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SMALL FARM ANIMAL BREEDING

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Abstract

Goats are used for milk as well as for meat production. One can develop specialized dairy type goats or specialized meat type goat or dual purpose ones; the dual purpose ones being most desired in India. Goats are also raised for hair fibres in the Himalayan region; e.g., the Kashmere or Pashmina goat. Hair of goats of other regions is rather coarse and is used for carpet making. Goat skins are also a very important commodity in this country. Breeding techniques for goats have to be used for improving the above characteristics in them. There are several well developed breeds of goats in India as described in the previous section. Constant endeavours have to be made via production recording, selection and mating (selective breeding), to improve the potential of such breeds. These breeds, in turn, can used for upgrading non-descript stock in other regions. Jamnapari and beetal are most promising ones for this purpose. In fact, Jamnapari is extensively used for grading local stock not only in India but also in several other Asian countries; such a breeding programme giving progeny with better growth performance as well as milk production

BREEDS:

SPECIES AND BREEDS:

The morphological and physiological characters formed the basis of dividing the animal kingdom into species and breeds within a species. The first division is into species. The most important feature of division is the reproductive discontinuity which means that two species do not interbred or the progeny of two species do not produce fertile progeny when they are further mated together. For example, horses and asses are two species and on mating produce viable but sterile progeny, except few rare cases. The interspecies crosses have variable fertility e.g., the female progeny produced by mating yak and cattle are fertile but their male ones are sterile. However, fertile male progeny of yak and cattle can be produced by two back crossing to cattle. Therefore, the reproductive discontinuity as a dividing criterion between species in some cases is liquidated.

A species is further divided into breeds or sub species. Different breeds have both qualitative and quantitative characters which differ for one breed to the other. These qualitative characters are more morphological such as colour and type of hairs, shape and size of horns, presence or absence of some body parts like zebu breeds of cattle are humped whereas European breeds are hump less for which they are regarded as subspecies of the same genus , Bos. The quantitative characters can be considered as differences in type and size of the body, milk production and fat percent in milk etc. However, there is no clear dividing line between breeds

for quantitative characters for the reason that these traits show continuous variation under the control polygenes.

Each species of farm animals contains a number of breeds. A group of animals of the same species having same origin(related by descent) and having common characteristics like general appearance, body colour, feature, size, configuration etc. is said to be a breed. The mating of animals within a breed maintains the purity of breed. A breed is a genetic entity developed over a long period of time as result of planned matting and selection . Therefore, a breed has certain well defined physical conformation different from other breeds in the vicinity and has distinct local names.

The breeds are not included in the Linnean Taxonomic classification and hence the binomial nomenclature of different breeds of a species is same.

There is further division of a breed into strains based on isolation from each other due geographical conditions or due to different aims of breeding the animals. This is called as **strain breeding**. **The individuals of a breed or strain are more closely related to each other than others due to interbreeding. This group is called a line. A line is called an inbred line when the inbreeding coefficient is reached at least 0.375** as a result of two generations of full sib mating. The full sib or half sib group of animals in cattle is the sire dam or sire family and all the individuals of a family are equally closed related to each other.

What is Breed

A group of animals related by descent and similar in most characters like general appearance, features, size, configuration etc., are said to be a breed. There may be considerable differences between individuals, still they have as a group many common points which distinguish them from other groups. Such a common characteristic group is termed a breed. The purity of the breed is maintained by confining the mating of animals to within the breed.

In India there are 25 well defined breeds of cattle and 6 breeds of buffaloes in addition to a large number of non-descript of low productivity in nature.

What is Species

A group of individuals which have certain common characteristics that distinguish them from other groups of individuals. Within a species the individuals are fertile when mated, in different species they are not.

GENETIC IMPROVEMENT OF SHEEP AND GOATS

Sheep occupy an important position among the domesticated animals in contributing towards the agricultural economy of the world. They are essentially dual purpose animals producing wool and mutton and in certain cases like Zackel from the Balkans, milk also. Their importance lies in that they can utilize vegetation on uncultivable wastelands for production.

The production characteristics of Indian sheep with respect to quality and quantity of wool and mutton are very poor in comparison to improved breeds in the advanced countries. The average annual production of wool by sheep in India is 700 kg per head compared to 5.4 to 6.7 kg in advanced countries, like Australia. The wool is generally coarse type suitable for carpets and coarse blankets and garments. While an average Indian sheep produces 9.6 kg mutton the developed sheep of Europe yield 22 kg at a younger age. The lamb crop per 100 ewes in India remain between 60 and 70, but in improved sheep, it may be as high as 120-140 lambs. Thus, it is evident that the sheep rearing industry in this country still remains in its primitive stage. This is at the same time the despair and hope for the animal breeder in the country, despair because of the pathetically low level of production and hope because of the tremendous scope for improvement through the application of breeding principles.

GENETIC CORRELATIONS:

It has been found that genetic correlations exist between fibre diameter and both clean-fleece weight and staple length to an extent to slow progress if selection is concurrently made for smaller fibre diameter (fineness) and higher clean fleece weight and increased staple length. Negative genetic correlations between weaning weight and staple length and between weaning weight and freedom from folds have been observed in Columbia, Targhee and Rambouillet breeds. Possibly important genetic antagonisms exist between staple length and body weight. The general belief, however, is that none of these correlations are intense enough to prevent progress. Rather, they would limit or slow progress in breeding programmes in which selection is made concurrently for these traits.

SELECTION OF BREEDING STOCK:

In advanced countries seed stocks are maintained as speicalised enterprise separate from commercial flocks of sheep. The stress in the first business is the maintenance and improvement of predictable genotype in individuals which will be sold to commercial flock owners. The latter aims at maximizing productivity most economically. But in developing countries no such specialization is evident. The same farmer raises lambs commercially and raises breeding stock.

In selecting ewes and rams for breeding, individual performance and family average are the two important basic considerations on the basis of which initial selection is made. At a later stage , some culling can be made on the basis of first lamb crop or two. Progeny testing has been found to increase progress by 20 percent and 5 percent respectively for weaning and yearling traits with characters having heritabilities as low as ten percent. In Australian Merinos, studies revealed that little gain was possible from a progeny testing programme for selecting rams as compared with individual cum family selectionwith heritabilities around 0.3, progeny testing has been found to decrease progress in traits with heritabilities of 0.6. Progeny testing has its usefulness in sheep only in carcass traits and in traits with low heritabilities.

One has only to observe the variation existing between breeds to appreciate that selection can be effective in changing or improving a character over a period of time. There are limitations as to how fast this change can occur or even whether the change will occur at all. In order that selection should be effective the following preconditions should be fulfilled:

01.The animals exhibiting the favourable trait could be identified with reasonable accuracy. For this, the trait should be distinct.

02.The selection standard should be applied to all stock meant for breeding without any exception.

03.Incorporation of too many traits for selection will lower the efficiency of selection in individual traits. Therefore, a minimum number of traits should be selected at a time.

04.Selection pressure should be applied continuously, or there will be a rapid regression towards average.

05.Only select for economically important traits. Selecting for a trait which has a short-time popular appeal will result in losing the opportunity of selecting for other economically important traits. Long experience has shown that in sheep, the most important economic traits are : (a)number of lambs weaned per ewe (b)Growth rate of the lamb and (c)weight of fleece.

PUREBREEDING AND CROSSBREEDING IN SHEEP:

In order to maintain seedstock flocks, the owner has the options of 9i)following an outbreeding system within his breed, (ii)adopt a mild linebreeding or inbreeding system, or (iii)follow an intense inbreeding programme. Each one of these is applicable under certain circumstances only.

With medium to high heritability estimates for most traits except fertility in sheep, an outbreeding system should be able to bring about desired degree of improvement in reasonable time.The main disadvantage is that in all except larger flocks a farmer will have to depend on external sources for breeding rams. Often it is not possible to know as much about the genetic worth of such purchased sires as would have been possible if the sires had been raised in his own flocks.

The other two options involve two different levels of inbreeding. Results of inbreeding in sheep are very similar to those with other species of livestock. General decrease in weaning and yearling weight, body size and decreased staple length and fleece weight were observed with increase in inbreeding. Inbreeding causes severe

effects on fertility and a decline of vigour and survivality of lambs. In some instances, appearance of defects due to pairing of recessive genes has also been seen.

However, reduction in the productivity with inbreeding are not to the extent to discourage developing highly inbred lines. In moderately large flock with three or more rams, mild linebreeding can be followed. Such a practice will only increase inbreeding by two to four percent in a generation.

CROSSBREEDING: In developed countries, crossbreeding is usually done in commercial flocks for maximizing productivity. One can , by persistence and with time, achieve some remarkable change in a breed or flock through selection. However, if another breed or strain exists with the desirable traits already present, how much easier it will be simply introduce the trait by making a cross with this second breed and then selecting the best combinations from the offsprings. Introducing twinning body size and wool quality is being handled in this manner in many commercial concerns.

In the wide variety of crosses that have been made with breeds of sheep, the information indicates that for most characteristics, the crossbred animal is intermediate between the two parental breeds. Characteristics which, however do show quite marked increases are the fertility and milk production of the first cross ewes. Because of the latter, we can expect, as has been reported from many places, that lambs from first cross ewes will have higher daily rates of gain than lambs from purebred ewes. In order to obtain the best economic return from sheep, it is necessary to obtain good wool and good lambs from the same flock. At present no purebred will do this and so commercial producers in developed countries have to rely on a planned system of crossbreeding as a method of maximizing production.

Wool and mutton industry in India has been assuming increasing importance, but the low productivity and poor quality of mutton and wool of our sheep act as limiting factors in developing sheep.As mentioned earlier, introducing of desirable highly developed traits of exotic breeds of sheep into indigenous breeds through crossbreeding is a much easier, potent and faster tool than trying to improve these traits by selective breeding . Crossbreeding of Indian sheep with Rambouillet was tried in Jammu and Kashmir, Himachal Pradesh, Uttar Pradesh, Maharashtra and Rajasthan, with Merino in Maharashtra, Kashmir and Himachal Pradesh, with Polwarth in Uttar Pradesh, with Romney Marsh in Madras and Bihar and with Correadale in Haryana and Uttar Pradesh. It has been generally observed that qualitative and quantitative characteristics of wool improved as a result of crossbreeding. With increase in the level of exotic inheritance, the fleece weight, density of wool fibres and dineness increased. Staple length decreased in the case of Rambouillet crossbreds, but Merino, Polwarth and Romney Marsh crossbreds did not present any consistent trend. Medullation percentage decreased with the extent of exotic inheritance. In many of the experiments carried out in India, because of the small number of animals in any group, it was difficult to draw any definite conclusion about the suitability of different exotic breeds for crossing with the local breeds. However, the crossbreds in general gave improved production performance over the indigenous breeds. Also it was evident that improvement tended to increase with the increase in exotic inheritance. But, the mortality rate also increased with increase in exotic inheritance. This drawback of higher-grade cross-breds could be remedied by better management.

There was a tendency towards increase in birth weight and weaning weight (at 90 days) with increase in exotic inheritance in rambouillet X hokla, and rambuillet Malpura crosses. At six months, crosses with 5/8 exotic inheritance attained heavier weights than half-bred F_2's , $3/4^{th}$ and ¾ interbreds. In general Rambouillet X malpura crossbreds had a heavier birth weight and attained better weights at weaning, six months and one year age than Rambouillet X Chokla or Rambouillet X Jaisalmeri.

Considerable experience has accumulated regarding crossbreeding in advanced countries. United States department of Agriculture in its programme of crossbreeding , observed that offsprings from the various two way crosses of mutton type Shorpshire, Southdown and Hampshire produced more than the average of the purebred parents. The offspring of the two-way cross ewes from purebred rams of a third breed, either of mutton or wool type, also averaged higher than the average of the purebred parents. Further, the use of a wool type ram in the three way crosses significantly increased quality and quantity of wool produced without materially affecting the carcess quality. Besides production, fertility, prolificacy, lamb livability and overall reproductive performance were higher for crossbreds than for purebreds. There was also an upward trend in these traits with the increase

in the number of breeds involved in these crosses. Studies on heterosis in weight gains during successive periods and wool production suggest that the crossbred lambs excel the averages of the purebred breeds.

IMPROVEMENT OF GOATS:

Goats are used for milk as well as for meat production. One can develop specialized dairy type goats or specialized meat type goat or dual purpose ones; the dual purpose ones being most desired in India. Goats are also raised for hair fibres in the Himalayan region; e.g., the Kashmere or Pashmina goat. Hair of goats of other regions is rather coarse and is used for carpet making. Goat skins are also a very important commodity in this country.

Hence, breeding techniques for goats have to be used for improving the above characteristics in them. There are several well developed breeds of goats in India as described in the previous section. Constant endeavours have to be made via production recording, selection and mating (selective breeding), to improve the potential of such breeds. These breeds, in turn, can used for upgrading non-descript stock in other regions. Jamnapari and beetal are most promising ones for this purpose. In fact, Jamnapari is extensively used for grading local stock not only in India but also in several other Asian countries; such a breeding programme giving progeny with better growth performance as well as milk production.

Some synthetic breeds can also be developed using different breeds in crossbreeding. This is being attempted at several institutions in India with variable success. One of the outstanding examples of the evolution of a synthetic breed is the Anglo-Nubian breed, which has been evolved from Nubian (of Sudan) and Jamnapari. It is a very goat tropical milch goat. Some of the recognized European dairy goat breeds like Saanen, Toggenburg and Alpine have also been tried for crossbreeding with indigenous breeds of goats in india and other tropical countries. Even purebred exotic goats have also been reared in warm regions.

Experimental evidence from India and other tropical countries indicates that, perhaps, the Anglo-Nubian is the best as regards allround performance; they peoduce on an average one litre of milk per day with a lactation length of around 250 days. Next, the Saanen and British Alpine are considered to be better suited than Toggenburg for the tropical regions with good feed resources, especially to the sub-tropical regions.

The black Bengal breed of goats along with its variant the Brown Bengal are dwarf goats that are renowned for the quality of their meat, through they are very small and hence yield ten kilos or less meat. This breed is well suited for more humid regions of the country, i.e., eastern and north-eastern states. The efficiency of introducing the inheritance of this breed in others for improvement of meat quality has not yet been clearly established.

Mohair, a quality goat fibre, is produced by the Angora goat that originated from central China. Its hair grows about 12 cm long on an average in long lustrous white locks. This breed can be successfully used, and is being used, in the hilly regions of the country for mohair production.

Reference

FAO (1989) Sustainable development and natural resources management, Paper C 89/2, Sup. 2 presented to the twenty-fifth session of the FAO conference, Rome, Nov 1989

Gopal R. Gowane, Lalit Mohan Sharma, S. S. Misra, P. K. Mallick, Arun Kumar, Farmer's participatory approach for breed improvement in Malpura sheep, Journal of Animal Breeding and Genetics, 10.1111/jbg.12519, **0**, 0, (undefined).

Gupta SC, Kumar D, Pandey A et al (2009) New k-casein alleles in Jakhrana goat affecting milk processing properties. Food Biotechnol 23(1):83–96

Jyotsana Diwedi, Abhijeet William Singh, Sonika Ahlawat, Rekha Sharma, Reena Arora, Himani Sharma, K.N. Raja, N.K. Verma, M.S. Tantia, Comprehensive analysis of mitochondrial DNA based genetic diversity in Indian goats, Gene, 10.1016/j.gene.2020.144910, **756**, (144910), (2020).

Sudarshan Mahala, Samita Saini, Arun Kumar, R.C. Sharma, G.R. Gowane, Genetic trends for the growth rates and Kleiber ratio in Avikalin sheep, Small Ruminant Research, 10.1016/j.smallrumres.2020.106143, (106143), (2020).