

Inbreeding and Its Effect on Growth Performance in a Closed Herd of New Zealand White Rabbits

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Abstract : The influence of inbreeding on growth traits in the New Zealand White rabbits maintained at Sheep Breeding and Research Station, Sandynallah, The Nilgiris, India was studied in a closed herd. Data were collected over a period of 15 years (1998 to 2012). The traits studied were body weights at weaning (W42), post-weaning (W70) and marketing (W135) age and growth efficiency traits viz., average daily gain (ADG), relative growth rate (RGR) and Kleiber ratio (KR) estimated on a daily basis at different age intervals (1=42 to 70 days; 2=70 to 135 days and 3=42 to 135 days) from weaning to marketing. The effects of inbreeding along with other non-genetic factors (sex of the kit, season and period of birth of the kit) were analyzed using least-squares method. The inbreeding (F) and equivalent inbreeding (EF) coefficients were taken as fixed classes as well as covariates in separate analyses. When taken as covariate, the effect was analyzed as partial regression of respective growth trait on individual inbreeding coefficient (F or EF). The mean body weights at weaning, post-weaning and marketing were 0.715, 1.276 and 2.187 kg, respectively. The maximum growth efficiency was noticed between weaning and post-weaning. Season and period had highly significant influence on all the growth parameters studied and sex of the kit had significant influence on certain growth efficiency traits only. The average coefficients of inbreeding and equivalent inbreeding in the population were 13.233 and 17.585 percent, respectively. About 11.17 percent of total matings were highly inbred in which full-sib, half-sib and parent-offspring matings were 1.20, 6.30 and 3.67 percent, respectively. The regression of body weight traits on F and EF showed negative effect whereas most of the growth efficiency traits showed positive effects. Significant inbreeding depression was observed in W42 and W70. The depression in W42 was 0.214 kg and 0.139 kg and in W70 was 0.269 kg and 0.172 kg for every one unit increase in F and EF, respectively. Though the trait W135 showed positive value and ADG1 showed depression, the effects of inbreeding and equivalent inbreeding were non-significant in these traits. Higher values of inbreeding depression could be due to more variance of F or EF in the population. The analysis of the effect of level of inbreeding on growth traits revealed that the inbreeding class was significant on W70, ADG2, RGR2 and KR2 while EF classes had significant influence only on ADG2, RGR2 and KR2. Obviously, inbreeding does not have a positive effect, therefore, these results suggest that inbreeding had no effect on these traits.

Keywords : growth parameters, equivalent inbreeding, inbreeding effects, rabbit genetics

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