

Original Research Article

Evaluation of the Percentage of Heterosis for Body Weight and Carcass Traits

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ABSTRACT

The present experiment was conducted on four genetic groups of poultry involving Vanaraja (VR) and Gramapriya (GP) breeds maintained at instructional livestock farm of Bihar Veterinary College (BVC), Patna on random mating for a large number of generations. The four genetic groups were formed namely VR♂♂ x VR♀♀, GP♂♂ x GP♀♀, VR♂♂ x GP♀♀ and GP♂♂ x VR♀♀. The data were obtained collected on 300 birds of which 120 and 180 were males and females respectively. The numbers of male and female birds in each genetic group were taken as 30 and 45 respectively. Besides, 6 males and 6 females from each genetic group were taken randomly at 20 weeks of age to study various carcass traits. All the values of heterosis percentage for body weight were observed to be positive in VR♂♂ x GP♀♀ genetic group except at 5th week of age whereas GP♂♂ x VR♀♀ genetic group the heterosis percentage was found to be negative except at zero day. The heterosis percentage for body weight was found to be ranged from -0.875 – 10.51% in VR♂♂ x GP♀♀ genetic group and -15.86 – 2.93% in GP♂♂ x VR♀♀ genetic group. All the values of heterosis percentage for carcass traits were found to be negative in both the crossbreds except for giblets weight. The heterosis percentage was found to be ranged from -18.99 – 4.86%, in VR♂♂ x GP♀♀ and -17.75 – 9.12% in GP♂♂ x VR♀♀ genetic group.

Keywords

Vanaraja,
Gramapriya, Body
weight, Carcass
traits

Introduction

Raising of local poultry breeds in backyard is one of the important source of livelihood for the small and marginal poor farmers of India. The growing demand for indigenous eggs and low investment in backyard poultry keeping provides an opportunity of subsidiary income to the rural poor particularly to the women. Backyard poultry keeping in India is characterized by small flock size consisting of 5-10 predominantly

non-descript birds maintained in extensive system under zero input condition, but fetch the owners much needed animal protein and supplementary income.

Gramapriya and Vanaraja which are improved varieties of poultry is an egg type bird preferred by farmer for its colored plumage with better growth rate, more egg production, large egg size and brown egg

shell. Gramapriya is suitable for free range system and backyard farming with low cost inputs in nurseries to deliver optimal performance in village condition. The carcass quality is important characteristics for consumer preference and acceptance.

Materials and Methods

The experiment was conducted on Vanaraja and Gramapriya breeds of poultry maintained at ILFC, BVC, Patna on random mating for a number of generations. Four genetic groups were formed namely VR ♂♂ X VR ♀♀, GP ♂♂ X GP ♀♀, VR ♂♂ X GP ♀♀, GP ♂♂ X VR ♀♀

Ten males and 50 females under each genetic group were taken randomly to act as the parents of progenies which provided the data for this study.

The mating of male and female was done in the ratio of 1: 5 in each group on random basis. All the progenies were obtained from the single hatch in each group.

The birds were maintained on deep litter system. Better uniform management and standard ration and clean water were provided *ad. lib* to all the birds throughout the experiment.

Procedure for processing of carcass traits

The methods which were used for processing and evaluation of carcass yields.

Killing of bird

Bleeding

Scalding and Defeathering

Dressed weight, Eviscerated weight, Giblets weight, Legs weight, Thighs weight and Breast weight of the carcasses after defeathering was recorded.

Statistical Analysis

Data were analysed by MIXED MODEL LEAST-SQUARES AND MAXIMUM LIKELIHOOD COMPUTER PROGRAM PC-2 in the Department of AGB, BVC. The least squares means, standard error and coefficient of correlation were calculated through least squares models (Harvey, 1990) and some of the minor calculations were carried out by a programmable scientific calculator as per standard statistical method (Snedecor and Cochran, 1994).

Significant differences between means were tested by Duncan multiple range test modified by Kramer, 1957.

Results and Discussion

Body weight

All the heterosis percentages for body weight in VR♂♂ x GP♀♀ crossbred were found to be positive except at 5th week of age and ranging from -0.875 to 11.16%. The heterosis percentages for body weight (table: 1) at 0, 5, 10, 15 and 20 weeks of age were observed to be 3.397, -0.875, 11.61, 9.35 and 10.51% respectively in VR♂♂ x GP♀♀ crossbred. On the contrary, all the heterosis percentages for body weight in GP♂♂ x VR♀♀ crossbred were found to be negative at all the age groups except at zero day and ranging from -15.86% to 0.03% (table: 1).

No definite trend could be observed for heterosis percentage of body weight, however, the lowest and highest heterosis percentages for body weight in VR♂♂ x GP♀♀ crossbred were observed at 5th and 10th week of age respectively, whereas in GP♂♂ x VR♀♀ crossbred the lowest and highest heterosis percentages for body weight were observed at 10th week of age and zero day respectively.

Sharma (1984) reported heterosis percentage ranging from 0.66% at day old to 38.53% at 8th week body weight in RC♂♂ x WR♀♀ crossbred and Reddy *et al.*, (1998) observed heterosis percentage ranging from 0.50 to 9.87% involving Cornish and Rock breeds of Poultry at 1-5 weeks of age. The trend of the of heterosis percentage obtained in VR♂♂ x GP♀♀ crossbred of the present investigation is similar to the reports of the above authors. On the contrary some authors have reported that crossbreds were not superior to purebreds with respect to body weight at different weeks of age in poultry Ozola, 1966; Dev and Singh, 1970 and Sapra *et al.*, 1972. The findings of the present study in GP♂♂ x VR♀♀ crossbred is similar to the findings of the research workers mentioned above.

Carcass Traits

All the heterosis percentages for carcass traits in VR♂♂ x GP♀♀ and GP♂♂ x VR♀♀ crossbreds pooled over sexes at 20th

week of age (table: 2) were negative except giblets weight which is positive in both the crossbreds. The lowest and highest heterosis percentages were observed for legs weight and giblets weight in both the crossbreds. In VR♂♂ x GP♀♀ crossbred the heterosis percentages were observed to be ranged from -18.99% for legs weight to 4.86% for giblets weight. The corresponding values for GP♂♂ x VR♀♀ crossbreds were found to be -17.75% and 9.12% respectively. Thus, results obtained in the present investigation suggest that crossbreds were not superior to purebreds with respect to various carcass traits at 20th week of age. The results obtained in present study may be due to crossing between egg type and meat type breads of poultry. Hence, the crossbreeding between meat type and egg type breeds may not be suitable for genetic improvement of carcass traits of poultry. The percentages of various carcass characteristics, in general, did not differ significantly among the purebreds as well as among the crossbreds (table: 2).

Table.1 Percent heterosis of body weight at different weeks of age in crossbred chicken (Sexes pooled)

Traits	VR ♂♂ X GP ♀♀			GP ♂♂ X VR ♀♀		
	Average purebred	Average crossbred	% Heterosis	Average purebred	Average crossbred	% Heterosis
Zero day	32.525	33.63	3.397	32.525	33.48	2.93
5 th week	338.02	335.06	-0.875	338.02	337.90	-0.035
10 th week	895.24	973.00	11.16	895.24	736.36	-15.86
15 th week	1848.78	2021.80	9.35	1848.78	1782.78	3.57
20 th week	2320.505	2564.47	10.51	2320.505	2217.40	-4.44

Table.2 Percent heterosis of 20th week carcass traits in crossbred chicken (sexes pooled)

Traits	VR ♂♂ X GP ♀♀			GP ♂♂ X VR ♀♀		
	Average purebred	Average crossbred	% Heterosis	Average purebred	Average crossbred	% Heterosis
Dressed weight	711.92	1486.25	-8.47	711.92	1458.91	-10.13
Eviscerated weight	1478.45	1351.41	-8.59	1478.45	1306.66	-11.61
Giblets weight	46.66	86.16	4.86	46.66	89.66	9.12
Legs weight	270.54	219.16	-18.99	270.54	222.50	-17.75
Thighs weight	274.53	237.08	-13.65	274.53	235.16	-14.35
Breast weight	401.12	374.75	-6.57	401.12	383.00	-4.51

Table.3 Least Squares mean ± S.E. and CV% of body weights at different weeks of age in various Genetic groups of poultry pooled over sexes

Genetic groups	Zero day		5 th Week		10 th Week		15 th Week		20 th Week	
	Mean ± S.E.	CV%	Mean ± S.E.	CV%	Mean ± S.E.	CV %	Mean ± S.E.	CV%	Mean ± S.E.	CV%
VR ♂♂ X VR ♀♀	34.91 ^a ± 0.58	12.85	345.54 ^a ± 10.077	21.59	1084.40 ^a ± 41.75	31.0 3	1937.15 ^a ± 55.69	23.17	2607.35 ^a ± 84.93	25.21
GP ♂♂ X GP ♀♀	30.14 ^a ± 0.61	16.06	330.50 ^b ± 9.64	22.57	666.08 ^b ± 43.46	50.5 0	1760.41 ^b ± 57.97	25.48	2033.66 ^b ± 87.91	37.92
VR ♂♂ X GP ♀♀	33.63 ^a ± 0.56	13.42	335.06 ^{bc} ± 9.27	22.29	973.00 ^a ± 47.61	34.5 9	2021.80 ^a ± 60.00	22.19	2564.47 ^a ± 81.59	25.64
GP ♂♂ X VR ♀♀	33.48 ^a ± 0.63	13.30	337.90 ^c ± 10.17	22.09	736.36 ^b ± 45.39	45.6 7	1782.78 ^b ± 63.50	25.18	2217.40 ^b ± 93.03	38.29

Values with similar superscripts (column-wise a, b, c) did not differ significantly.

Literature revealed no definite trend regarding the heterotic effect on dressing percentage. Hussain (1972); Kaushal *et al.*, (1973) and Singh *et al.*, (1983) observed superiority of crossbreds over purebreds with respect to dressed weight at different weeks of age in poultry, whereas Chhabra and Sapra (1973) could not find significant difference in dressing percentages between the purebreds and crossbreds. Literature also presents varied results for giblets weight in crossbreds.

Chhabra *et al.*, (1972) reported more giblets weights in WR♂♂ x RC♀♀ crossbred over purebreds whereas Padhi *et al.*, (1997b) reported negative heterosis for giblets percentage in poultry. Singh (1978) and Sharma (1984) reported heterotic effect for breast weight in poultry whereas Padhi *et al.*, (1997b) obtained positive heterosis for 6 weeks of dressing percentage which is not in agreement with the findings of the present study.

There was no definite trend in the direction of heterosis percentage for body weight which was observed to be positive in VR♂♂ x GP ♀♀ and negative in GP♂♂ x VR ♀♀ genetic group, whereas heterosis

percentages for carcass traits were, in general, negative in both the crossbreds except for giblets weight.

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