TAILORING GENETIC IMPROVEMENT TO MEET THE OVERALL LIVESTOCK DEVELOPMENT OBJECTIVE

B.U. Khan, R.C. Sharma, S. Kumar and B.P. Kushwaha

Central Sheep and Wool Research Institute, Avikanagar, Rajasthan-304 501, India

INTRODUCTION
Animal rearing has traditionally been a part of soil-plant-animal-man chain since time immemorial and this system has been meeting the requirements of the people in developing world for food, fuel and farm power partly. Livestock sector is linked with the sustenance livelihood of millions of masses by gainful employment and supplementing income. Mostly small/marginal farmers and land less labourers in rural area are engaged in animal rearing with small units. India’s milk production had grown substantially during the last 30 years and it has become the world leader in milk production. The per capita availability of milk raised from 106 g per day in the sixties to more than 225 g presently. Nation’s dairy development programmes involving farmers and high yielder crossbreds in the field have been the instrumental in this steep hike. Simultaneously, meat production in India has also increased drastically. However, the productivity per unit of livestock is not comparable with that of the developed countries and the gap is due to various reasons.

PRODUCTION SYSTEM
In general, every farmer is rearing one or two unit of cattle/buffalo or both to cater their needs and sell the surplus produce to the local market. Males are either being retained by themselves as draught or they are sold at an early age. Cattle and buffalo farmers were organised through dairy cooperatives for milk collection and marketing of produce. Sheep and goat farming in India has remained nomadic, transhumance or crop livestock mixed farming. Average flock size varies from 30-100 in northwestern region and 5-50 in southern region of India. Both species are raised primarily for meat but in the northwestern region goat milk and sheep wool are important in addition to meat. Both species are reared on extensive grazing, mainly on natural pastures and wastelands and to some extent semi intensive system is also in practice in some areas.

LIVESTOCK GENETIC RESOURCES
India is rich repository of animal genetic diversity as is reflected from available breeds of livestock. The country has some of the world’s best dairy buffalo, draught cattle and prolific goat breed. It is estimated that the country has a population of 209 million cattle, 91 million buffaloes, 56.47 million sheep and 120.6 million goat, 2.1 million horses, mules and donkeys, 1.03 million camels and 16 million pigs. The agro ecology of the country greatly influences breed distribution as well as the production of different breeds. There are 26 described breeds of cattle, 7 of buffaloes, 42 of sheep, 20 of goats, 6 of camels, 6 of equines and 3 of pig. In addition to above, there are number of non-recognized breeds in each species which are known by local names and may perhaps be a mere variant of the described breeds existing in the area and have not been granted the status of separate breeds. Cattle breeds like Sunandini in Kerala,
Karan Swiss and Karan Fries in Harayana and Frieswal in Military farms spread all over the country have been evolved from crossbred base involving different exotic and native cattle breeds. Both river and swamp type buffaloes are available in the India and majority of buffaloes is river type, which are distributed throughout the country. Important buffalo breeds are Murrah, Nili-Ravi, Surti, Jafarabadi, Bhadawari, Nagpurui and Pandharpuri.

Among sheep breeds, Marwari in Rajasthan and Gujrat and Deccani in Maharastra are the most important numerically and the largest contributors to mutton production. Marwari, Patanwadi, Nali, Magra, Jaisalmeri and Chokla are the largest contributors to the carpet wool production. Most of the sheep breeds found in India are non prolific except Garole and Bonpala found in eastern region. Among goat breeds Marwari in Rajasthan, Kutchi in Gujrat and Black Bengal in West Bengal, Bihar and other eastern states are numerically the most important. For meat production, Black Bengal and Barbari are famous. Jamunapari, Beetal and Jhakrana are the breed of choice for milk production. Goats of temperate Himalyan region grow fibres of good quality and finest undercoat called cashmere or pashmina. All the milk breeds are found in the northwestern region of the country, whereas dual-purpose breeds are found in southern region and highly prolific breeds are found in the eastern part of the country. Chanthangi and Chegu are two important pashmina goats breeds of India found at an altitude of more than 4000 meter.

**RESEARCH EFFORTS AND EXPERIENCES**

**Cattle and buffalo.** In view of the available poor germplasm of cows, crossbreeding of local cattle with elite exotic breeds and their upgradation was adopted as a national policy to improve animal productivity and milk production in the country. Breed improvement programs have been taken up in indigenous cattle (Red Sindhi, Tharparkar, Sahiwal, Haryana, Ongole and Gir) through selective breeding but this was not considered sufficient in bridging the gap between milk requirement and availability in a reasonable period of time. Crossbreeding has been taken up as an alternative to boost productivity of indigenous cattle in the shortest possible time. Rearing of crossbreds was limited to the resourceful farmers as the demand of the feed and fodder was more in crossbred as compared to the local animals. Nation’s dairy development programs and crossbreeding have helped significantly in enhancing the per capita milk availability. While reviewing the crossbreeding in tropical areas, McDowell (1985), commented that the best biological efficiency in tropical areas was observed to be 4000-4500 kg of milk per lactation. Attempt to push yield higher resulted in low efficiency in use of feed energy. With high dependence on tropical grasses and crop residues best-sustained milk yield was 1800-2000 kg per lactation. This means that more attention should be given to breeding plans to raise animal productivity from low to intermediate rather than providing genetic potential for productivity that can not be supported economically. A number of research projects and development schemes were undertaken on buffalo improvement in last fifty years, but programmes on cattle improvement like crossbreeding have been given more emphasis. National Commission on Agriculture in 1962 reviewed the breeding policy in each state and recommended a policy followed milk production in Indian Buffalo/cattle. The buffalo breeding policy envisaged (i) selective breeding for conservation and improvement of buffalo breed in their home tract and (ii) grading up of non-dispirit buffaloes. Although no scientific evaluation of the grading up schemes have been made, large increase in share of buffalo milk overtime suggested the effectiveness of grading up schemes. Since, India has the best buffalo germplasm in world therefore, to bring genetic improvement in this species selective breeding seems best-
fit tool for its improvement. Emphasis during selection in buffaloes was mostly on their dams’ performance. This was expected in the absence of progeny testing. Different grades of Murrah and Nili-Ravi were developed. Because liquid milk of buffalo fetches more price compared to cow and demanded higher in dairy industry. Few important breeds like Surti and Bhadawari which are precious are dwindling in their numbers therefore there is an urgent need to look such type of situations. Small herd size, poor economic status of the farmers and poor spread of artificial insemination (AI) have been the major hindrance in taking up the performance recording and progeny testing in the field.

Sheep and goat. Research efforts were concentrated on evaluating the important native breeds for body weight at different ages, feed conversion efficiency wool production and quality etc. Cross breeding of native breeds with Rambouillet/Merino sheep was undertaken to improve wool production and quality, and Dorset/Suffolk for improving mutton production. On the basis of experience gained during the last decades, it has been observed that crossbreds developed have not performed well under farmers’ management conditions. Further it has not been possible to produce fine wool with desirable staple length from higher crosses in arid and semi-arid regions. A classical example of developing successfully a fine wool breed has been obtained in the case of Kashmir Merino, which is now well recognized for apparel wool. This breed of sheep has been developed at the Government sheep breeding and Research Farm, Reasi (Jammu) by using the foundation population produced by mating ewes of Kashmir valley, viz. Gaddi, Bhakarwal and Poonch breeds of sheep, with exotic rams of Delaine Merino, Rambouillet and Soviet Merino breeds. Inter-se mating and rigorous selection has been followed for improving the fleece characteristics and body weights in Kashmir Merino. Attempts were made to improve the productivity of some breeds like Jamunapari, Beetal, Barbari, Black Bengal and Malabary etc. through selection. In these experiments, flock size was not large enough and as a result only small number of bucks could be progeny tested. Results indicated that Jamunapari and Beetal could be used as improper sire breeds for enhancing the productivity and prolificacy of small size breeds and non-descript goats in the country. In crossbreeding programmes, the European dairy goat breeds of Saanen, Alpine, and Toggenberg and the native breeds like Beetal and Jamunapari have been used for improving milk production. Crossbreeds of Sangamneri with Angora goats have produced Mohair at 75% and 87% of the Angora inheritance. Jamunapari, Beetal, Barbari and Black Bengal were studied for their combining ability. Jamunapari and Black Bengal were found best with respect to milk production. Now, in India survey, evaluation and improvement through selective breeding of indigenous sheep and goat breeds are under way.

FUTURE STRATEGIES
Livestock breeding policy in the fast changing scenario needs to be reviewed keeping in view the farmers needs and perception, demand and supply of animal products, availability of feeds and fodder, existing species/breeds and their performance, infrastructure and support system in different agro-climatic zones. Attention should be given to raise animal productivity from low to intermediate level rather than providing genetic potential for productivity that can not be supported economically. In case of crossbreeding, implementation must be considered situation specific i.e. resources needed for crossbreds must be available. Also investment in research and development for improving quality of feed resources should be increased. Database on
different aspects needs to be updated through periodic surveys. Development and transfer of appropriate viable technologies of livestock production systems by conducting on and off farm trials in different agro-climatic zones deserve urgent attention.

**Cattle and buffalo.** It is necessary that cattle and buffalo breeding policy should aim at reducing animal number while increasing animal productivity. Indigenous breeds in tropics are known to have genes for disease resistance, draught quality, and adaptability and heat tolerance. It is therefore necessary to preserve these special genes for posterity. Crossbreeding of low producing non-descript cattle with exotic dairy breeds may be attempted where adequate feed and fodder are available. Inter se mating among crossbred cattle using proven/pedigreed crossbred bulls. Non-descript buffaloes should be upgraded with improved breeds. Field recording and associated herds testing programme should be strengthen in both the species.

**Sheep and goat.** Priority areas for research in sheep and goat breeding are: survey, evaluation and improvement of indigenous sheep breeds for carpet wool and mutton production with special emphasis on higher lambing rate and developing feeding systems for increased animal growth. It must be recognized that improved crossbred animals can not perform well if inputs are deficient. Dual purpose breeds particularly meat and milk for goats and mutton and carpet wool for sheep may be evolved. Nucleus flocks involving progressive farmers should be strengthened to produce improve bucks and rams. Apparel wool production may be intensified in temperate areas. In these areas $3/4^{th}$ crosses of Rambouillet or Merino including Bharat Merino may be propagated. Performance recording and increased selection pressure must be implemented. Hairy goat breeds may be improved through crossbreeding with Angora bucks.

**REFERENCES**