



# Cross breeding and its impact in the livestock sector of Kerala

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**K**erala State has its own peculiarities in the agricultural sector. These include high density of human population, increased literacy rate, land pressure, large number of small holdings, declining trends in paddy cultivation, raising milch animals mainly on purchased feed, efficient cattle cross breeding programme and well organized farmers' milk co-operatives. These features pose different problems and require their own solutions, related to technology transfer in dairying compared to other States of the country. Rearing cows for milk is still an occupation for many farmers in the State, though many own only one or two cows.

Agriculture though can no longer be ascribed, as the main source of livelihood in Kerala. It is still one of the important occupations. Here around 40 % people are engaged in it either as cultivators or as agricultural labourers. Agriculture continues to be the single largest employment source with at least 30 % of the total work force engaged in it. Pressure on land, rapid

fragmentation of land and adverse economic pressure on seasonal crop production have all resulted in large areas of paddy land being put under other use. Currently the total area under paddy is only about 0.5 million hectares and about 0.8 million hectares are under coconut. There are a total of 5.42 million operational holdings, 85% of them in the size group- "below 0.5 hectare". Only 58 % of the total geographical landmass of the state constitute the net sown area, however with cultivation intensity of 1.34, 28% of the land in the state is under forest cover.

Though Kerala has none of the natural attributes to make it an ideal dairy zone, it did go through with a thoroughly successful cattle development programme, transforming more than 67 % of the total cattle population into medium to high producing crossbred in a comparatively short span of 40 years, pushing up average yield per cow per day from less than a litre to over 6 litres and milk production in the state to 24.2 metric tons in 1998-99.

With the steady increase noticed in the population size of the state, the milk requirement in the state will have to increase fast from the present 218 g per day to meet the demand @ 280 g per day. Simultaneously attempts should be made for reducing the cost of production, by enhancing the productivity of the animal.

## Cattle breeding in the past

Kerala never had a cattle breed of its own. The cattle were non-descript and low producers. The state has never been recognized as an area suitable for dairying. With a view to improve the productivity of non-descript cattle, the agricultural department brought in bulls of Ongole, Kangayam and Mahal breed from neighboring British Indian states. The result was not satisfactory. As such bulls from the North Indian dairy breeds like Red Sindhi as well as some English breed were imported and tested. The Red Sindhi breed was

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found to adapt well to local conditions. Efforts were made to popularize this breed. Herds of selected bulls and cows were imported from Karachi and maintained at the Government farms. Calves born to them were distributed (in pairs) to individuals and institutions interested in cattle breeding. The impact of such a programme being trivial, it was thought that better results could be obtained quickly and cost effectively, though less perfectly, by grading up the local cows with bulls of superior 'strain'.

However, no National policy for cattle development was in vogue prior to 1951. But individual and isolated efforts were made in programmes like distribution of bull, castration of scrub bulls etc. Royal Commission on Agriculture in India in 1928 first suggested the need for co-ordination and proper guidance of the state's activities in cattle development on an all India basis.

#### Genetic improvement

Genetic improvement of cattle was attempted as early as 1950 by using Red Sindhi as a donor breed in the Key Village centres of the AHD. During 1952-53

Key village blocks were started with artificial insemination facilities. The policies for the development of cattle and dairy enterprises laid down on an all India basis were adopted in designing the cattle development programmes of the state. Kerala state being an area of non-descript cattle with low productivity, the breeding policy adopted was grading up of local cattle with recognized cattle breeds of India. The objective was to improve both milk and draught qualities. Keeping these objectives in view, Red Sindhi breed was considered suitable for high rainfall and humid conditions of the state. In areas where demands for bullocks were high, Kangayam breed was also approved. In buffaloes the objective was to increase milk yield and as such buffalo bulls of the Murrah breed were used for breeding.

#### Earlier Crossbreeding experiments

A pilot scheme for fundamental research on cross breeding of local cattle using Jersey breed was started at two units at Chalakudy and Neyyattinkara during 1955-1956 initiated by the ICAR. The results of the crossbreeding experiments are given below.

|                        | Chalakudy |         |         |         | Neyyattinkara |         |         |         |
|------------------------|-----------|---------|---------|---------|---------------|---------|---------|---------|
|                        | Local     | 1/4 Jy. | 1/2 Jy. | 3/4 Jy. | Local         | 1/4 Jy. | 1/2 Jy. | 3/4 Jy. |
| Lactation yield (kg.)  | 521.4     | 1521.3  | 1359.9  | 1435.0  | 753.3         | 2252.7  | 2182.7  | 2415.1  |
| Lactation length(days) | 284.7     | 298.5   | 297.6   | 297.5   | 289.6         | 441.3   | 378.2   | 373.5   |
| Calving interval(days) | 515.7     |         | 480.1   | 477.0   | 511.9         |         | 498.9   | 497.7   |

Results of crossbreeding between Brown Swiss bulls and non-descript dams at Mavelikara region showed that the mean first lactation yields of the F1 progenies and their non-descript dams were  $1611.4 \pm 12.79$  litres and  $793.04 \pm 134.6$  litres respectively.

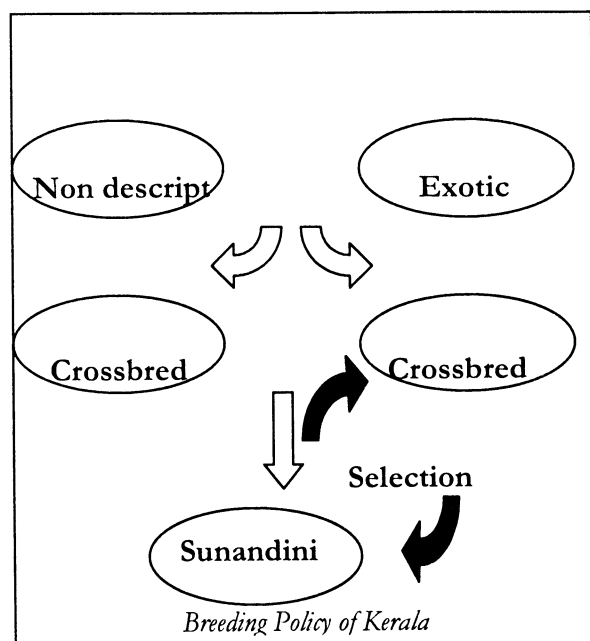
Analysis of the records on the first lactation milk yield of Jersey x local and Brown Swiss x local cows reared by the farmers in the ICDP areas of Kerala and the farms of the Indo Swiss Project revealed no significant differences between the crosses.

#### Cross breeding of cattle Breeding Policy of Kerala

The introduction of exotic breed was done with the implementation of cross breeding scheme during

1955-56 using Jersey as the donor breed on an experimental basis. Large scale cross breeding using exotic breeds and AI as tool was however introduced in 1963 with the launching of ICDP. Later on this becomes the official policy of the government. The establishment of the ISPK paved the way for expanding the cross breeding programme on large scale throughout the State. In the beginning, Brown Swiss was used as the donor breed. With the introduction of cross breeding on a large scale, a breeding policy was formulated in the state with an intention of developing a new breed having exotic inheritance between 50 % and 75 %. The programme was to develop a gene pool with a theoretical average of 62.5 % exotic and 37.5 %





indigenous inheritance. It was also envisaged to adopt intensive selection within the crossbreds to build up an economically viable stock in natural balance with the local ecology.

Consequent to the launching of a self-employment scheme for cattle breeding in the State during early seventies, it was decided to divide the State into two zones for cross breeding - north zone for Jersey and south zone for Brown Swiss. However, the breeding programme followed for Jersey was 'grading up'. Subsequently during 1978 after the formation of the Board, it was further decided to lift the breed barrier on public demand which necessitated modifications to the breeding policy and the Government has appointed a high power committee to review the breeding policy and submit recommendations. During 1980, the committee recommended to limit the level of exotic inheritance to around 50 % and practice intensive selection within the crossbred population especially the sires' through progeny testing.

#### Recommendations of expert committee

Another committee of experts again reviewed the breeding policy during 1992 and recommended to continue the breeding policy and to use Jersey, Brown Swiss and Holstein-Friesian as donor breed. A high level committee had again reviewed the breeding policy during 1997 and submitted its report. The government

had approved the recommendations in toto. The major recommendations are as follows.

Considering the smaller size, high fat content in milk, lesser feed intake and the liking of the farmers of the state Jersey would be used as exotic donor breed and Jersey and its crossbred lines would be used in larger proportions. In areas where roughage are available in abundance and where feeding is less expensive Holstein - Friesian and its crossbred lines would also be introduced.

The present level of feeding and other inputs and management support provided by the framers will not be adequate to make economic use of animals with blood levels higher than 50 %. Therefore it is proposed that the level of exotic inheritance be limited to around 50 %. However, commercial dairy farmers who can provide higher level of management and inputs may be given semen of high value pure breeds. Proven Sunandini bulls will be made available in premium bull artificial insemination programme.

There is need to intensify genetic selection to augment the productivity of breeding stock. All the crossbred bulls used in artificial insemination programme should be progeny tested to ensure that only superior bulls are used for artificial insemination programme. Selection of bull mothers will be intensified using modern genetic tools so that their progenies will produce better stock. It is also proposed to replace around 20 % of the exotic bull stock annually with exotic bulls of higher genetic merit and preferably from unrelated sources so as to bring in superior germplasm from outside sources. It is recommended to incorporate embryo transfer technology also in the production of breeding bulls for artificial insemination in the state.

It has been recommended to cull and remove about 2 % of the crossbred population for poor milk production and 1 % for delayed first calving age annually after compensating the loss of the owners so as to improve the production standards of the crossbred animals.

There are a number of animals with high production potential. These elite stocks should be bred with premium bulls and semen of the premium bulls shall be made available for breeding the elite cows all





over the state.

In order to provide timely breeding facilities it is essential to have one artificial insemination unit for every 500 breedable cattle. At present there is a considerable disparity in the availability of breeding facilities between the northern and southern Kerala. It is opined that relocating available artificial insemination centres and taking proper care while allotting new artificial insemination centres may eliminate the disparity in the availability of artificial insemination centres between the north and the south. The mobile artificial insemination programme may be implemented in all artificial insemination centres by the close of the ninth plan in a phased manner so that artificial insemination facilities are made available at the doorstep of the farmer.

AI technicians are to be given refresher training once in 5 years so as to improve the conception rate



Sunandini bulls

and to keep the technicians updated with the latest trends in animal breeding and reproduction. The farmers training programmes may be strengthened and expanded for providing know how on easy to adopt scientific management packages. Fodder production programme needs a thorough restructuring with the involvement of grama panchayats so that good quality fodder is made available to the cattle. Quality control of compound feed will be ensured to improve feeding standards. It is recommended that the special breeding programme be expanded to cover at least 15 % of the female calves born in the state annually. A massive programme to achieve 'zero sterility' should be launched for improving the reproductive efficiency of the cattle. It is proposed to establish 'Pasubhavans' in selected areas to be expanded in a phased manner to collect information on the production and productivity of the livestock sector.

The breeding programme for buffaloes will be strengthened by the supply of superior buffalo bull semen for artificial insemination.

Increasing the genetic potential of crossbreds through selection

The substantial genetic difference in milk production potential between *Bos indicus* breeds and *Bos taurus* breeds is too large to be ignored. To put this difference in perspective, we could say that the *Bos taurus* dairy cattle appear to have a genetic potential for milk production 100% higher than that of *Bos indicus*. At the same time, efficient dairy selection schemes produce rates of genetic change of approximately 1% per year.

Crossbreeding is often regarded as an alternative to selection. However, these are not mutually exclusive strategies and any crossbreeding options require a supporting selection program, either in the contributing purebreds or in the resulting synthetic. The genetic improvement from breeding superior animals is a function of accuracy with which the breeding value of an animal is estimated, the proportion retained for breeding, genetic variability for the trait under consideration and generation interval.

Accuracy x

Intensity x Genetic variance

