. Allow collection of data on the herd and animal performance
5. Disallow breeding of their animals by either natural service or by any other A.I. agency.
6. Animal sale / transfer should be with the consent of the organization.

**Young bulls for testing.** The field recording enabled selection of bull dams on type and 305 day production basis. Selected young bull calves were brought to bulls station at 6 months age. Rigorous health standards were maintained and caryotyping was done before 1000 semen doses per bull were used for test mating.

**System of milk recording.** The milk yield was recorded at fortnightly interval using alternate AM/PM recording method. The first record was taken within 15 days of calving. The records of animals dried before completing 150 days of lactation and lactation in progress but of less than 90 days lactation period were eliminated. After comparing three methods (Test Interval Method (Mangurkar et. al., 1984), Centering Date Method (Cunningham and Viel, 1968) and Average Yield Methods (Khanna and Balaine, 1988)) for estimation of 305 days milk yields from fortnightly milk records, Test Interval Method was selected and adopted for routine estimation. Separate regression factors were developed for each stage of lactation and missing yield was calculated by using these factors.

**RESULTS AND DISCUSSION**
In the initial phase, frozen semen of 40 Holstein Fresian (7 imported and 33 home bred) and 41 Jersey sires (6 imported and 35 homebred) were introduced in the programme. The least square analysis showed that location and genetic group within two classes of crossbreds significantly affected milk yield. The milk yield increased with increasing level of homebred Holstein and Jersey inheritance. The bulls were ranked using BLUP procedures.

The average milk production lactational performance of Holstein Fresian and Jersey crossbreds produced and recorded was 2286 ± 46 and 1696 ± 35 kg. respectively.
By the time these bulls were tested following field breeding, observations were generated (Mangurkar and Gokhale, 1991).

1. The number of AI required per recorded female birth was 8.5.
2. The herd survival rate of female progeny from birth to completion of first lactation was estimated to be 46%.
3. The number of AI required to obtain one milk recorded daughter to be 18.4.
4. The mean age at first calving of the progeny of crossbred bulls was 32.8±0.7 months.

In the second phase of improvement stage, it was observed that the preference of the farmers was more for Holstein Fresian crosses rather than Jersey. 35 young crossbred bulls selected from the field recordings were used along with pure bred sires for testing their genetic potential.

Estimated Sire Merits were calculated using Simple Daughter Average, Herd-mate Comparisons, Contemporary Comparison, Least Squares and BLUP. The range of sire merit value was smaller for BLUP compared to other methods. In general sire rankings estimated by different methods were not the same, at least for the bulls not among the highest or lowest-ranking ones. The wide range of variation in the progeny number per sire and their distribution among different herds of small size might have led to this variation. The estimates derived suggested that BLUP or Contemporary Comparison methods could well be used for evaluation of the sires under field conditions.

Out of a total of 128 bulls used in the programme, 78 bulls were selected on the basis of their BLUP and Contemporary Comparison Breeding Value estimates. These bulls have been extensively used for genetic improvement of the village cattle. The average lactation yields increased over a period of time and the averages from first to fourth lactation's of the field HF crossbreds were 2678 ± 22, 2736 ±22, 2860 ± 27 and 2914 ± 35 kg respectively (Gokhale and Mangurkar, 1995). The average butter fat percentage varied from 4.07 % in second month to 4.16 % in the 8th month of lactation (Mangurkar and Gokhale, 1991).

The average genetic contribution of crossbred bulls was estimated to be 107 kg (ranging from -117 kg to + 652 kg) per lactation. It is estimated that 3208 tons of milk have been added in the project area due to use of selected bulls tested under the project. (Gokhale unpublished results 2000).

It was concluded that the genetic improvement programmes for improving milk yield of rural cattle are possible and fruitful in low and medium input system. The progeny testing and selection of breeding bulls suitng to local environment and input system can yield genetic progress nearly similar to the genetic improvement programmes of similar nature undertaken elsewhere, thus demonstrating the general value of the principles and operational guidelines of such breeding plans.
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REFERENCES