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RESEARCH PAPER

Productive Performances of White Leghorn Hen at 120 Weeks of Age

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ABSTRACT

White Leghorn is the most competent breed of layer which is known for egg production. The aim of the study was to assess the productive performances of White Leghorn hen at 120 weeks of age and to compare the economic traits between laying and none laying hen. The data of 40 White Leghorn hens, maintained at the Livestock Farm Complex, College of Veterinary Sciences & A.H., Selesih were utilized for the study. The traits studied were body weight, age at first egg in days (AFE), egg weight, egg mass, egg number, comb and vent size and condition at 120 weeks of age. The AFE, mean body weight, egg number, egg weight, egg mass for White Leghorn hens at 120 weeks of age was 148.49 ± 0.80 days, 1.60 ± 0.03 Kg, 245.79 ± 3.11 numbers, 48.50 ± 0.45 gm, 310.21 ± 21.78 gm, respectively. The overall body weight, comb breadth, vent breadth was found to be non significant and comb, vent and keel length was found to be significant (P<0.01) between laying and none laying hen. The keel length was found to be significantly (*P*<0.01) high in laying hen. It was showed significant (*P*<0.01) negative correlation (-0.789 and -0.837, respectively) between laying and none laying White Leghorn hen. In conclusion, the birds having dull and inactive eyes, small, less warm, shrunken comb, dried vent and depth of keel length 1 or 2 fingers should be culled in time so that the economy of the farm can be maintained.

HIGHLIGHTS

- White Leghorn is the most competent breed of layer which is known for egg production.
- Culling of bird denotes detection and elimination of the non-laying or low producing hens from a laying flock. Unless the birds are culled, they are fit for marketing or human consumption.
- The birds showed low vigour and slow maturing, dull and inactive eyes, small, less warm, shrunken comb, dried vent and depth of keel length 1 or 2 fingers should be culled in time.

Keywords: Age, performance traits, White Leghorn birds

Poultry farming in India plays a major role in bringing speedy economic growth. Nowadays, farmers need a genetically improved bird which lay more eggs with optimal egg size and the least feed consumption (Rahman *et al.* 2003). In Indian agriculture poultry farming is the fastest growing subsector (Talukdar *et al*. 2015; Tomar *et al*. 2015). Inexorable hard work and rigorous research in poultry reproduction it has lead to the development of high egg producing layer stocks suitable for any environment and management practices. White Leghorn is the main capable breed of layer industry which is known for egg production (Bais *et al.* 2008). Growth and egg production traits of a bird related to its genetic makeup and adaptation to the explicit atmosphere (Tomar *et al*. 2015).

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Culling of bird denotes detection and elimination of the non-laying or low producing hens from a laying flock. Unless the birds are culled, they are fit for marketing or human consumption. It would be more cost-effective to remove poor or none layers early in their life than to wait until later. Other than, selection high and low producing pullets prior to laying, ahead of removing the weak, has not been undeniably worked out (North and Bell, 1984). The pullets of low vigour, sluggish growth, would be culled at the growing stage itself. Culling of low-grade or none laying birds reduces the cost of feed, labour and overall egg production, incidences of diseases are less and availability of space becomes more for high producing hens (Buragohain *et al*. 2015; Tomar *et al*. 2015). Therefore, it is our prime duty to examine the each and every bird carefully before introducing them into layer house. The birds which are weak and unthrifty should be culled as early as possible. The present study was undertaken to assess the productive performances of White Leghorn hen at 120 weeks of age and to compare the economic traits between laying and none laying White Leghorn hen.

MATERIALS AND METHODS

The data of 40 White Leghorn hens, maintained at the Livestock Farm Complex (Poultry), College of Veterinary Sciences & A.H., Selesih, Aizawl, Mizoram were utilized for the study. The birds were maintained under uniform practices of feeding, housing and management under cage system. The traits studied were age at first egg in days (AFE), condition of eyes, comb colour, comb size, vent condition and size, keel length i.e. distance between tip of the breastbone and pubic bones and distance between two pubic bones, body weight (Kg), egg weight (g), molting percentage at 120 weeks of age, egg number and egg mass upto 120 weeks of age. The keel length was measured by own fingers (One finger is approximately 1.25 to 1.5 cm). The comb and vent size was measured by using vernier calipers.

The data collected from the study were subjected to statistical analysis using a suitable formula for meaningful and accurate comparison and interpretation as per Snedecor and Cochran (1994) and presented as mean ± standard error (SE). The economic traits of laying and none laying birds at 120 weeks of age were compared by using paired t-test.

RESULTS AND DISCUSSION

The average Age at First Egg (AFE) for White Leghorn hens was 148.49±0.80 days. Tomar *et al.* (2015) reported that average age at first egg showed significant ($P<0.05$) differences in the different generations. The present findings were found to be similar with Paleja *et al.* (2008); Jayalaxmi *et al*. (2010); Jadhao *et al*. (2012) and Veeramani *et al*. (2012). On the other hand, Giriraj *et al*. (2008) reported lower AFE in White Leghorn lines (IWH), while Bais *et al.* (2008) reported higher AFE than the present study. The variability of the earlier and present findings might be due to genetic and environmental differences in the different flock.

The average body weight at 120 Weeks of age was 1.60±0.03 Kg. Tomar *et al*. (2015) reported that average body weight of White Leghorn hens at 20 weeks of age was ranged from 1246.52 g to 1412.25 g and at 40 weeks average 1568.64 g. The present results are found to be similar with Paleja *et al*. (2008) and Jadhao *et al*. (2012). On the divergent, Godara *et al*., (2007); Bais *et al*. (2008); Barot *et al*. (2008); Chaudhary *et al*. (2009); Jayalaxmi *et al*. (2010) reported lower and Devi and Reedy (2005); Giriraj *et al*. (2008) reported higher body weight than the present study which might be due to good feeding and management setting.

The average egg number of White Leghorn upto 120 weeks of age was 245.79±3.11 eggs. Tomar *et al*. (2015) reported that there was significant ($P<0.05$) differences in egg number over the different generations at 40 weeks of age. Godara *et al.* (2007) reported less eggs, whereas Devi and Reedy (2005), Ahmad and Singh (2007), Barot *et al*. (2008), Paleja *et al.* (2008), Jayalaxmi *et al*. (2010) and Veeramani *et al*. (2012) reported higher egg production than the present study.

The average egg weight of White Leghorn at 120 weeks of age was 48.50±0.45 gm. Tomar *et al*. (2015) reported that the mean egg weight of White Leghorn was 50.87 gm. They also reported that the egg weight was maintained at a constant level over the generations, which might be due to inclusion of egg weight as a selection criterion. The present results are in close conformity with the findings of Paleja *et al*. (2008) and Bais *et al.* (2008).

On the contrary, Devi and Reedy (2005), Jayalaxmi *et al*. (2010), Jadhao *et al*. (2012) and Veeramani *et al*. (2005) reported higher egg weight than that observed in the present study. The egg mass upto 120 weeks of age was 310.21±21.78 gm. Paleja *et al*. (2008) reported lower egg mass than the present finding.

The combs found to be large, red, warm in 35% of the White Leghorn hen at 120 weeks of age and 65% having small, less warm, shrunken comb which indicating poor layers (Fig. 1). The comb length and breadth of White Leghorn at 120 weeks of age was found to be 36.09±1.74 and 22.97±1.00 mm, respectively. The vent length and breadth of White Leghorn at 120 weeks of age was found to be 21.09±0.90 and 12.20±0.30 mm, respectively. A superior quality layer have active and well developed ovary; hence they secreted higher sex steroids i.e. testosterone which is accountable to development of sound combs and wattles (Sharma *et al*. 2002; Vishwanath *et al*. 2021).

The distance between tip of the breastbone and pubic bones was found to be 2.90 ± 0.11 finger and distance between two pubic bones was found to be 1.54±0.08 finger in White Leghorn hen at 120 weeks of age (Fig. 1). In case of superior quality layers, due to recurrent relaxation of the pubic bones, they become more flexible, thinner and remained separated by a larger distance. In none-layers, the bone might be stout and very hard (Sharma *et al.* 2002).

Overall 30% of White Leghorn birds have big, bright and active eyes and 70% birds appear dull and inactive eyes which indicating none layers (Fig. 1). A superior layer is likely to open their eyelids much more than poor and none layers in order to receive more light stimulus required for egg production (Rath *et al*. 2015). While the egg is being laid, the pubic bones will be relaxed to help passageway of egg and oviposition. In case of good layers, the pubic bones remain relaxed as it occurs frequently. This type of relaxation is responsible for round vent (Cloaca) to become oblong. In addition to date, throughout the oviposition, there will be vaginal secretions to help passageway and laying of egg which makes the vent moist. For that reason, the vent of a laying hen is large, moist and dilated and tends to become oblong in shape. In case of none layers, it become small, contracted and dry (Vishwanath *et al.* 2021). In the present study, 80% of the birds having round, dried vent at 120 weeks of age and has a yellow ring over the vent which indicating none layers. Tomar *et al.* (2015) reported that there was presence of yellowish colour round the vent in none layer birds whereas poor and good layers had definitely bleached vent.

The rate of production is measured by the condition of the plumage. If the hen lays on a regular basis, she usually retains her old feathers. If she stops laying, the feathers begin to drop and this condition is called as 'moulting' apart from sickness or broodiness. Hens considered as "late moulters" which lay for 12 to 14 months before moulting, while others, referred to as "early moulters" may begin to moult after only a few months of egg production. Late moulters are considered as better laying hens and early moulters are generally poor layers. In order to that birds lose their feathers is quite definite. The feathers of the bird are missing starting from the head followed by the neck, breast, body, wings and tail. In the present study, a total of 72.5 % of the birds have moulting (Fig. 1).

The comparison between laying and none laying of White Leghorn hen at 120 weeks of age are presented in Table 1. The overall body weight, comb breadth, vent breadth was found to be non significant between laying and none laying White Leghorn hen. The overall comb length, vent length and keel length was found to be significant ($P<0.01$) between laying and none laying White Leghorn hen. The distance between tip of the breastbone and pubic bones and the distance between two pubic bones was found to be significantly ($P<0.01$) high in laying White Leghorn hen. The distance between tip of the breastbone and pubic bones and the distance between two pubic bones showed significant ($P<0.01$) negative correlation (r=-0.789 and -0.837, respectively) between laying and none laying White Leghorn hen. These parameters have been used to measure the abdominal capacity of the hen (Sreenivas *et al*. 2013). A superior quality layers may consume more feed than the poor or none layers. The laying bird has sound ovary and oviduct which is about 20 times as big as the same organs of a non-productive hen (Singh *et al*. 2001). To accommodate these changes, there might be some structural change in the skeletal system. Moreover, the abdominal muscles become flaccid

A1 & B1: Comb colour, shape and size, eyes of laying (A1) and none laying (B1) hen
A2 & B2: Keel length of laying (A2) and none laying (B2) hen
A3 & B3: Vent shape and size of laying (A3) and none laying (B3) hen
A4 & B4: Moulting pattern

Fig. 1: Comparison between laying and none laying White Leghorn hens at 120 weeks of age

Table 1: Comparison between laying and none laying White Leghorn hens at 120 weeks of age

Parameters	Laying	None laying	t-value
Body weight (Kg)	1.62±0.03	1.55±0.02	1.710^{NS}
Comb length (mm)	36.45±2.34	28.07±1.61	2.941**
Comb breadth (mm)	22.36±1.20	19.04±1.40	1.794^{NS}
Vent length (mm)	25.69±1.63	17.97±0.66	4.378**
Vent breadth (mm)	12.65±0.46	12.68±0.49	0.047^{NS}
Distance between tip of the breastbone and pubic bones (finger)	3.42±0.11	2.25±0.09	7.909**
Distance between two pubic bones (finger)	2.10±0.06	1.15±0.07	9.438**

***P<0.01; ^{NS}Non significant.*

(loose) in case of good layers because of steady pressure of the viscera and the weight of egg in the oviduct (Deka *et al.* 2017). The ability to produce eggs is related to the depth or distance from the front of the keel to the centre of the back, the space between the end of the keel and the pubic bones, the width and length of the back, and by the width and length of the keel. The distance of 4 to 5 fingers from the end of the keel to the pubic bones is linked with good rate of production, while a depth of 2 or 3 fingers indicates fair to poor production. Due to recurrent relaxation of the pubic bones in case of superior quality layers, the bones become more flexible, thinner and remained separated by a larger distance. In case of none-layers, the bone might be stout and very hard (Sharma *et al*. 2002).

CONCLUSION

The birds showed low vigour and slow maturing, dull and inactive eyes, small, less warm, shrunken comb, dried vent and depth of keel length 1 or 2 fingers that birds should be culled in time so that the economy of the farm can be maintained.

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