STUDIES ON EGG PRODUCTION AND BODY WEIGHTS OF DWARF PULLETS INHERITING DIVERSIFIED POLYGENIC GENOME

Untersuchungen an Eier Produktion und Gewichten der erwachsene Körper der Zwerg Hünchen mit mehere Ploygenic Genome

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The present study involves dwarf pullets carrying sex-linked recessive dw gene having diversified polygenic status obtained from similar genetic background. The performance of these dw pullets were compared with non-dwarf sibs. The polygenic inheritance of both broiler populations was 87.5 broiler and 12.5 dwarf Leghorn, which was obtained by successive back crossing of heterozygous $dwdw^{+}$ cockrels with non-dwarf dw^{+} pullets.

Dwarf egg layer was synthesized from the same gene pool as that of two broiler populations except that 75.0 Broiler : 25 dwarf Leghorn, males were mated with females of White Leghorn control line to arrive at a polygenic combination of 37.5 broiler : 50 White Leghorn : 12.5 dwarf Leghorn. This seggregating population was further developed in to true breeding dwarf egg population and named Narmada-X1 which has a broad genetic base.Apart from broiler it inherits gene pool of six White Leghorn strains which were utilized to synthesized the control line.

A total number of 281 survived pullets of three genotypes from a single hatch i.e. Narmada-X1 (130), dwarf broiler (103) and normal broiler (43) were utilized in the presentation of the data. Pullets at 17 weeks of age were housed in individual cages and were fed mash containing 18 per cent crude protein and 2850 Kcal/metabolizable energy per kg feed. Fourteen hours light was provided. Data on egg production was recorded on individual bird basis from 21st to 40th week of age. Body weights were also recorded at 20, 30 and 40-week of age.

Egg Production

Average egg production of Narmada-X1 dwarf broiler and non-broiler sibs is presented in Table 1.

Simple one way classification model showed highly significant ($P<.01$) genotype effect on egg production. Egg type dw pullets produced about 14-15 eggs more than either of broiler genotypes, and the dwarf broiler produced 1.5 eggs more than non-dwarfs. Chambers et al.(1974), Jaap (1968), Mohammadian and Jaap (1972) also reported superior egg production of broiler dw pullets compared to their sibs.

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Table 1. Average number of eggs produced by dwarf and non-dwarf pullets

Genotype	No.of observations	Mean ± S.E.
Narmada-X1	115	79.6±0.37
Dwarf broiler	100	66.2±0.46
Non-dwarf broiler	43	64.7±0.70

There is general agreement that effect of dw gene is more severe in small bodied chicken (Hutt, 1959, Mohammadian & Jaap, 1972), hence the dw broiler pullets should have superior reproductive and production performance. In the present study Narmada-X1 are significantly lower in body weight than dwarf broiler pullet but produced more eggs (Table 2). This is contrary to above hypothesis but did agree with the contentions of Reddy and Seigel (1977) and Cherry and Seigel(1978) that expression of dw gene depends on its genetic back ground. The Narmada-X1 pullet carry 50 per cent genome from a broad based control line and thus had inherited genetic modifiers to suppress the ill effect of dw gene on egg production inspite of its small body size.

Body weights

Average body weights of 3 genotypes at 20, 30 and 40 week of ages are presented in Table 2. The analysis of variance showed highly significant effect due to genotype.

Table 2. Mean body weights by genotype and age

Genotype	Body weight 20-week	Gain in body weight		
		30 week	40-week	Cumulative
Egg				
Narmada-X1	1113±1.33	+25	+193	218
Broiler				
Dwarf	1401±1.39	+69	+228	297
Non-dwarf	1254±3.13	+191	+197	388

There are two independent comparisions that could be made on data presented. The Narmada-X1 dwarf pullets gained 218 gms body weight, however in comparision with the dwarf broiler the Narmada-X1 pullets were 20.58% smaller at 20-week and 21.60% at 40-weeks of age. On the contrary, dwarf broiler were 33.3 percent less at 20-week body weight as compared their to non-dwarf sibs. The divergence increased to 39.8 at 30-week of age followed by almost similar pattern of growth for both the genotypes up to 40-week of age.

Results indicated that maximum divergence ratio which reached at 20-week body weight did not increase further between dwarf pullets and this was probably due to specific effect of dw gene on post maturity body weight, however such restriction was not

observed in broiler pullets where dw was replaced by its dw^+ allele inspite of their identical polygenic status.

Genetic correlations estimates from sire variance and covariance components for Narmada-X1 pullets indicated that post maturity body weights were independent of each other but on phenotypic scale the association was highly significant (Table 3).

Table 3. Genetic (r_g) & Phenotypic (r_p) correlations for Narmada-X1 pullets

Parameter	Body weight			Egg production
	20 week	30-week	40-week	
20-week r_g		-.15	-.17	+.46**±.42
r_p		0.75**±.06	.58**±.08	.41±.006
30-week r_g			-.03	-.09
r_p			.92±.04	.15
40-week r_g				-.67**±.36
r_p				.16

Results are not in agreement with the estimated genetic correlations reported for egg type fowl by Kinney (1969) but it may be of great significance that on phenotypic scale the prediction of post maturity body weight may act a reliable criteria in monitoring adult body weight in Narmada-X1 dwarf pullets.

Genetic correlation of egg production with 20-week and 40-week body weights were 0.46±.42 and -0.67±.36 respectively. Phenotypic correlation was only statistically significant (0.41±.006) with 20-week body weight. These results further indicated that 20-week body weight appeared to be more reliable criteria of selection to improve egg production in Narmada-X1 dwarf pullets but similar predication could not be based on 40-week body weight.

SUMMARY

Narmada-X1 dwarf (50 White Leghorn: 37.5 broiler : 12.5 dwarf Leghorn), dwarf broiler and normal broiler (87.5 broiler: 12.5 dwarf Leghorn) pullets laid, 79.6±0.37, 66.2±0.46 and 64.1 ±0.70 number of eggs during the period from 21 to 40 week of age, respectively. Genotype differences were highly significant (P/0.01).

Dwarf broiler pullets were 33.31 per cent smaller than normals at 20 week of age. Divergence further increased about 10% at 30 and 40 weeks of age. On the contrary, Narmada-X1dwarf egg layer were 20.6% less in body weight than dwarf broiler pullets at 20 week and no further divergence was observed at 30 and 40

week of ages. Further, low magnitude of genetic correlations among body weights indicated that pleiotropic genes and polygenes linked with dw gene influenced independently body weights at different ages.

Resümee

Harmada-XL Zwerg (50 Weiss Leghorn: 37,5 Broiler : 12,5 Zwerg Leghorn), Zwerg broiler und normale Broiler (87,5 Broiler: 12,5 Zwerg Leghorn) Hühnchen gelegt, 76,6±0,37, 66,2±0,45 und 64,1±0,70 Eier beziehungsweise während Alter von 21 bis 40 Wochen. Genotype-Unterschieden sind sehr bedeutsan ($P/0.01$).

Zwerg-Broiler Hühnchen waren 33,31 prosent schmaler als normalen Hühnchen an 20 Wochen Alter. Divergens weitere Vergroperung ca 10 prozent bei 30 und 40 Wochen Alter. Gegenteil, Harmada-XL, Zwerg Broiler Hühnchen waren 20,6 prozent kleiner in Körpergewicht als Zwerg Broiler Hühnchen an 20 Wochen Alter. Keine weitere Vergroßerung in der Divergens an 30 und 40 Wochen Alter wurde beobachtet. Weiter niedrige Größe der Genetic Correlations zwischen Körpergewichten Zeigten daß pleiotropic genes and polygenes verbindet mit dw Gene Körpergewichten an verschiedene Altern beeinflüsten.

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