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A comprehensive assessment of poultry husbandry practices at DK poultry farm, Chattogram, Bangladesh

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ABSTRACT

This study was carried out at D K Poultry Farm in Chittagong from September 3 to September 17, 2024, aiming to evaluate various management practices for a flock of 4,027 layer hens housed in a three-tier cage system. The research focused on key aspects such as housing conditions, feeding protocols, lighting, production efficiency, and disease management to identify factors influencing productivity and health. The hens' body weights averaged around 1.89 kg and 1.94 kg at different measurement points within the study period. Mortality rates were exceptionally low, recorded at 0.074% during the 34th week and 0.024% in the 35th week, indicating effective management and health practices. Daily feed intake per bird was approximately 42.65 grams, providing insights into nutritional management. Egg production metrics revealed that peak productivity occurred around the 35th week, with an average of 87.67% egg production per hen per day and reaching a maximum of 87.76%. These results suggest that hens achieve their highest egg-laying capacity near the 35th week of age, highlighting the importance of optimal management practices during this critical period for maximizing productivity. Overall, the study underscores effective farm management strategies to enhance egg production and maintain flock health.

INTRODUCTION

Bangladesh has a longstanding tradition of poultry farming rooted in traditional backyard practices, which laid the foundation for the industry's evolution. The development of commercial poultry farming in the country has been significantly supported by the Department of Livestock Services (DLS), which initiated large-scale programs focused on improving poultry productivity. DLS introduced pure line breeding stocks to marginalized groups, including distressed women and unemployed youth, alongside semi-urban farmers, to meet the growing demand for eggs and meat (DLS, 1995).

Husbandry practices for layers in Bangladesh are often traditional and primarily rely on scavenging, with limited adoption of modern management techniques (Ahmed et al, 2020).

Despite considerable progress, the poultry sector remains a sub-sector within agriculture; however, it plays a vital role in Bangladesh's agrarian economy and contributes notably to the national Gross Domestic Product (GDP) (BBS, 2021).

A substantial number of Bangladeshis suffer from a severe shortage of animal protein. However, rapid growth in the poultry sector has played a crucial role in alleviating this deficiency. Poultry and eggs are now major sources of animal protein for all age groups, with poultry estimated to contribute around 30% of the total animal protein intake among the

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population (DLS, 1995). Globally, poultry meat has become the second most widely consumed meat, with recent estimates indicating an annual consumption of approximately 100 million tons roughly 30% of total meat consumption worldwide (FAO, 2022).

Despite these advancements, a significant portion of poultry production in Bangladesh about 75% of eggs and 78% of poultry meat is still derived through scavenging systems. To bridge the nutritional gap more rapidly, recent policies have shifted focus toward promoting intensive poultry farming. As a result, many commercial farms have been established near urban centers, emphasizing high-yield breeds fed exclusively on formulated poultry ration. Furthermore, numerous private hatcheries have been set up, producing around 20 million layer chicks and 80 million broiler chicks annually, which meet approximately half of the country's current demand for commercial poultry products (DLS, 2023).

A substantial portion of poultry production in Bangladesh, approximately 75% of eggs and 78% of poultry meat, is still derived through traditional scavenging systems. Recent government policies have aimed to promote the transition from scavenging to more modern, intensive poultry farming systems. The shift towards high-yield breeds and the establishment of commercial hatcheries are key strategies to meet the increasing demand for poultry products (Hassan, et al., 2018).

Some local farms now rear broiler and layer parent and grandparent stocks to meet growing chick demand, thanks to efforts from private companies such as BRAC, Paragon, Usha, Kazi Farms, Dhaka Hatchery, and Biman Poultry. However, to maximize productivity and benefits, scientific and efficient management practices are essential. This study was carried out to examine the management practices of layer farms, specifically at D K Poultry Farm in Chittagong. The goals of the study are to assess the overall management system, including housing, rearing, feeding, biosecurity, disease control, egg collection, and marketing and to evaluate the production performance of the farm.

MATERIALS AND METHODS

This study was conducted at D K Poultry Farm, located in Raozan, Chittagong, Bangladesh. The facility housing the research included cages fitted for COB 500 layer strain hens. The research period extended over 15 days, from September 3 to September 17, 2024. A total of 4,047 layer birds participated in the study.

Data collection

The data collection process included examining farm records and interviewing the farm owner. Production data were obtained from the farm's official register, whereas management practices were evaluated through systematic observations and responses gathered using a structured questionnaire.

Housing system

The poultry housing system consisted of a metal shed with side walls constructed to a height of one foot, incorporating wire mesh to facilitate ventilation. Curtains were installed to provide insulation during cold weather. In the brooder house, rice husks were used as bedding material. Each chick was initially allotted approximately 0.5 square feet of floor space, which was gradually increased as they grew. Water was supplied using 5-liter round containers, with one container provided for every 50 chicks. To maintain adequate warmth for 500 chicks, the brooding area was illuminated with three to four 100-watt bulbs. Chick guards measuring 1.5 feet in height and 7 feet in diameter were used to contain the chicks within a brooding area of approximately 250 square feet.

In the layer house, birds were housed in a cage system. Each cage accommodated three birds and provided a total floor area of 7.5 square feet, ensuring 2.5 square feet of space per bird. The cages were equipped with linear feeders and plastic waterers, each designed to serve three birds efficiently.

Figure 1: Cage rearing system of Cob 500 at D K Poultry Farm

Biosecurity

Rigorous biosecurity measures were implemented to prevent disease introduction and maintain herd health, in accordance with established poultry management guidelines (Uddin et al., 2011; FAO, 2010). Chick vaccination was conducted following the recommended schedule to safeguard against prevalent avian diseases. Personnel entry was strictly regulated; all visitors and workers were required to bathe, wash their hands, and wear designated protective clothing before entering the poultry shed, thereby minimizing the risk of pathogen transmission (Rao et al., 2012). The farm environment was cleaned and disinfected twice daily once in the early morning and again in the evening to reduce environmental contamination. Footbaths containing disinfectant solutions were placed at all entrance points to prevent external contaminants from entering the facility. Fresh, high-quality feed was supplied daily, with routine checks to ensure compliance with nutritional and safety standards. Water sources were regularly disinfected, and disinfectant sprays were applied inside the shed every 15 days to inhibit pathogen survival. Rodent control measures were actively enforced to prevent pest intrusion and environmental contamination (Saha et al., 2015). All equipment associated with nesting, drinking, and feeding, including water tanks, was cleaned and disinfected on a regular basis to uphold hygiene standards. Additionally, protective barriers such as fencing or screening were installed to prevent wild animals from accessing the shed.

Fumigation

Regular fumigation, typically conducted after cleaning and before new flock introduction, helps maintain a hygienic environment conducive to healthy egg production and bird welfare. The farm used underlying fumigation technique.

Fumigation place	ppm + Formalin (gm + ml)	Fumigation time
Layer house	(20 + 40)	20 minutes

Deworming

Deworming was administered when the birds reached 45 days of age, and a second deworming was performed at 90 days.

Beak trimming

Beak trimming is a common management practice in the DK poultry farm to reduce injurious pecking and cannibalism among laying hens**.** The procedure involved removing the tip of the beak, usually within the first week of age, using hot blade or infrared methods, minimizing pain and discomfort when performed appropriately. The farm carried out beak trimming was carried out at 95 days of age using a debeaker.

Vaccination

Vaccinations were provided by the farm to protect against Gumboro disease, Ranikhet disease, Fowl Cholera, Infectious Coryza, and Fowl Pox (Table 1).

Age/Day	Vaccine
3rd-5th	IB+ND (Live)
12th	IBD (Live)
17th	IB+ND (Live)
22th	IBD (Live)
28th	ND (Killed)
35th	Fowl pox
55th	Infectious Coryza
65th	ND Killed
75th	Cholera
105th	Infectious Coryza
115th	IB+ND+EDS

Lighting

Adequate lighting is essential for optimizing production and maintaining the performance of laying hens, as it influences their feeding, activity, and reproductive behaviors (Sahin et al., 2014). Proper lighting schedules, typically involving 16-17 hours of light per day, stimulate higher egg production and improve feed efficiency. Controlled lighting also helps reduce stress and feather pecking, contributing to overall flock welfare.

In the selected farm, birds were provided with 16 hours of light per day. However, if the body weight of the birds decreased, an additional hour of lighting was provided. At the chosen farm, lighting was initiated at 4 AM and continued for 16 hours, meaning the lights remained on until 8 PM.

Table 2: Lighting schedule practice in Dk farm

Day/week	Duration of light (hour)
1st Day	24
2nd Day	22
3rd Day	20
4th Day	18
5th Day	17
6th Day	16
7th Day	15
8th Day	14
9th Day	13
10th Day	12
11th Day	12
12th Day	12
13-140th Day	12
141-147th Day	14
148-154th Day	14
23rd week	15
24th week	16
25th week to end	16

Table 3: Light intensity

Age (week)	Light intensity (Lux)
1st to 5th week	40-60 lux
6th to 18th week	10-20 lux
19th to 50th week	20-30 lux

Feeding

Feeding is a crucial aspect of modern poultry farming, as it significantly influences profitability and overall success. Approximately 50-55% of the total farming costs is allocated to feed. At D K Poultry Farm, ready-made feed is used, and fresh feed is supplied to the birds regularly. The birds are fed twice daily—once in the early morning and again at noon. Additionally, restricted feeding practices are implemented from 4 weeks of age until 20 weeks.

Table 4: Standard ration in D K Poultry Farm

Age in week	0-4	4-7	8-14	15-17	17-40	40-60	+ 60
CP%	21-22%	19.5%	17.5	15.0	17-18	16-17	15-16
ME/K CAL/KG	2900	2900	2825	2775	2800	2775	2750
Crude Fiber%		3-5	3-6	4-7	3-6	3-6	3-7
Crude fat %		2.5-6	2.5-7.0	2.5-7.0	3-7	3-7	3-7
Linoleic acid		1.2	1.0	1.0	1.2	1.2	1.2

At D K Poultry Farm, the following rations were approximately maintained for 100 kg of feed. In addition to the main feed, feed additives, toxin binders, vitamins, and minerals were also included. However, the composition of the ration sometimes varied based on the physical condition of the birds and environmental factors.

Watering

To prevent diseases, clean and germ-free water was provided to the birds. During the brooder stage, each group of 100 birds had one round drinker. Once the birds were moved to the cages, a plastic bowl was provided for every three birds. In addition to plain water, supplementary nutrients such as antibiotics, vitamins (like Electromin, AD_3E, Liver tonic, Vitamin E, etc.) were often mixed with the water to support the birds' health.

Egg collection

Proper egg collection helps to reduce breakage of egg and increase production %. Egg collection was done two times at 11pm and 4pm.

Figure 2: Egg collection and storage

Calculation method of egg production

Egg production percentage was calculated by using the following formula (North, 1996)

Hen housed egg production for one day (HHEP)

The following formula is a measure of the egg productivity in relation to the number of hens (housed) at the beginning of the laying period.

$$\text{HHEP \%} = \frac{\text{No.of egg produced}}{\text{No.of birds housed}} \times 100$$

Hen day egg production for one day (HDEP):

The following formula is a measure of the egg productivity of the live hens on any given day.

$$\text{HDEP \%} = \frac{\text{No.of egg produced}}{\text{No.of birds available in the flock on that day}} \times 100$$

RESULTS AND DISCUSSION

The evaluation of the Cob 500 commercial layer hybrid between the 34th and 35th weeks of age revealed promising production performance under typical commercial conditions. With a flock size of 4,027 birds, representative of large-scale poultry operations, the findings offer valuable insights into the breed's viability in intensive production systems.

Table 5: Daily production performance of Cob 500 layers from Week 34 to Week 35 of age.

Date	Age at week	No of birds	number of death	Total feed Kg/day	Feed/ Hen/d	Bwt/Kg/week	Egg pro./day	% of Egg/day
3rd Sep	1/34	4027	0	175	43gm	1.85	3514	87.261
4th	2/34	4027	0	175	43	-	3540	87.907
5th	3/34	4027	0	175	43	-	3535	87.782
6th	4/34	4025	2	175	43	-	3530	87.702
7th	5/34	4025	0	175	43	-	3520	87.409
8th	6/34	4024	1	170	41	-	3520	87.475
9th	7/34	4024	0	170	41	1.923	3520	87.475
10th	1/35	4024	0	175	43		3530	87.723
11th	2/35	4023	1	172	42.3		3515	87.372
12th	3/35	4023	-	171.5	42.1		3520	87.497
13th	4/35	4023	-	172	42.3		3530	87.745
14th	5/35	4023	-	175	43		3530	87.745
15th	6/35	4023	-	175	43		3535	87.869
16th	7/35	4023	-	175	43	1.90	3555	88.366

The flock consisted of 4,027 birds, with a weekly mortality rate of 0.001% and hen-day egg production averaging 87.27%.

One of the most notable outcomes was the exceptionally low mortality rate of 0.001%, which reflects outstanding management practices, effective disease control, and overall flock health. This figure is significantly lower than the mortality rates reported in other studies, which typically range from 0.005% to 0.01% depending on environmental and management variables (Saif et al., 2018). Such a low mortality rate may suggest the implementation of superior biosecurity protocols, optimal housing conditions, and attentive husbandry, all of which contribute to flock longevity and productivity (Mishra et al., 2021).

Hen-day egg production was recorded at 87.27%, a level considered high for this stage of the laying cycle. This performance is consistent with the genetic potential of modern hybrid layers and reflects the effectiveness of nutritional, lighting, and management strategies employed during the study period (Devaraj et al., 2020). Comparable studies have reported hen-day production rates ranging from 85% to 90% during peak laying phases, indicating that the Cob 500 performs competitively within the expected range (Sharma et al., 2019). However, while the production rate is commendable, some farms have achieved rates exceeding 90% under optimal conditions, suggesting that there may be room for marginal improvement through refinements in feed formulation, photoperiod management, and environmental control.

In summary, the Cob 500 demonstrated strong performance metrics in terms of both survivability and productivity. The findings align with existing literature on high-yielding layer hybrids and underscore the importance of meticulous management in achieving optimal outcomes. Further studies could explore the impact of specific environmental and nutritional interventions to push performance even closer to the breed's genetic ceiling.

Table 6: Weekly averages of egg production, mortality, and feed intake during the laying period (Days 238 to 251; Weeks 34 to 35 of age) in Cob 500 layers, compared with standard performance benchmarks.

Age In week	Total birds	Death /week	Standard				Observation					
			Hen Day%	Feed intake Gm/d	Total Intake kg/hen	Mortality rate	Bwt gm	Feed Gm/day/bird	Bw/week	Mortality/week	Total egg/ week	% egg in a week
34	4027	03	93	43	4.12	1.5	718	42.8 gm	1.89	.074%	24679	87.57%
35	4024	01	92	43	4.5	1.6	721	42.5 gm	1.94	.024%	24715	87.76%

Total flock size: 4,027 birds; observation period: 14 days

The evaluated flock consisted of 4,027 birds, monitored over a 14-day period during the 34th and 35th weeks of age, corresponding to days 238 to 251. The key performance metrics—hen day egg production, mortality rate, and feed intake—were compared with the standard levels to assess the flock's performance and management efficiency.

Egg Production: The hen day egg production was recorded at 87.57% for the 34th week and 87.76% for the 35th week, with an overall average of 87.67%. These figures are closely aligned with the standard expected levels for high-yielding layer strains like Cob 500, which typically achieve around 85-90% during peak laying periods (Devaraj et al., 2020). The slight increase from the 34th to 35th week suggests a stable production trend, indicating effective management and optimal environmental conditions.

Mortality: The mortality rate was very low, at 0.074% during the 34th week and 0.024% during the 35th week. Such minimal mortality reflects good health management, adequate housing, and disease prevention protocols, aligning with relatively low mortality rates reported in well-managed commercial projects (Saif et al., 2018). The decreasing trend indicates that mortality management improves with age, possibly due to enhanced immunity or better acclimatization.

Feed Intake: Average daily feed intake was 42.65 grams per bird during this period. This intake level is consistent with the standard consumption for birds at this stage, considering their age and production status (Sharma et al., 2019). Proper feed intake is crucial as it directly influences egg production and body weight maintenance.

Impact of Feed Intake and Body Weight: Feed intake and body weight are interrelated and can be influenced by factors such as season, housing, diet composition, transportation, and management practices like debeaking (Mishra et al., 2021). Variations in these parameters can affect production efficiency, with adequate feed intake supporting maintaining optimal body weight and egg production rates during the laying period.

Comparison with Standard Levels: Overall, the flock's performance during this period was quite satisfactory and closely matched the standard expectations for high-yielding layers. The slight variations could be attributed to environmental conditions, feed quality, or management practices. Maintaining optimal feed intake and body weight is essential for sustaining high egg production and minimizing mortality, as supported by literature (Devaraj et al., 2020).

CONCLUSION

Although the studied farm adheres to the principles of layer farming, the egg production has not yet reached the standard peak levels. However, the mortality rate during both chick rearing and laying periods was notably low.

It can be concluded that with improved management practices, the egg production could be increased to meet standard levels, thereby ensuring greater profitability for the farm.

The farm is currently faced with a significant rodent problem, which poses a risk to the layers by potential contamination or disease transmission. Additionally, the farm's proximity to the local area and the poorly constructed surrounding wall increases the risk of external disturbances that could negatively impact production.

During my placement period, I recommended to the farm owner that they upgrade their biosecurity measures, notably by constructing a concrete surrounding wall, to better protect the flock and enhance the farm's overall safety.

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