

## **Effect of Parental Comb Size and Body Weight on Subsequent Performance in Lyallpur Silver Black Layers**

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### **Abstract**

Present study was conducted at Poultry Research Center University of Agriculture Faisalabad Pakistan to investigate the effect of parental comb size and body weight on subsequent productive performance of Lyallpur Silver Black breed. To initiate the project 45 LSB females and 9 males at 29th week of age were divided in to 9 experimental units. Each unit comprising 5 females was allocated to one male using stud mating system, where each female was rotated with male for 24 hours after every 5 days. Daily egg production per bird was recorded to calculate hen house egg production per cent. Egg weight was taken weekly. Egg of each female observed for its quality on monthly basis. Body weight of individual parental male and female was taken fortnightly. Weekly chick weight was recorded till maturity. At the age of 16th week, all the available pullets were confined in individual battery cages for the determination of age at first egg. Sire had Average 49.24±14.32cm comb size and 1478.21gm±184.91 body weight but dam had 12.79±5.04 cm comb size and 1089±106gm body weight at 29th week of age. The results thus obtained revealed the non-significant effect of body weight and comb size of sire on fertility (80.65±20.24), age at first lay (175.59±23.60), weight at first lay (1295.37±100.94), day old chick weight (29.19±2.59), 6th week chick weight (232.80±67.07), 11th week chick weight (712.64±156.52), dead germ, dead in shell and hatchability (74.79±23.24) individually where as comb size of sire had significant (P<0.05) effect on hatchability. Body weight of dam had positive effect on egg weight (P<0.01)(44.9±2.08), egg production (P<0.05) (33.06±1.36) and day old chick weight (P<0.01) but had negative effect on hatchability, fertility, age at first lay, weight at first lay, albumin quality (haugh unit) (86.32±2.89), egg quality (yolk index) (0.427±0.08), 6th week chick weight, 11th week chick weight, dead germ, dead in shell and mortality.

Where as comb size of dam had significant influence on egg weight but had non significant influence on hatchability, fertility, age at first lay, albumin quality (haugh unit), egg quality (yolk index), egg production, day old chick weight, 6th week chick weight, 11th week chick weight, dead germ, dead in shell and mortality individually. Statistical analysis showed highly significant (P<0.01) effect of age of dam and sire on feed intake (754.21±44.74) and non-significant effect on feed conversion ratio (2287.6±809.5). Combined effect of sire comb size and body weight has been investigated to have a positive influence for successful selection in the progeny for day old chick weight but dam comb size and body weight has been selected for egg weight. There were non significant combined effect of dam comb size and body weight for albumin quality (haugh unit), egg quality (yolk index) and egg production % where as combined effect of sire and dam comb size and body weight was non significant for hatchability, fertility, age at first lay, weight at first lay, 6th week chick weight, 11th week chick weight, dead germ, dead in shell and mortality. Parents flock showed the 14% mortality but progeny showed the 13.2% mortality. At the end of experiment about 20% birds were selected for future breeding.

**Key words:** Lyallpur Silver Black, Pedigree breeding, Comb Size, Body weight

### **Introduction**

House hold poultry plays significant role in supplying animal protein by providing 36% of chicken meat and 60% of the table eggs in the country (Anonymous, 2002). The house hold poultry is mainly based upon the indigenous birds which are maintained by rural people. Desi birds are non-descript and have been reported to produce 0.98 kilograms of meat in 6 months and lay on an average about 46 eggs in a year. In this paradigm Lyallpur Silver Black (LSB) breed was evolved with the main objective to develop a breed that could survive and perform well under rigorous environmental conditions of rural areas. LSB has been reported to

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have low mortality, better growth and improved egg production than that of Desi (Yaqoob *et al.*, 1965).

The LSB is being maintained at the Poultry Research Center University of Agriculture Faisalabad since its development. Although LSB survives best in extreme local conditions and has higher disease resistance (Ashraf, 2000) and has been reported to have low mortality i.e. 16.67% (Mahmood *et al.*, 1984). Inbreeding without selection decreased egg number, egg weight, shell thickness and increased age at first egg, haugh unit score and body weight (Ibe, 1982). So improvement in its productive potential through selection and breeding still needs rigorous studies.

Comb size and body weight are important indicators for selection for further breeding of parent stock. It has been asserted that comb size can influence productive capacity (Tufvesson *et al.*, 1998). Male comb size had a higher genetic influence on egg laying performance than female's own comb size while genetic correlation between body weight at 19th week and age at first lay had negative correlation between male comb size and age at first lay (Tufvesson *et al.*, 1998) which has suggested early selection for maturity. Pullets exhibiting early sexual maturity were characterized by high growth rate in the period prior to laying of first egg. Increase in egg production was associated genetically with decrease in mature body weight and egg weight with no change in fertility and hatchability. While increase in body weight was associated genetically with increase in mature body weight and egg weight and decrease in fertility and hatchability (Nester and Noble, 1995).

Keeping in view the importance of parental comb size and body weight in improving the production potential of chicken, current study reports the productive performance of the Lyallpur Silver Black chicken.

## Materials and Methods

The study was carried out at Poultry Research Centre, University of Agriculture, Faisalabad, Pakistan. A total of 54 mature birds of 29th week of age comprising 45 females and 9 males varying in comb size and body weight were divided into 9 experimental units. Males were selected on the varying comb size and body weight. Comb size was measured at 29th week of age (comb index = Height of the comb x Length of the comb) and body weight. Birds were selected for small, medium and large comb size and for high and low body weight.

Five females were randomly allotted to one male (one experimental unit) after weighing and measuring the comb index. Stud mating system was used. In which particular male was maintained in breeding coop where each female of the experimental unit was rotated for 24 hours for breeding purpose after every 5th day. The

progeny of the parent stock was brooded and at the age of 16th week all selected female of the parent stock were shifted to the battery cages.

Two eggs from each female were observed for haugh unit, yolk index, blood and meat spot on monthly basis. Four hundred and fifty eggs were collected at 30th, 31st, 32nd and 34th week of age of hens for four hatches, marked and set in incubator after one week of storage. At the time of hatch the day old chicks were banded on legs with metal tags for identification, fertility and hatchability percentage was calculated.

Daily egg production for each bird from 39th to 48th week was recorded and weekly egg weight was taken. Eggs collected from each hen were marked and stored for one week and set in hatchery. Body weight of individual bird was taken fortnightly, day old chick weight of individual chick from individual female was recorded and weekly chick weight was recorded till 11th week of age to determine the growth rate and weight gain.

At the age of 16 weeks selected pullets were confined to battery cages to determine the age at first lay and at this age weight of first egg, comb index and weight of the bird was recorded. The birds that showed better performance for egg production and age at first lay were selected for future breeding. The data of egg production, egg quality, body weight, comb size, hatchability, fertility and age at first lay was analyzed for variation between individual birds using general linear model (Sokal and Rohlf, 1995).

## Results and Discussion

Average comb index of cocks and hens were  $49.24 \pm 14.32$  and  $12.79 \pm 5.04$  at 29th week of age, respectively. Average body weight of cocks and hens were  $1478.21 \pm 184.91$  and  $1089.00 \pm 106.00$  at 29th week of age, respectively (Table 1).

**Table 1: Different Parameters Estimated in the Parents**

Parameters	Average
Comb Size of sire at 29th week (cm <sup>2</sup> )	$49.24 \pm 14.32$
Body Weight of sire at 29th week (gm)	$1478.21 \pm 184.91$
Comb Size of dam at 29th week (cm <sup>2</sup> )	$12.79 \pm 5.04$
Body weight of dam at 29th week (gm)	$1089 \pm 106$
Feed intake/bird/week (gm) 29-38 weeks	$754.21 \pm 44.74$
Feed Conversion Ratio/dozen eggs (Kg) 30-38 week	$2287.63 \pm 809.56$
Egg Production (%) 29-48 weeks	$33.06 \pm 1.36$
Egg weight (gm) 29-48 week	$44.9 \pm 2.08$
Albumen Quality (Haugh Unit) 29-48 week	$86.32 \pm 2.89$
Yolk Index 29-48 week	$0.427 \pm 0.08$
Mortality of parent flock (%) 29-48 weeks	$14 \pm 00$

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Average weekly feed intake from 29-38 week of age was  $754.21 \pm 44.74$ . Statistical analysis showed highly significant ( $P < 0.01$ ) effect of age of dam and sire on feed intake and indicated that feed intake decrease with the increase in age of dam. Mahmood *et al.*, (1984) reported the low feed intake in Lyallpur Silver Black without mentioning the comb size and body weight. Ashraf (2000) also reported 736.39gm feed intake per bird per week in Lyallpur Silver Black.

Average weekly feed conversion ratio/Dozen of egg ( $2287.63 \pm 809.56$ ) determined from 30-38 week of age and it showed non-significant effect with reference to age of birds but it was indicated that feed conversion ratio/Dozen of egg decrease with increase in age of dam. Ashraf (2000) reported the poor feed conversion ration ( $2925 \pm 133.93$ ) in Lyallpur Silver Black without mentioning the comb size and body weight.

Statistical analysis showed non-significant effect of both comb size and body weight of dam on egg production while individual regression coefficients indicated that there was significant ( $P < 0.05$ ) effect of weight of dam on egg production where as comb size of dam had non-significant effect on egg production. Egg production increased with increase in weight while decreased with increase in comb size of dam. This result disagreed with the finding of Tufvesson (1986) who reported that comb size at 29th week could be used to select for egg number.

Dam comb size and body weight showed statistically significant ( $P < 0.05$ ) effect on egg weight. Regression analysis showed that egg weight increased 3.4gm by an increase of 100gm body weight of dam, these results are in line with the findings of Tufvesson *et al.*, (1986), Robertson (1988) and Anthony *et al.*, (1989) while there was 0.0426gm decrease in egg weight by one cm<sup>2</sup> increase in comb size of dam these findings differed from the finding of Tufvesson *et al.*, (1998).

Albumen quality (Haugh unit) and Yolk index showed non-significant effect of both comb size and body weight. Statistical analysis showed non-significant effect of dam and sire's comb size and body weight on mortality. Tufvesson (1998a) reported that strong selection for large comb size did not affect male mortality but increased mortality in females.

**Table 2: Different Parameters Estimated in the Progeny**

Parameters	Average
Fertility (%) 30-34 weeks	$80.65 \pm 20.24$
Hatchability (%) 30-34 weeks	$74.79 \pm 23.24$
Day old chick weight (gm)	$29.19 \pm 2.59$
6th week chick weight (gm)	$232.80 \pm 67.07$
11th week chick weight (gm)	$712.64 \pm 156.52$
Mortality of progeny (%) 1-11 weeks	13.22
Age at first lay (days)	$175.59 \pm 23.60$
Weight at first lay (gm)	$1295.37 \pm 100.94$

Statistically analysis for fertility and hatchability showed non-significant effect of sire and dam comb size and body weight.

Comb size and body weights of sires and dams showed highly significant ( $P < 0.01$ ) effect on day old chick weight while 6th week chick weight and 11th week chick weight was statistically non significant. These results were inline with Abdellatif (1989) who reported that birds should be selected for body weight gain at an early age.

Age at first lay was found non significantly affected by comb size and body weight of sire and dam. These results are in line with the results of Eitan and Soller (1991) who reported that age at first egg was greater in low body weight bird and minimum body weight may be required for onset of lay.

Statistically comb size and body weight of sire and dam showed non-significant effect on weight at first lay. Eitan and Soller (1991) reported that body weight at first egg was greater in heavy birds and body weight at first egg was significantly correlated with age at first egg.

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