ABSTRACT

Title of Thesis: Selection for maximising productivity (Meat and Wool) in the Malpura and Sonadi breeds.

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To develop an appropriate selection criteria for maximising the net productive performance of the two extremely coarse carpet wool breeds of North-Western region, viz., Malpura and Sonadi, study was undertaken to investigate the effects of non-genetic factors and to obtain estimates of genetic and phenotypic parameters for body weights at birth, four weeks, weaning and six months, pre- and post-weaning average daily gains and first six monthly greasy fleece weight. Pre- and post-weaning survival, efficiency of feed conversion in the individual feedlot, feedlot gain, carcass weight and dressing percentages were also considered for studying the influence of different non-genetic factors.

Records on 1110 Malpura and 426 Sonadi lambs, progenies of 38 and 15 sires respectively and pertaining to the Central Sheep and Wool Research Institute's Unit of the "All India Coordinated Research Project on Sheep Breeding for Mutton" were available. These records extended over six years (1972-1977). The adult animals were primarily maintained on grazing on natural vegetation with some supplementation with conserved hay and
top feed during scarcity periods. Lambs were fed 50 to 100 g of concentrates during first month of life and 250 g during second and third months. Thereafter males in the feedlot were given ad libitum concentrates and hay. Female lambs were offered concentrates @ 350 g/day. Green fodder was given as per the availability.

Least squares means for weights at birth, four weeks, weaning and six months were 2.63 ± 0.03 and 2.56 ± 0.04; 5.80 ± 0.10 and 5.71 ± 0.03; 10.49 ± 0.19 and 11.06 ± 0.23 and 16.50 ± 0.51 and 17.07 ± 0.55 for Malpura and Sonadi breeds in that order. Pre- and post-weaning average daily gains and first six monthly greasy fleece weight for the two breeds were 0.084 ± 0.002 and 0.093 ± 0.002; 0.063 ± 0.005 and 0.063 ± 0.005 and 0.745 ± 0.039 and 0.544 ± 0.049. Similarly pre- and post-weaning survival were 82.47 ± 3.28 and 83.26 ± 4.53 and 87.58 ± 3.04 and 90.31 ± 3.59; feedlot average daily gain, total digestible nutrients consumption and efficiency of feed conversion were 0.091 ± 0.001 and 0.100 ± 0.007; 40.73 ± 2.97 and 61.12 ± 3.18 and 19.84 ± 2.12 and 13.25 ± 1.02 and carcass weight and dressing percentages on live weight and empty live weight basis were 3.42 ± 0.39 and 8.12 ± 0.38; 47.15 ± 0.66 and 48.18 ± 0.62 and 57.28 ± 0.71 and 57.87 ± 0.86 for Malpura and Sonadi breeds respectively. In general there was no difference between the two breeds excepting
first six monthly greasy fleece weight and efficiency of feed conversion where the Malpura breed performed better than the Sonadi.

The effect of year and season of birth, sex of lamb and ewe's weight at lambing were studied independently of sires. Data were adjusted for significant non-genetic effects using factors developed from the least squares constants. Estimates of heritabilities of and genetic correlations among different traits were obtained from sire components of variances and covariances.

The heritability estimates for birth, four weeks, weaning and six months weights, pre- and post-weaning average daily gains and first six monthly greasy fleece weight were 0.26 ± 0.06, 0.28 ± 0.06, 0.26 ± 0.07, 0.13 ± 0.04, 0.22 ± 0.06, 0.09 ± 0.32 and 0.16 ± 0.05, respectively.

The phenotypic and genetic correlations of birth weight with later weights and gains and first six monthly greasy fleece weight were positive and large excepting the genetic correlations of birth weight with post-weaning average daily gain and first six monthly greasy fleece weight, which were low and negative. The phenotypic correlation of four weeks weight with the other traits were similar, while the genetic correlations with weaning weight and pre-weaning average daily gain were positive and large, with post-weaning average daily gain and first six monthly greasy fleece
weight were negative and large and with six months weight, negative and small.

The phenotypic correlations of weaning weight with six months weight, pre-weaning average daily gain and greasy fleece weight were positive and highly significant and with the post-weaning average daily gain low and non-significant. Genetic correlations were positive and large with six months weight and pre-weaning average daily gain and large and negative with post-weaning average daily gain and first six monthly greasy fleece weight.

Phenotypic and genetic correlations of six months weight with pre- and post-weaning average daily gains and greasy fleece weight were positive and large and significant. Genetic correlations of pre-weaning average daily gain and first six monthly greasy fleece weight were positive and large while phenotypic correlations were low and non-significant with post-weaning average daily gain and positive and highly significant with greasy fleece weight.

Direct and correlated responses to individual trait selection, when individuals one standard deviation above the means are retained, showed that selection based on six months weight would be most appropriate.

Selection indices were constructed combining weights at birth, four weeks, weaning and six months, pre- and post-weaning average daily gains and first six monthly greasy fleece weight. Index combining six months weight
and first six monthly greasy fleece weight would provide large improvement in these two characters higher than based on six months body weight alone and without any deterioration in the other characters. It has a large correlation with aggregate genetic worth ($R_{TH} = 0.89$) which is only a little less than the other two indices, one combining four weeks and six months weights, first six monthly greasy fleece weight and post-weaning average daily gain ($R_{TH} = 0.96$) and the other combining birth, weaning and six months weights and first six monthly greasy fleece weight ($R_{TH} = 0.95$).

It can be concluded from this study that the Malpura performs better than the Sonadi breed in first six monthly greasy fleece weight and efficiency of feed conversion. Improvement for market weight and first six monthly greasy fleece weight can be best made through selection based on an Index $I = 0.902$ (six months weight) + 4.415 (first six monthly greasy fleece weight).