Genetic Architecture of
The Synthetic Sheep Population

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Dedicated To

My Late
Grand Parents

Preface

The present study was undertaken with the objectives to study the effects of non-genetic factors, to estimate phenotypic and genetic parameters and phenotypic and genetic trends and divergence analysis of synthetic sheep population.

The data were collected from records maintained in the project entitled, "Estimating the cross combining ability of Corriedale and Russian Merino rams with Nali ewes" in the Department of Animal Breeding, CCS Haryana Agricultural University, Hisar. The data on economically important traits were collected on 1118 animals for 15 years (1986 to 2000) & these animals were grouped into seven generation viz. G1 to G7.

The economic traits studied were: Birth weight (BW), Weaning weight (WW), Six-month body weight (SMW), Pre-weaning average daily gain (PRWDG), Post-weaning average daily gain (POWDG), One year body weight (YBW), Age at first lambing (AFL), Weight at first lambing (WFL), Average lambing interval (ALI), Grease fleece weight (GFW), Staple length (SL), Average fibre diameter (FD) and Medullation per cent (MP). The data were analyzed using Mixed Model Least-squares and Maximum Likelihood computer programme (Harvey, 1987).

Effect of year of birth was significant ($P \leq 0.01$) on all the traits under study except YBW and ALI. Effect of season was significant ($P \leq 0.01$) on BW, WW, POWDG, YBW and GFW and non-significant on rest of the traits. Sex of lamb was found to be significant ($P \leq 0.01$) source of variation in all the growth traits and GFW. Effect of dam's age at lambing was significant on BW, WW, SMW and PRWDG, while non-significant on rest of the traits. Dam's weight at lambing significantly affected BW, WW, SMW, PRWDG, YBW, WFL, GFW, FD and MP.

Heritability estimates were moderate to high for most of the traits under study. The phenotypic correlation of BW with WW, SMW, PRWDG, AFL, WFL and GFW was positive and significant ($P \leq 0.01$). The phenotypic correlation of AFL & WFL were positive & significant ($P \leq 0.01$) with GFW; whereas phenotypic correlation of WFL & ALI with FD were negative and significant ($P \leq 0.01$). The phenotypic correlation of GFW with other wool traits was non-significant except with FD, which was significant ($P \leq 0.01$) but

negative. The genetic correlations among various traits varied from low to moderate hence, were of little significance except correlations among the growth traits (WWx PRWDG, SMW x POWDG) and some of the reproduction traits (WFL x AFL), which were of higher values.

Divergence analysis revealed that the D^2-value was maximum and significant between generation G2 and G7. BW, WW and GFW contributed maximum towards discrimination. G1 and G2; G3 and G4 & G5, G6 and G7 were grouped in cluster I, II & III respectively, for growth and reproduction traits, indicating that the synthetic sheep population became stable in the last three generations.

Virender Sehrawat

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CHAPTER – I
Introduction

India is a rich repository of sheep genetic resources having 42 breeds. Majority of these breeds have been defined in terms of phenotypic characteristics, which distinguish them from other populations & have primarily been named after the name of their main habitat. No attempt has been made to define these populations in terms of their phylogeny & genetic structure.

Cross breeding of native sheep with exotic breeds has been in practice since long to bring about improvement in both wool & mutton production. The results of such attempts have been the evolution of some superior breeds, viz. Hissardale, Kashmir Merino, Bharat Merino etc.

Thus, aim of sheep breeders is to bring about genetic change in their livestock, with a view to increase profitability, sustainability and ease of management at the production level. Breeding objectives declare a desired direction for genetic change. They should be constructed in a manner which allows their rational expression as part of a Genetic Evaluation System, in order to facilitate ranking of animals on genetic merit and for effective implementation of breeding programmes.

A knowledge of change in the performance of farm livestock with time due to changes, either in the genetic structure of the population or improvement in the management and environment is of fundamental interest to the animal breeder, which is an aid in formulating breeding strategies for future