A Survey on the Management Practices and Production Performances of Broiler Chickens in Kurunegala District, Sri Lanka

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Abstract

Remarkable improvements in broiler management made its meat available at low cost. To what extent management practices are adopted by local farmers and their effects on broiler production performance are not well documented in the Sri Lankan context. Hence, the present study investigated the effects of management factors on broiler production. One hundred broiler farmers, selected randomly from the areas in Kurunegala district, filled the structured questionnaire with face-to-face interviews. The data was analyzed with Excel and SPSS. The results showed that 74% of the farmers reared 1000 – 3000 birds, 88% of them fed pre-starter feed to birds below 10 days old, 94% fed starter feed from 10 – 20 days and 94% fed finisher to the birds above 20 days. Further, 77% of the farmers did not change the litter throughout the rearing cycle, 76% of them provided vaccine to birds, 96% were able to diagnose diseases, 96% used Baycox to treat disease and 40% provided supplements to their birds. 98% of the farmers sold live birds at 2kg and above 2kg body weight at the maximum of 42 days. The linear regression analysis showed that vaccination, experience of farmers, number of birds, not changing the litter, amount of starter feed, feeding days of pre-starter, feeding days of finisher, disease diagnosis and supplement can affect the body weight of the broiler and these factors together explain 68.1% of the variation in slaughter body weight. The study concludes that the slaughter weight of broiler chickens are affected by several rearing practices, thus, it is suggested the farmers may focus on feeding, vaccination, disease diagnosis, flock size, supplementation and litter management to increase the final slaughter weight of broiler chickens and production performance.

Keywords: Feeding, Vaccination, Litter management, Disease management, Slaughter weight

I. INTRODUCTION

Poultry is the most developed livestock sub sector in Sri Lanka, and has shown a phenomenal growth over the past three decades (Prakash et al., 2017). Poultry sector in Sri Lanka has recently placed in a higher position due to higher contribution to national GDP. It developed as countries most disciplined and well-organized livestock subsector which generates the billions of tax revenue compared to the other livestock and fisheries (Manjula et al., 2018). The poultry industry in Sri Lanka plays a prominent role in the protein supply to the nation, important to safeguard children from malnutrition. Hence, it is necessary to ensure the sustainability of the poultry production which can be fulfilled by identifying the factors that are found to be the hindrance for its performance and sustainability. Prakash et al. (2017), identified the poor support services from government as affecting the poultry production in the Kurunegala district. Factors influencing poultry production is not only based on physical inputs such as land area, labour, quantity of feed used, quantity of vaccine applied and quantity of energy used, but also socio-economic, demographic, institutional and non-physical factors. According to Gharib, El-Menawey and Hamouda (2023), experience, gender, education, labor type, extension, training, veterinary, credit, flock size, management interventions, marketing information, and the market price of live chickens positively influenced the profitability of broiler while farmer age, feed cost, home consumption, and mortality rate negatively influence the broiler profitability.

Adebayo and Adeola (2005), found that the limited finance; high cost of input and labour coupled with unfriendly government policy had adversely affected the overall performance of poultry farmers. Overall, broiler chicken production performance are be influenced by

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management factors which are under the control of the farmers and socioeconomic characteristics, and climatic factors which can be totally or partially manipulated by farmers and support services which include supplies to farms and government services. However, in open house intensive broiler production system, management practices play a pivotal role therefore, management practices should be understood and well-maintained to ensure the better production and optimum level of yield (Biesek et al., 2022).

According to Prakash et al. (2017), the highest number of the poultry farms were located in the Kurunegala district, however, 74% of layer farms and 62% of broiler farms operated at small scale rearing less than 1000 chickens in open house intensive production system. The management practices carried out by poultry farmers will play important role in the performance of poultry farms. Remarkable improvements were already achieved in poultry performances. This improved management practices led to the price reduction of poultry and made the poultry meat available to everyone at low cost. Even though advanced management practices are available, to what extent those practices are adopted by farmers and how those adopted practices affect the broiler production performance are poorly studied in Kurunegala district where the poultry farms are concentrated in Sri Lanka. Therefore, the present study is an attempt to identify the management factors affecting the production performance of broiler chicken in selected areas of Kurunegala district.

II. METHODOLOGY

A. Study Area

The study was conducted in Kurunegala district (7.4871° N, 80.3649° E) in North Western province of Sri Lanka. Kurunegala features a tropical and hot throughout the year. During the month of April, the temperature can rise up to about 35 degree Celsius. The only major change in Kurunegala weather occurs during the monsoons from May to August and October to January. Moreover, Kurunegala has good road and rail connections with the rest of Sri Lanka. This area was chosen because of its popularity for broiler farming and large number of broiler farms are situated in this area.

Local broiler farmers (n=100) were selected using random sampling method from Aariyamam, Yagamwela, Dvirumpola, Dummalasooriya, (Udubaddawa DS division), Maningala (Nattandiya DS division), Hettipola (Panduwasnuwera west DS division), Pannava (Kobeigana DS division), Gallegama, Kureekotuwa, Horambawa, Siyambalagaskotuwa (Kuliyapitiya east DS division), Kinniyama (Bingiriya DS division), Anukkana (Panduwasnuwera east DS division), and Panagamuwa (Rideegama DS division) areas. Structured questionnaire with field visits and observations was filled with face-to-face interview. The questionnaire included information such as personal details, breeds adopted, housing conditions, feeding and watering, poultry health, marketing, mortality, and slaughtering. All the data from filled questionnaires were coded and entered into Microsoft Excel and analyzed with Excel (2016) and SPSS (25.0). The Ethical Review Committee approval (ERC/FT/2022/06) was obtained for the study from the ERC of Faculty of Technology, South Eastern University of Sri Lanka.

III. RESULTS AND DISCUSSION

A. Socioeconomic Characteristics of Broiler Farmers

The data on socioeconomic characteristics from the questionnaires were analyzed using Microsoft excel and the results are presented in Table 01.

According to the results (Table 01), most of the farmers (77%) were below the age of 56 and above 25 years old indicating that they are in their productive age. The results showed that 50% of the farmers had 4 – 6 members in their family, however, 31% of the farmers had 7 – 9 members in their family. All most all of the farmers (96%) were educated up to secondary level. With regard to the ownership, 79% of the farmers had their own farm while 20% of farmers practiced buyback method and another 1% operated the farm on partnership basis. With regard to the engagement of the farmers in farming activities, it was found that 77% of them engaged full time farming while 23% of them involved part time in farming. Both the full-time engagement in farming and ownership together indicates the importance of broiler farming in contributing for employments and livelihoods of the people in the study area. The results also showed that 91% of the farmers started the farming without prior experience while only 9% of them started with experience. Further, 91% of the farmers indicated

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that they did not have training on broiler farming whereas another 9% had training. The results may indicate that farmers are with the attitude that both formal experience and formal training are not necessary to undertake broiler farming operations. From our discussion with farmers, we found that farmers usually follow the instructions provided by the chick suppliers and other input suppliers in managing their farms.

Table 01: Socioeconomic Characteristics of Poultry Farmers

Characteristics	**Percentage**
Age	
25 -35	20%
35- 45	27%
45-55	30%
55-65	20%
65-75	03%
Family size (number of heads)	
0-3	19%
3-6	50%
6-9	31%
Educational status	
Primary level	1%
Secondary level	96%
Degree level	03%
Status of farm	
Own	79%
Partnership	1%
Buyback	20%
Engagement of farmer	
Full time	77%
Part time	23%
Experience level of farmer	
With experience	09%
Without experience	91%
Undertaken a course	
Yes	09%
No	91%

B. Management Practices

The study found that there were three chick supply sources i.e., 1. private hatcheries, 2. companies that supply chicks to farmers who involve in buyback method, and 3. chick sellers (Table 02). Farmers mainly purchased chicks from private hatcheries (46%), and also from companies (19%) and chick sellers (35%). All of the chick suppliers supplied Cobb 500 breed. We could not collect the data on the quality of chicks and prices. Therefore, it is not possible to comment on the quality of chicks. The results showed that most of the farmers (74%) reared 1000 – 3000 broiler chickens. According to the existing literature, the characterization of poultry farms based on the number of birds varies. For example, flock size with 50 – 1000, 1001 – 10000 and above 10000 are categorized as small scale, medium scale and large scale commercial farm respectively. Whereas Uchendu et al. (2015), categorized poultry farms having the flock size with 250-1900 birds, 2000-5000 birds and above 5000 birds as small scale, medium scale and large scale respectively. In the present study, we categorize poultry farms in the study area with the flock size of below 1000 birds, 1001 to 5000 and above 5000 as small scale, medium scale and large scale respectively. Accordingly, 91% of the broiler farms were categorized as medium scale farms. Further, majority of the farmers (55%) operated more than five production cycles per year which is in agreement with previous findings wherein it was found that broiler farmers operated 1 – 6 cycles per year in Nigeria (Adeyonu and Odozi, 2022) and about eight cycles in Indonesia (Setiadi et al., 2022). According to the results, most of the farmers (77%) did not change the litter. Three common practices are adopted for litter management in broiler units, those are single use litter, partial re-use and multi-use litter (Bernhart et al., 2010). The single-use litter involves the total clean-out of the house after each flock and replacement of the bedding material. Partial re-use involves the removal of litter from the brooding section for spreading on the grower section of the house. With the multi-use of litter, only caked material is removed (Sistani et al., 2003) and the house is disinfected (Bolan et al., 2010). According to Abougabal (2019), recycling litter had no adverse effect on broiler performance, survival %, carcass traits, economic consideration and broiler welfare.

The results (Table 03) showed that most of the broiler farmers (88%) fed pre-starter feed (booster feed) to the birds with the age of below 10 days. Broiler booster is a complete supplement with a formulation consisting of vitamins, probiotics, amino acids, and minerals. Boosters for broilers are commercial feed additives. The booster products/feed produced by the feed mill has a diverse composition. Likewise, 94% of the farmers fed starter feed from 10 - 20 days. The broiler starter feed contains 21 - 22% of crude protein and 12.45MJ/kg of metabolizable energy. Similarly, 94% of the farmers fed finisher feed to the birds with the age of above 20 days.

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Table 02: General Management Characteristics

Characteristics	Percentage of farmers
Sources of chicks	
Directly from private hatcheries (private companies)	46%
Provided by the company (under buyback method)	19%
Chick sellers	35%
Number of birds	
Below 1000	5%
1001 - 3000	74%
3001 - 5000	17%
Above 5000	4%
Number of production cycles per year	
1 - 3	1%
4 – 5	44%
6 and above	55%
Housing and management system	
Intensive management system	100%
Changing of litter materials	
Below 3 times during a cycle	9%
Above 3 times during a cycle	5%
Spreading new husk on wetted husk	9%
No changing of litter materials	77%

The finisher feed contains 18 – 19% of crude protein and 12.97MJ/kg of metabolizable energy. Muharlien et al. (2020) in their study used pre-starter, starter and finisher diets from 1 – 7days, 8 – 21 days and more than 21 days respectively. Accordingly, most of the broiler farmers' feeding practice in the present study was acceptable. However, according to the results, feeding practice carried out by certain farmers was not as per the recommendations. For example, 5% of the farmers fed starter feed to the birds with the age of below 10 days. Likewise, 5% of the farmers fed finisher feed to the broiler chicken with the age of below 20days. These types of feeding practices may affect the feed intake and the performance of the birds.

Table 04 shows that only 40% of the broiler farmers provided supplements to their birds and 60% of the farmers did not provide supplements. Out of the supplements used, it was found that chick tonic (31%) was the widely used supplement by farmers.

According to the results (Table 05), 76% of the farmers provided vaccine to their broiler chickens and another 24% did not provide vaccines. Most of the farmers (89.3%) provided Gamboru vaccine to their birds.

Table 03: Feeding Practices Carried out by Farmers

Feeding practices	Percentage of farmers
Feeding at morning and evening	100%
Feeding pre-starter feed (booster feed)	
Below 10 days	88%
From 10 – 20 days	10%
Above 20 days	2%
Feeding starter feed	
Below 10 days	5%
From 10 - 20 days	94%
Not using starter feed	1%
Feeding finisher feed	
Below 20 days	5%
Above 20 days	94%
Not using finisher feed	1%

Table 04: Feed Supplements Given to Broiler Chickens by Farmers

Supplementation details	Yes	No
Providing supplements	40%	60%
Chick tonic	31%	69%
Vitamin B and C	19%	81%
Anasone	2%	98%
Biovit	12%	88%
Aminovit	8%	92%
Ganadexil	5%	95%
Selvit E	2%	98%

Note: Supplements details were given in % by taking yes (40%) as 100%.

Table 05: Vaccination Practices Undertaken by Farmers

Vaccination details	Yes	No
Providing vaccine	76%	24%
Gamboru	89.3%	10.7%
Endovict	1.2%	98.8%
Ranikhet	8.3%	91.7%
IBH	1.2%	98.8%

Note: Vaccination details were given in % by taking yes (89.3%) as 100%.

Most of the farmers (96%) were able to diagnose Gamboru disease, only 4% of them said they did not diagnose Gamboru disease. Further, 84% of the farmers diagnosed chick cough and 16% said they did not. Whereas 24% of the farmers diagnosed coccidiosis and 76% of them did not diagnose coccidiosis. With regard to the treatments, 96%, 27%, 76% and 62% of the farmers used Baycox, Amoxicillin, Salpharin and Panadol and Paracetamol respectively to treat diseases. The diseases diagnosed and the treatments used by farmers indicated that the farmers were not able to correctly apply treatments against the diseases diagnosed. For example, Baycox is used against coccidiosis in

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poultry (Vertommen Peek and van der Laan, 1990). In the present study, 96% of the farmers used Baycox to treat disease, however, only 24% of the farmers said they diagnosed coccidiosis. The contradictory results may suggest the immediate need of training to farmers on disease diagnosis and treatments that will help them to apply correct treatments.

The study found that the mortality was highest (80%) in broiler chickens during the age of 21 – 30 days whereas it was 28% above 30 days of age and 2% below 20 days of age. According to Yerpes, Llonch and Manteca (2020), the first week mortality on average was 1.8%. According to Heier et al. (2002), the mortality increases 0.48% per week during the rest of the growth period. The present study further showed that heat stress (54%) was the main cause for the mortality compared to weak chicks (32%) and disease (14%). These results were unexpected because previous studies found diseases as the major cause of mortality in broiler chickens (Dalal et al., 2020). Therefore, it is recommended to carry out further studies on the causes of mortality in broiler chickens.

The results (Table 08) showed that 83% of the farmers performed culling in the broiler production and 17% of them did not carry out culling. The culling at farm level is performed since the birds are considered economically worthless. Most of the farmers (77%) carried out culling at the age of 10 – 20 days. Another 19% of the farmers carried out culling whenever they identify the birds to be culled. Further, 80% of the farmers stated that broken legs as the main reason for culling whereas 20% of them stated that broken legs is not the reason for culling. The findings in the present study is in agreement with previous finding where Knowles et al. (2008) reported the leg disorder as the main reason for culling in broiler birds. The disease was identified as the reason for culling by 69% of the farmers however, 31% said it was not the reason for culling. The study also found that poor growth was not the reason for culling which was mentioned by 98% of the farmers.

Table 06: Disease Diagnosis and Treatment Activities Carried out by Farmers

Diseases and treatment	**Yes**	**No**
Diseases are diagnosed	96%	4%
Diseases diagnosed		
Gamboru disease	96%	4%
Coccidiosis	24%	76%
Diarrhea	7%	93%
Chick cough	84%	16%
Treatments used		
Baycox	96%	4%
Amoxicillin	27%	73%
Salpharin	76%	24%
Panadol and paracetamol	62%	38%
ESB3 (Sulfaclozine)	1%	99%
Dinatrin	1%	99%
Ganadexil	1%	99%

Note: Disease diagnosis and treatments details were given in % by taking yes (96%) as 100%.

Table 07: Mortality Status at Farms

Mortality status	**Percentage**
Age of mortality	
Below 20 days	2%
21 – 30 days	80%
Above 30 days	28%
Reasons for mortality	
Heat stress	54%
Weak chicks	32%
Disease	14%

Table 08: Culling Practices Performed by Farmers

	Yes	**No**
Culling is done	83%	17%
Age of culling (out of 83%)		
Below 10 days	1%	
10 – 20 days	77%	
Above 20 days	3%	
Whenever identified	19%	
Reasons for culling (out of 83%)		
Broken legs	80%	20%
Disease	69%	31%
Poor growth	2%	98%

Table 09: Body Weight at Selling and Slaughtering

	Body weight	**Percentage of farmers**
Selling live birds	2 – 2.2kg	97%
Selling slaughtered birds	1 – 2kg	2%
Selling slaughtered birds	Above 2kg	1%

The study found that 97% of the farmers sold live birds at the body weight of 2kg at the maximum age of 42 days. Or above and only 3% of the

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farmers sold slaughtered birds. The live weight at selling is in agreement with previous findings where in survey on status of broiler production found that live weight at selling was 2kg.

C. Factors Affecting Selling Weight of Broiler Chickens

We employed a linear regression model to analyze the effects of some factors on the selling/slaughtering weight of broiler chickens.

According to the model obtained through the linear regression analysis, variables such as vaccination, experience level of farmers, number of birds, not changing the litter, amount of starter feed, feeding days of pre-starter feeds, feeding days of finisher, disease diagnosis and supplement can affect body weight of the broiler. Further, aforementioned mentioned variables explained 68.1% of the variation of the broiler production performance and slaughter weight.

Table 10 shows the significant factors affecting the broiler production in the study area. Accordingly, farmers by focusing on poultry management related factors such as size of the flock, litter management, amount of feeding of starter feed, feeding days of pre-starter feed, feeding days of finisher feed, disease diagnosis and feed supplements can improve the slaughter weight of broiler chickens.

The model is stated as follows:

$Y= \beta0 + \beta1X1 + \beta2X2 +\beta3X3+ \beta4X4 + \beta5X5 + \beta6X6 + \beta7X7 + \beta8X8$

Where,

$\beta0 = 1.620$

$\beta1X1$= -.480 experience level of farmer

$\beta2X2$= .311 number of birds

$\beta3X3$= .296 no change litter

$\beta4X4$= .221 amount of starter feed

$\beta5X5$= .277 feeding days of pre-starter feed

$\beta6X6$= .346 feeding days of finisher

$\beta7X7$= .456 disease diagnosis

$\beta8X8$= .246 supplement provided

Table 10: Significant Factors Affecting Broiler Production

Factors	**Co efficient**	**t value**	**p value/ sign**
Constant) vaccination	-	19.517	.000
Experience level of farmers	-.480	-5.575	.000
No of birds	.311	4.249	.000
No changing litter	.296	3.950	.000
Amount of starter feed	.221	3.181	.000
Feeding days of pre-starter	.277	3.396	.000
Feeding days of finisher	.346	2.558	.000
Disease diagnosis	.456	6.540	.000
Supplements provided	.246	2.837	.000

IV. CONCLUSION

The study found that the broiler production performance is affected by several rearing practices carried out by farmers. The slaughter or selling weight of broiler chickens can be affected feeding, vaccination, disease diagnosis, size of the flock, and feed supplements. Having the findings of the study, it is suggested that farmers may focus on proportionately maintaining feeding, vaccination, disease diagnosis, number of birds, feed supplement and litter management to increase final slaughter weight of broilers and production performance.

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