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QUANTITATIVE EFFECTS ASSOCIATED WITH A
DWARFING GENE IN POULTRY

by

R.W. POLKINGHORNE B.Ag.S.

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University of Adelaide.

Department of Genetics
University of Adelaide
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SUMMARY

Comparisons of body weights and shank lengths of dwarf and normal birds were made in two ways. A Dwarf Group, produced by mating dwarf to dwarf, and a Normal Group, produced by mating normal to normal were used to compare unrelated dwarf and normal birds. Related dwarf and normal birds were compared within a Segregating Group, produced by mating heterozygous sires, which are phenotypically normal, to dwarf dams. Due to the sex-linked recessive inheritance of the dwarfing gene the Segregating Group produced dwarf and normal female, and dwarf and heterozygous male offspring.

Measurements made on birds used as parents in this study indicated that dwarfs lay eggs which are on average 10% smaller than those from normal birds. There was no apparent reproductive disadvantage associated with either dwarf dams or sires relative to normal birds.

Within the progeny produced there was no indication of any disturbance in the segregation of sex or in the segregation of the dwarfing gene. The day-old body weight of birds was shown to be closely related to the average egg weight of their dam, but by 6 weeks there was no apparent effect of average egg weight of dam on body weights for either dwarf or normal offspring. Dwarf birds showed greater retardation of body weights and shank length at 12 than at

6 weeks relative to normal birds despite having the same day-old body weight. Retardations of 17% and 27% for body weights and 11% and 19% for shank lengths at 6 and 12 weeks respectively were observed for dwarf compared with normal birds.

The variances of body weight and shank length measurements were shown to be the same for related dwarf and normal birds and the coefficients of variation the same in unrelated dwarf and normal birds. Variance associated with the sex-chromosomes (sex-linkage) was shown to be more important in dwarf than in normal birds in determining body weights and shank lengths.

Common environment or maternal effects were shown to be important in determining the day-old body weights of both dwarf and normal birds, but were not apparent for body weight or shank length measurements at 6 or at 12 weeks. No difference was detected between dwarf and normal birds for any of the heritability estimates of body weights or shank lengths. Correlation estimates showed a close genetic relationship between all combinations of body weight and shank length measurements at 6 and 12 weeks, with no apparent difference between dwarf and normal birds.

DECLARATION

I declare that this thesis contains no material which has been accepted for the award of any other degree in any University and to my knowledge contains no material previously published or written by another person except where due reference is made.

R.W. Polkinghorne

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