National Breeding Policy for Cattle and Buffaloes

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India is an agrarian economy where around 70% of the population is dependent on agriculture. Livestock rearing is a normal adjunct to agriculture. The dairy animals-cattle, buffaloes and goats are mainly reared by farmers and landless labourers under mixed farming system. Majority of the cattle and buffaloes are maintained in small herds (1-3) mainly on crop residues and by-products of cereals and oil seeds with the help of unemployed rural labour force especially women folk. Although returns from these low producing animals are small, they are still cost effective. In the absence of alternate employment opportunities, the bovines can play a significant role in the economic upliftment of small and marginal farmers and landless labourers.

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There are 30 well-defined breeds of cattle and 10 breeds of buffaloes apart from non-descript types which constitute around 80% in cattle and 60% in buffaloes. Total population of cattle and buffaloes was 204 and 84 million as per livestock census of 1992. Total number of indigenous and crossbred cattle was 189 and 15 million respectively. Annual growth rate of indigenous and crossbred cattle and buffaloes was 0.48, 5.92 and 2.08 per cent respectively during 1987-92. Total number of breedable cattle and buffalo in 1992 was 63 and 43 million while total number of milch cattle and buffaloes was 58 and 40 million respectively. There were 18032 indigenous cattle bulls, 431 crossbred cattle bulls and 2864 buffalo bulls in the country. The total milk produced by indigenous and crossbred cattle and buffaloes was16.918, 9.654and 34.450 million tonnes during 1994-95. The share of the buffalo to total milk production (63.804 million tonnes) was around 54 per cent. The cattle and buffalo account for more than 75 per cent of the total output value of the livestock sector.

Various indigenous breeds of cattle and buffalo in the country are the result of thousands of years of selection, evolution and development of the wild species in the process of domestication suiting to the local agro-climatic conditions. These breeds are now losing ground due to stiffer competition from other breeds and due to their poor economic viability under the present system of management.

Majority of the cattle breeds belong to draft category (Nagori, Bachaur, Kenkatha, Malvi, Kherigarh, Hallikar, Amritmahal, Khillari, Bargur, Kangayam, Ponwar, Siri, Gaolao, Krishna Valley etc.) providing only a little amount of milk. Some of these breeds have suffered decline and degeneration due to their becoming uneconomical in the present day production system. This calls for gearing up the current animal breeding and production systems to meet the market demands. Mechanization and commercialization of agriculture has influenced the utility of these breeds as draft animals.

Dairy type cattle breeds are Sahiwal, Red Sindhi, Gir and Rathi. Cows of these breeds are high milk producers but bullocks are of poor draft quality. The dual-purpose cattle breeds viz. Hariana, Ongole, Tharparkar, Kankrej, Krishna Valley, Mewati, Deoni

and Gaolao are fairly good milkers and bullocks provide good draft power. The home tract of the Sahiwal, Red Sindhi and Tharparkar is in Pakistan and a limited numbers are available in India.

The buffaloes have been classified into two groups viz. Swamp and Riverine. They belong to the same species but have different habitats. Swamp buffalo is more or less permanent denizen of marshy lands. The river buffaloes prefer clean water of rivers, irrigation canals and ponds. The river buffaloes are mainly dairy type and Murrah, Nili-Ravi, Surti, Mehsana, Jaffarabadi and Bhadawari breeds belong to this category. Cytogenetic studies have revealed that Nagpuri, Pandharpuri, Toda and Marathwada breeds also belong to riverine group.

In order to improve the productivity of indigenous breeds of cattle and making them economically viable, crossbreeding was introduced for faster genetic gains and improvement of production performance. This resulted in decline in the population of many breeds and some of them are coming under the threatened category. Hence immediate measures are required to be taken for the conservation of these breeds. It is necessary to conserve all the important breeds of cattle and buffaloes by adopting pure breeding with high level of selection for attaining optimum genetic improvement in their performance so as to make them economically viable and competitive with other breeds.

Breeding Practices in Villages: Since the proportion of population covered through AI on an average is meagre 10-15%, generally the cattle and buffalo herds of farmers in the villages are bred through natural service with the help of few breeding bulls usually selected on the basis of morphological characteristics and milk yield of their dams. Villages have common breeding bulls procured from State Animal Husbandry Departments, Livestock Breeding Farms, Charitable Institutions as well as promising cattle and buffalo breeders. The breeding bulls generally graze with the females in the villages. The cattle breed round the year, but in the buffaloes due to silent heat and anoestrus in females and impairment in the process of spermatogenesis in males due to summer stress, seasonality in calving is observed. If the summer stress is minimised by cooling the body surface of the animal or by protecting the animal from direct solar radiations, it has been observed that seasonality in calving can be overcome to a larger extent.

Keeping in view the vast variety of bovine breeds and local animals available in different agro-ecological zones of the country, no uniform breeding policy can be adopted. Currently, the cattle breeding policy is either **grading up** the local non-descript cows with the semen of males of well-defined superior breeds or **crossbreeding** with the semen of exotic (Friesian, Jersey) males.

Breeding Policy for Bovines:

The Royal Commission on Agriculture appointed by the Govt. Of India in 1926 pointed out that the owners of dairy cattle should aim at levels around 3500 litres per annum based on crossbreeding of local cattle with exotic dairy breeds. The commission also recommended confining the state departments to the improvement of milking qualities of indigenous breeds.

Animal Husbandry Wing of the Board of Agriculture and Animal Husbandry in India (1940) further recommended grading up of non-descript cattle with superior indigenous breeds and improvement of indigenous breeds through selection.

The ICAR in 1949 recommended following cattle breeding policy based on Goseva Sangh's Report:

1. Development of non-descript population into dual-purpose breeds having draft and milk quality.
2. Selective breeding in well-defined breeds.
3. Utilization of well-defined milch breeds in under-developed areas.

In 1961, Central Council of Gosamvardhana and Animal Husbandry Wing suggested certain changes in the existing cattle breeding policy for bringing about faster increase in milk production. The crossbreeding was accordingly permitted for crossing of non-descript cattle with exotic dairy breeds like Holstein-Friesian, Brown Swiss and Jersey.

In 1965, Union Ministry of Food and Agriculture set up a Scientific Panel of Animal Husbandry to review the breeding policy. It suggested selection among the indigenous superior breeds, grading-up of non-descript cattle with established defined breeds and crossbreeding with exotic dairy breeds in an intensive

and coordinated manner, ensuring simultaneously provision of suitable management conditions. The Panel recommended that bulk of the exotic inheritance should be obtained from Jersey breed and the crossbreeding with Brown Swiss and Holstein may be tried to a limited extent. Fourth five year plan further laid more stress on crossbreeding of cattle with exotic dairy breed.

Current Breeding Policy:

The current breeding policy recommended by National Commission on Agriculture (NCA) and adopted by Central and State Governments was similar to the one suggested by the scientific panel of Animal Husbandry and it again laid emphasis on selective breeding in the breeding tracts of well-defined breeds of cattle and buffaloes and upgrading of non-descript cattle and buffaloes by crossing with defined superior breeds and crossbreeding with exotic breeds in hilly and urban areas and around industrial townships to ensure adequate milk supply where facilities for rearing and maintenance of high yielding milch cattle exist. State-wise breeding policy of cattle and buffaloes is presented in Table.

Breeding Strategies to Improve Farmers' Cattle and Buffalo herds:

As a part of various cattle and buffalo breed improvement and development programmes under field conditions, a few attempts involving the farmers' herds in the progeny testing schemes have been made by various Research and Development Organizations viz. Bhartiya Agro-Industrial Foundation (BAIF), Pune, Kerala Livestock Development and Milk Marketing Board, Kerala and Punjab Agricultural University, Ludhiana, National Dairy Development Board, Anand and Punjab State Animal Husbandry Department. However, the breed improvement programmes involving farmers' herds could not be undertaken on large scale due to absence of animal performance recording system under field conditions. Currently, there is a need to develop performance recording system under field conditions alongwith herd improvement infrastructure facilities and to evolve selection criteria for selection of males and females incorporating the farmers' animals in the breeding programme keeping in view the environmental conditions prevalent in the area. The vast and widely distributed different types of cattle and buffaloes available with the farmers can be improved using the following breeding strategies:

I. Improvement of non-descript cattle: The population of non-descript cattle in the country is around 80 per cent. These cattle have low productivity (300-500 kg/ lactation), higher age at first calving (4 to 5 years) due to poor growth rate and longer calving intervals (20-26 months). Majority of the non-descript cattle available with the farmers can be genetically improved by adopting two breeding strategies:

a. Grading up: The non-descript (Desi) cattle available with the farmers in the different agro-climatic zones of the country can be upgraded with the semen of the progeny-tested bulls of well-defined superior indigenous milch breeds like Sahiwal, Red Sindhi, Gir, Deoni etc. available in and around their breeding tracts. For this, there is a need to strengthen the existing organized breeding herds of well-defined indigenous breeds by procuring high milk yielding cows from farmers' herds and applying new reproductive techniques like Multiple Ovulation and Embryo Transfer (MOET) for faster multiplication of superior germplasm of defined breeds (used as donors) utilising non-descript cattle as recipients. State Animal Husbandry and Dairying departments in collaborations with SAU's and ICAR institutes should take up these breeding programmes. Grading up may be resorted to in areas where feed and fodder resource availability is such that high yielding crossbreds cannot thrive well but defined milch breeds can be sustained. Grading up is expected to increase the milk yield by 500-800 kg in the first generation. By use of bulls of high transmitting ability for grading up in subsequent generations, milk yield can be improved to the extent of 5-10 % per annum.

b) Crossbreeding: In areas where feed and fodder availability is not a limiting factor and resource-rich farmers are following intensive agriculture and possessing adequate animal/milk marketing facilities, crossbreeding of non-descript local cattle can be taken up with exotic breeds like Holstein-Friesian and Jersey. In plains, Holstein-Friesian and in hilly and heavy rainfall areas relatively small-sized exotic cattle breed Jersey should be used for crossbreeding. The level of exotic inheritance should be 50% and inter-se-mating

amongst half-breds in subsequence generations should be done with the semen of progeny-tested half-bred bulls for sustaining and further improving milk production. There is 5-8 times expected improvement in milk production in non-descript in the first generation. The age at first calving and calving interval are also reduced in the crossbred daughters. According to an estimate, if 15% of the population of crossbred breedable cattle (1.05 million) is covered through AI, as many as 300 elite crossbred bulls were required in 2000 AD. The number of required elite bulls would be even more in the coming years.

II. Improvement of non-descript buffaloes: The non-descript buffaloes of the farmers can be improved genetically by grading-up with defined superior breeds like Murrah, Nili-Ravi, Surti etc. available in their respective breeding tracts. In Punjab, Haryana, Delhi and parts of western Uttar Pradesh, Murrah may be the breed of choice and to some extent Nili-Ravi may be used in few districts of Punjab bordering Pakistan. For Kerala, Karnataka, parts of Gujarat and Rajasthan, Surti is recommended. In other parts of the country where feed and fodder availability is adequate and good market for milk is available, Murrah is recommended. In the remaining parts of the country having non-descript buffaloes, grading up with defined breeds available in their respective breeding tracts or in the adjacent tract is recommended. Grading up is expected to increase the milk production of non-descript buffaloes by 2-3 times within a decade. The government and other agencies engaged in research and developmental activities on Animal Husbandry need to develop a network of infrastructure facilities on AI Centres, Semen Banks, Bull Mother Stations for promoting grading-up of non-descript buffaloes with improved germplasm of superior breeds of buffaloes. The farmers maintaining non-descript buffaloes should have an easy access to the nearby AI centre as well as satisfactory services for breeding their animals so as to get upgraded their non-descript buffaloes with the genetically superior semen of defined breeds. Under field conditions, the conception rate through AI has been reported to be low. Therefore, there is a need to explore all possibilities to enhance the conception rates through AI under field conditions.

V. Improvement of well- defined breeds of cattle and buffaloes: The well defined breeds of cattle and buffaloes available with the farmers can be genetically improved by selective breeding. The practical approach would be to get the females artificially inseminated with the semen of the progenlective breeding, it is expected that genetic improvement of 1.0 to 1.5 per cent of herd mean / annum at organised herds for milk production. The genetic gain will be even more in farmers' herds if proven bulls of high genetic merit are used.

The another important point is that before insemination, the farmer must be aware of detection of animal in heat and proper time for insemination and agencies conducting AI must ensure higher conception rate through AI. The agencies should also ensure that semen is properly stored in liquid nitrogen and belongs to a progeny-tested bull of high genetic merit. According to an estimate, to cover 15% of breedable population of cattle (9.45 million) and buffalo (6.15 million) through AI as many as 2250 proven indigenous cattle bulls and 4050 buffalo bulls of different well defined breeds were required in 2000 AD and the requirement will even be more in the coming years. Therefore, in order to meet the huge requirement of breeding bulls, there is, a need to enlarge the network of AI facilities to cover more proportion of breedable population of cattle and buffaloes as well as to undertake progeny testing programme on large scale alongwith establishing bull mother farms, young bull rearing units as well as integrating the new emerging reproductive and genetic engineering techniques with traditional breeding programmes for fast multiplication of superior germplasm and their dissemination.

Higher rate of genetic gain can be obtained through application of Open Nucleus Breeding System (ONBS) in dairy cattle and buffaloes. The technique divides the specific population in two groups i.e. nucleus and base. Elite animals are maintained at nucleus where an intense selection pressure is applied coupled with proper recording system and ways to increase the progeny size i.e. Multiple Ovulation and Embryo Transfer (MOET). Rest of the population is considered as base. Migration of selected (genetically improved) bulls is carried out from the nucleus to the base and elite females to the nucleus. This results in genetic

improvement in both of the groups and reducing inbreeding in the herds. It has been observed that ONBS with MOET may bring 3 times genetic improvement in milk production as compared to progeny testing scheme.

Participation of Farmers' Herds in Breed Improvement Programmes:

In order to bring about genetic improvement in milk production of different breeds of milch and dual purpose cattle, crossbred cattle, milch buffaloes, non-descript cattle and buffaloes available at organised farms and under field conditions (with the farmers), it is imperative that suitable infrastructure is developed for the survey of different breeds of bovines in their breeding tracts, field recording of performance data and use of such records for genetic evaluation of bulls (through progeny testing) and cows. In the past, efforts were made to progeny test the bulls at organised farms only. However, due to small herd size at institutional farms, the number of bulls that could be progeny-tested was very small and the accuracy and intensity of selection of sires was also low. In order to overcome the small herd size, the herds maintaining a particular breed were associated and the same set of bulls was progeny-tested in different herds situated in different regions. Associated herd concept was used in AICRP on cattle and buffaloes. Currently, Network programmes on cattle and buffaloes at various centres are following associated herd concept for genetic evaluation of sires through progeny testing. Although results are somewhat encouraging, yet required number of proven bulls with fairly high degree of accuracy can not be obtained from associating few numbers of organised herds only.

There is, therefore, an urgent need to associate farmers' animals clustering around each associating organised herd in the breed improvement programmes. In this programme, only those farmers possessing relatively large sized herds will be participating who are also interested in genetic improvement of their herds and not merely in profits over a short period of time through sale of milk.