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STUDIES OF HETEROSIS FOR 6-WEEK BODY WEIGHT IN CROSSBRED BROILER

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ABSTRACT

The broiler trait *viz.*, 6-week body weight (BW_6) were recorded on 1315, 819, 1356 and 889 test cross progeny of 71, 69, 85 and 68 sire in G_1, G_2, G_3 and G_4 generation respectively. The 6-week body weight average of crossbred broiler ranged from 887.97±5.66 to 925.07±4.71g over the generations. The regression of heritability on generation number was significantly negative. Based on the mid-parent value, the superiority of test cross progeny were 5.79, 17.36, 12.62 and 24.05 per cent in G_1, G_2, G_3 and G_4 generation respectively.

The use of crossbreds for higher animal productivity has been increasing in recent decades. Arthur (1986) pointed out that modern breeding systems in poultry is reciprocal recurrent selection (RRS) or some modification of that system to improve the performance of the cross. The superiority crossbred over the average of their parents is hybrid vigour. It is opposite complementary to the phenomenon of inbreeding depression, in general terms, the fitness lost on inbreeding tends to be restored on crossing. The present study has been design to evaluate the heterosis in crossbred broiler.

The broiler traits 6-week body weight (BW_6) recorded on 1315, 819, 1356 and 889 test cross progeny of 71, 69, 85 and 68 sires in G_1, G_2, G_3 and G_4 generation respectively were utilized for this study. In each generation the test cross broilers were produced by mating the cockerels of sire line with the pullets of dam line in the month of December. Selection of cockerels and pullets was done in two stages of the both line to propagate the next generation.

The criteria of selection for cockerels and pullets of sire and dam line were as under– in first stage selection of cockerels in sire line based on index of following traits as 6-week body weight, breast angle, shank length, keel bone and in second stage final selection of cockerels based on six week body weight of their test cross progeny. In first stage selection of pullets in dam line, sire families having above flock average were retained and finally the pullets were selected on the basis of the index of following traits as 6-sweek body weight, egg number and egg weight.

The least squares mean and heritability of 6-week body weight was estimated from sire component of variance and covariances using mixed model least squares and maximum likelihood computer programme of Harvey (1987). Heterosis estimated as the differences in the performance of test cross progeny and the parental types.

Regression of generation mean and heritability of 6-week body weight on generation number was computed as per Snedecor and Cochran (1968) to study the effectiveness of selection.

The least squares mean, heritability and per cent heterosis in 6-week body weight of crossbred broiler are presented in Table 1. The 6-week body weight of crossbred broiler ranged from 887.97±5.66 to 925.07±4.71g over the generation. Pooled over the generation mean was 910.07±2.89 g. The regression of

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Table 1. Least square means, heritability estimates and per cent heterosis in 6-week body weight of crossbred broiler

Generation	Mean	Heritability	Per cent heterosis over		
			Dam line	Sire line	Mid-parent
G_1	904.34±6.53 (1351)	0.48±0.10	-0.97	13.54	5.79
G_2	887.97±5.66 (819)	0.34±0.11	17.94	16.79	17.36
G_3	925.07±4.71 (1356)	0.27±0.08	13.45	11.80	12.62
G_4	922.92±5.21	0.16±0.08	19.74	28.03	24.05
Polled	910.07±2.89 (4379)	0.33±0.05			
b±SE	0.05±0.038	0.103±0.009**			

Within parenthesis are the number of observations.
** Significant at 1% level ($P < 0.01$).

6-week body weight on generation number was positive but non significant. The 6-week body weight average in White Rock x Red Cornish cross reported by Sharma *et al.* (1987) were lower than the present value.

Heritability estimates for 6-week body weight of crossbred broiler ranged from 0.16±0.8 to 0.48±0.10 over the generation. Pooled over the generation, estimate of heritability was 0.33±0.05. The regression of heritability on generation number was significantly negative, indicating that selection was effective in parental line. The heritability estimates reported here are similar to those reported by Dev Roy *et al.* (1983) and Kataria (1985).

The results revealed that test cross progeny were superior to their dams by –0.97, 17.94, 13.45 and 19.78 per cent for 6-week body weight in G_1, G_2, G_3 and G_4 generation respectively. The corresponding superiority of the test cross progeny over their male parent line was 13.54, 16.79, 11.80 and 28.03 per cent. Based on the mid-parent value, the corresponding superiority of test cross progeny was 5.79, 17.36, 12.62 and 24.05 per cent (Table 1). The results indicate that as the selection in the two lines progressed, the superiority of the test cross progenies over their parents increased which may be accounted both by additive and non-additive gene action. Sheridan (1990) reviewed the literature and concluded that in broilers, heterosis for body weight is close to zero up to first week of age, but expressed to the extent of 2 to 10 per cent in later part of growth (8-10 weeks).

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