ESTIMATES OF GENETIC PARAMETERS FOR VARIOUS TRAITS IN TWO STRAINS OF WHITE LEGHORN CHICKEN

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ABSTRACT

The genetic and phenotypic parameters of body weight and egg production traits up to 40 weeks of age were estimated from sire component of variances and covariances in two strains of White Leghorn (IWN and IWP). Heritability estimate of total egg numbers produced up to 40 weeks age (TEN_{40}) was high in IWN strain (0.543±0.139) and moderate (0.232±0.091) in IWP strain while other traits like body weight (BW), egg weight (EW), Age at first egg (AFE) etc. shows usual trends. Estimates of genetic correlation among production traits were of poor precision as they were associated with high standard errors.

KEYWORDS: Heritability, Phenotypic correlation, Genetic correlation, WLH.

INTRODUCTION

The study of the production traits of the layer populations has always been important to the accomplishment of the improvement goals both in biologic and economic terms. The heritability is the parameter of fundamental importance in evaluating efficient selection plans. The progress made when selecting for two or more characters, however, depends not only upon their selection differential and heritability but also upon the genetic correlations between those characters.

MATERIALS AND METHODS

The experiment was carried out in S_{10} generations of IWN and IWP strains of White Leghorn maintained at Department of Poultry Science, College of Veterinary Science and Animal Husbandry, AAU, Anand**.** Chicks were generated by mating 50 sires with 300 dams of S_9 generation from each strain. The traits measured were age at first egg, body weights upto 40 weeks of age, egg production, egg weight and derived traits viz., egg mass at 40 weeks and feed conversion efficiency traits. The records of 849 birds of IWN strain and 862 birds of IWP strain of white leghorn were analyzed using Least squares and maximum likelihood (LSMLMW) computer program (Harvey, 1990).

RESULTS AND DISCUSSION

Least Square means: Significant differences were observed between strains for Age at first egg, Egg number, Body weight, Egg weight traits indicated that these traits were sensitive to the environmental fluctuations (Table-1). Chatterjee *et al.* (2008) also reported significant effects on growth and production traits in White leghorn.

Heritability: The heritability of age at first egg was very high (0.457) in IWN strain and moderate (0.192) in IWP strain. Similar findings has been reported by Singh *et al.* (2004) (Table-1). Inheritance trend for EW_{40} were moderate and low in magnitude in IWN and IWP strain respectively. High heritability of BW at all the ages indicates additive genetic variance has played important role in expression of these traits. The heritability estimates for egg production upto 40 weeks of age in the present study were found to be 0.543 in IWN strain and 0.232 in IWP respectively. The egg mass is a composite trait and is greatly influenced by egg number. Heritability estimates for TEM_{40}

Table1. Least squares means and heritability estimates for certain growth, production and feed efficiency traits in IWN and IWP strains of White Leghorn.

TRAITS	Mean ± SE		Heritability	
	IWN STRAIN	IWP STRAIN	IWN STRAIN	IWP STRAIN
AFE (days)	134.50[b] ± 0.78	138.13[a] ± 0.59	0.457 ± 0.127	0.194 ± 0.085
BW_{16} (g)	978.21[b] ± 7.00	1000.84[a] ± 5.61	0.538 ± 0.138	0.360 ± 0.111
BW_{20} (g)	1250.47[b] ± 4.55	1280.41[a] ± 6.14	-	0.264 ± 0.096
BW_{40} (g)	1412.59[b] ± 7.93	1483.76[a] ± 8.48	0.272 ± 0.099	0.371 ± 0.112
EW_{28} (g)	44.84[b] ± 0.15	46.26[a] ± 0.12	0.364 ± 0.113	0.214 ± 0.088
EW_{40} (g)	50.36[b] ± 0.13	52.52[a] ± 0.12	0.182 ± 0.084	0.085 ± 0.066
TEN_{40} (No.)	119.26[a] ± 1.03	115.55[b] ± 0.79	0.543 ± 0.139	0.232 ± 0.091
EM_{40} (kg)	6.002 ± 0.048	6.061 ± 0.038	0.389 ± 0.117	0.132 ± 0.074
$FCDE_{40}$(kg)	1.718 ± 0.016	1.735 ± 0.140	0.453 ± 0.126	0.189 ± 0.084
$FCKE_{40}$(kg)	2.850 ± 0.026	2.758 ± 0.020	0.344 ± 0.110	0.116 ± 0.072

was high in IWN strain and moderate in IWP strain. Results were in accordance with Paleja *et al.* (2008) in IWN strain while Brah *et al*. (2012) reported moderate heritability. Inheritance of feed efficiency trait (FC/DE) and (FC/KE) shows higher magnitude in IWN strain while it was moderate in IWP strain. Similar results were explained by Niranjan *et al.* (2008) for FC/KE_{40} trait in IWH strain.

Genetic Correlations: The genetic correlations between AFE with Egg production at 40 weeks of age was -1.019 for IWN strain while -0.959 in IWP strain, respectively while the r_p were -0.595 and -0.488 in IWN and IWP strain, respectively (Table-2.3). Genetic correlation of AFE with TEN was found negative and high in magnitude also r_G falls above the parametric range due to negative sire components of variance which might be due to sampling error. However, the phenotypic correlations were negative and of higher magnitude in IWN strain. Association of TEN and BW at various stages were positive and high in magnitude suggesting unfavourable trend in IWN strain while they were negative and vary in magnitude suggesting favourable trend in IWP strain. In IWN strain, genetic correlations of TEN_{40} and EW_{28} and TEN_{40} and EW_{40} were (-0.190) and (-0.546) while phenotypic correlations were (-0.152), (-0.101) respectively. Whereas, in IWP strain, were (-0.499), (0.928) while phenotypic correlations were (-0.125), (0.153) respectively. Present findings were similar to Singh *et al*. (2002). Both strain shows, the genetic association of TEN with EM at various ages were positive and high in magnitude. Genetic and Phenotypic association between TEN with FCDE/FCKE were negative, unfavourable in direction and high in magnitude at all stages. Genetic association of AFE with BW was negative in both strains indicates low body weight at the time of housing increases the age at sexual maturity.

Table 2. Genetic (above diagonal) and Phenotypic (below diagonal) correlations of economic traits up to 40 weeks of age in IWN strain

	AFE	BW16	BW40	EW28	EW40	TEN40	EM40	FCDE40	FCKE40
AFE		-0.591 ± 0.198	-0.116 ± 0.237	0.086 ± 0.224	0.359 ± 0.245	-1.019 ± 0.161	-1.038 ± -0.179	-1.038 ± 0.045	1.063 ± 0.063
BW16	-0.466		0.476 ± 0.198	0.329 ± 0.207	0.296 ± 0.255	0.560 ± 0.150	0.705 ± 0.136	-0.569 ± 0.189	-0.707 ± 0.189
BW40	0.185	0.175		0.151 ± 0.245	-0.138 ± 0.293	0.175 ± 0.231	0.154 ± 0.244	-0.192 ± 0.238	-0.186 ± 0.255
EW28	0.226	-0.008	0.292		0.795 ± 0.162	-0.190 ± 0.219	0.005 ± 0.233	0.145 ± 0.222	0.043 ± 0.239
EW40	0.179	-0.033	0.263	0.414		-0.546 ± 0.243	-0.332 ± 0.248	0.501 ± 0.239	0.301 ± 0.297
TEN40	-0.595	0.321	0.004	-0.152	-0.101		0.971 ± 0.018	-1.002 ± 0.204	-0.967 ± 0.231
EM40	-0.497	0.291	0.107	0.026	0.311	0.913		-0.987 ± 0.233	-1.005 ± 0.276
FCDE40	0.556	-0.286	-0.012	0.137	0.076	-0.975	-0.899		0.976 ± 0.016
FCKE40	0.471	-0.265	-0.104	-0.009	-0.273	-0.903	-0.971	0.937	

Table 3. Genetic (above diagonal) and P henotypic (below diagonal) correlations of economic traits up to 40 weeks of age in IWP strain

	AFE	BW16	BW40	EW28	EW40	TEN40	EM40	FCDE40	FCKE 40
AFE		-0.062 ±0.284	0.449 ±0.230	0.555 ±0.259	0.670 ±0.389	-0.959 ±0.361	-0.010 ±0.465	-0.916 ±0.166	0.980 ±0.223
BW16	-0.439		0.624 ±0.172	0.214 ±0.261	0.256 ±0.352	-0.060 ±0.257	0.003 ±0.310	0.170 ±0.279	0.138 ±0.331
BW40	0.262	0.211		-0.017 ±0.263	0.138 ±0.352	-0.523 ±0.239	-0.608 ±0.286	0.582 ±0.237	0.707 ±0.296
EW28	0.188	-0.017	0.167		1.562 ±0.427	-0.499 ±0.290	-0.139 ±0.349	0.576 ±0.273	0.292 ±0.361
EW40	0.112	0.084	0.130	0.274		0.928 ±0.464	-0.870 ±0.373	0.957 ±0.380	0.935 ±0.615
TEN40	-0.488	0.228	-0.078	-0.125	0.153		0.990 ±0.039	-0.985 ±0.841	-0.988 ±0.614
EM40	-0.428	0.255	-0.019	-0.004	0.261	0.912		-0.968 ±0.613	-0.982 ±0.811
FCDE40	0.424	-0.183	-0.049	0.090	0.142	-0.961	-0.882		0.998 ±0.030
FCKE40	0.385	-0.287	0.010	0.004	-0.189	-0.904	-0.960	0.943	

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