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Study of Correlation Between Body Weight and Conformation Traits in Coloured Synthetic Dam Line Broiler Chicken at Five Weeks of Age

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ABSTRACT

In coloured strain of synthetic dam line broiler chicken correlation between body weight and conformation traits were studied at 5th week of age. Body weight, breast angle, shank length and keel length were measured in both males and females. The genetic, phenotypic and environmental correlation between 5th week body weight and each with breast angle, shank length and keel length from sire components of variance and covariance were positively and statistically significant (P<0.01). It was concluded that individual selection for high body weight at 5th week of age would be most effective and, correlations between body weight and each with breast angle and shank length are higher in males while body weight and each with breast angle and keel length are higher in females.

Keywords: Body weight, conformation trait, correlation, CSDL broiler chicken

Poultry production at present is the fastest growing sub-sector of Indian agriculture. Last 3 decades have witnessed phenomenal growth in poultry sector in general and in particular in broiler production. If the broiler industry continues to expand at the present growth rate of 12% per annum with an improvement of average slaughter weight by 20g per bird per annum by the year 2015, India will be producing 5million tons of broiler meat (Narahari and Sapcota, 2009). Breeding of meat type chicken is considered to be more complex and difficult proposition than breeding of egg type chicken as the broiler breeders not only to be selected for broiler traits such as growth rate, viability and feed efficiency of the common broiler but also for the reproductive traits of the parent lines for viability of operation. In achieving the target, the poultry breeders have to improve the genetic constitution of the existing flocks and further propagating the genetically superior germplasm.

MATERIALS AND METHODS

The data utilized in this study were obtained from a flock of dam line coloured synthetic broiler chicken maintained at All India Co-ordinated Network Research Project on Poultry Improvement located at College of Veterinary Science & Animal Husbandry, Bhubaneswar. The chicks were produced in five consecutive hatches at an interval of 10 days during the month of January to March, 2010. Artificial insemination was practised within the strains in California type cage housing system considering 70 numbers of sires and 560 dams and 8 dams were inseminated by each sire. Dams were allotted at random with the restriction that no full or half-sib mating permitted. Chicks were removed from the Hatcher on 22nd day of incubation, pedigreed by sire and transferred to brooder house, after taking hatch weight. All through the experiment, the chicks were brooded on the cages following the standard brooding practices. The rations provided to the birds had the same formulation for all the hatches and consisted of starter rations from 0-2weeks of age and finisher for 3-5 weeks of age. The 5th week body weight, breast angle, shank length and keel length were measured in 3138 males and 2959 females obtained from in five different hatches. Selection was practiced for the single trait, high body weight at 5 weeks of age under this study.

All the data were corrected for hatch effect using least square constant (Harvey, 1966) for each hatch, separately within sex basis and were arranged in one way classification to find out the sire component of variance and covariance. The estimates of heritability and genetic, phenotypic and environmental correlations were calculated from sire components of variance and covariance. All the statistical analysis was carried out on DCM (microprocessor based computer system).

RESULTS AND DISCUSSION

The average values were 1105.46±2.72 g, 54.12±0.07 degree, 8.58±0.01 and 9.50±0.01 cm for body weight, breast angle, shank length and keel length, respectively at 5 weeks of age in males and the corresponding values were 983.58±2.56 g, 53.26±0.08 degree, 8.29±0.01 and 9.31±0.01 cm, respectively in females.

Singh *et al.* (2003), Jha *et al*. (2003), Anon (2008) for control line observed lower averages for 5th week body weight. Lower average values on combined sex were also reported by Kishore *et al.* (2002) for PB-2, Mishra *et al.* (2006) for synthetic broiler, Anon (2008) for Pb-1, Pb-2, CSML and CSFL and Anon (2010) for Pb-1, Pb-2 broiler chicken.

Annual report (2010) of AICRP, Poultry Improvement Project, Bhubaneswar reported the lower breast angle value than the present results in different broiler strains at five weeks of age. Anon (2010) observed the breast angle to be higher in a flock of CSML broiler in combined sex at five weeks of age while Annual Report (2010) of AICRP Poultry Improvement Project, Bhubaneswar reported both higher and lower average values for breast angle in SDL, Control and CSML broiler chicken.

The mean shank length at five weeks of age in Red Cornish growth line, feed efficiency line and control line for both the sexes and for the females of SDL synthetic broiler line and control line as reported in literature were lower than present results. (Singh *et al*., 2000; Anon, 2006; Anon, 2007). However, the results reported by Anon (2010) in SDL and control line males to be nearly equal or little higher than present findings.

Lower average for keel length was reported by Singh *et al*. (2000) as compared to this study in Red Cornish growth, feed efficiency and in control line. Similarly, Anon (2010) reported lower average value for keel length than the present study in SDL, CSML broiler chicks.

In the present study, genetic correlation between 5th week body weight and breast angle were 0.726±0.010 and 0.660±0.001; body weight and shank length were 0.683± 0.012 and 0.628±0.001; body weight and keel length were 0.674±0.012 and 0.649±0.011 in males and females respectively. The estimates were all positive and statistically significant. The phenotypic correlation between 5th week body weight and each with breast angle; shank length and keel length were 0.540± 0.032 , 0.506 ± 0.018 and 0.470 ± 0.024 in males and 0.527 ± 0.019, 0.486 ± 0.031and 0.477 ± 0.028 in females respectively. The values obtained for environmental correlations between 5th week body weight and each with breast angle; shank length and keel length were -0.054, -0.045 and -0.053 in males and -0.064, -0.061, -0.078 in females, respectively.

The estimates of genetic correlation between body weight and breast angle available in the literature closely resembled to the present results (Singh *et al*., 2003; Annual report, 2010). Singh *et al.* (2003), Singh (2008) and Annual report (2010) observed positive and high phenotypic correlation between the 5th week body weight and breast angle while Singh *et al*. (2003) and Annual Report (2010) observed positive phenotypic correlation of lower magnitude between the two traits. Annual Report (2010) also reported negative phenotypic correlation between the two traits in some broiler chicken. The high positive and significant phenotypic correlation obtained in this study indicated that body weight at 5 weeks of age also had more breast angle in both male and female birds. The environmental causes contributed less towards the relationship between body weight and breast angle at 5 weeks of age than genetic causes in both the sexes as is evident from the magnitude of the correlations (Table-2).

The estimates of genetic correlation between body weight and shank length available in the literature were positive like present findings but lower in magnitude (Mishra *et al.*, 2006; Singh *et al*., 2003; Singh, 2008). Singh *et al.* (2003) and Singh (2008) observed positive and high phenotypic correlation between the traits as in the present study though Annual Report (2010) reported negative phenotypic correlation between the two traits in some of the broiler strains. The environmental causes contributed less than the genetic cause in both the sexes as is evident from the magnitude of the correlations.

Shank length has a moderate heritability and its genetic relationship with body weight was high, so selection for this trait will improve body weight at 5 weeks of age as a correlated response. The positive genetic and phenotypic correlation between two traits in the present study indicated that birds with longer shank length possess higher body weight both genetically and phenotypically.

The reports of Mishra *et al*. (2006), Singh *et al*. (2003) and Singh (2008) for the genetic correlation between body weight and keel length were lower in magnitude than the present findings while Annual Report (2010) reported negative genetic correlation between these two traits in some of the broiler birds. Singh *et al.* (2003) for feed efficiency line of Red Cornish broiler and Singh (2008) in Dhanaraja broiler observed positive and high phenotypic correlations between body weight and keel length, Annual Report (2010) reported both positive and negative association between the two traits in different broiler strains. The environmental causes contributed less towards the relationship between body weight and keel length at 5 weeks of age in both the sexes.

Such high correlations in the present study suggested that improvement in keel length through selection will be associated with increase in body weight at 5 weeks of age. The correlations between body weight and breast angle were higher than that of body weight with shank length and keel length both genetically and phenotypically. Since, genetic and phenotypic parameters are property of a population and also vary depending upon breeding history, variation in the results reported as well as obtained in the present study were not entirely unanticipated.

Table 1: Average values (Mean ± S. E.)

Traits (5th week)	Male (3138)	Female(2959)
Body weight (g)	1105.46 ±2.72	983.58 ± 2.56
Breast angle (degree)	54.12 ± 0.07	53.26 ± 0.08
Shank length (cm)	8.58 ± 0.01	8.29 ± 0.01
Keel length (cm)	9.50 ± 0.01	9.31 ± 0.01

Table 2: Genetic, phenotypic and environmental correlations between different traits and their standard errors in males and females

Correlation between(5th week)	Male			Female		
	r_g	r_p	r_e	r_g	r_p	r_e
Body weight & breast angle	0.726± 0.010	0.540** ±0.032	-0.054	0.6601 ±0.00	0.527** ±0.019	-0.064
Body weight & shank length	0.683 ±0.012	0.506** ±0.018	-0.045 ±0.00	0.6281	0.486** ±0.031	-0.061
Body weight & keel length	0.674 ±0.012	0.470** ±0.024	-0.053	0.6491 ±0.01	0.477** ±0.028	-0.078

(**- P<0.01)

CONCLUSION

It was concluded that individual selection for high body weight at 5 weeks of age would be most effective. Selection index considering body weight along with breast angle and shank length is expected to give better results in males and body weight along with breast angle and keel length will give better results in females.

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