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AN ASSESSMENT OF COMMERCIAL LAYER MANAGEMENT PRACTICES IN SOUTHERN DISTRICTS OF BHUTAN

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ABSTRACT: The study assessed the management practices of commercial poultry layer farms in southern districts of Bhutan. The data were collected through face-to-face interview using semi-structured questionnaire with 77 respondents identified purposively amongst poultry farmers from five southern districts. Majority of the respondents had farms at semi-commercial to commercial level. The results showed 87 % of farms are located proximate to human settlements and 97.4% of farms adopted open sided housing and deep litter system. There was no significant association between education level and lighting system adopted in the farms ($p > 0.05$). It was also observed that more than 75% of the respondents keep downtime of more than a month. Most farmers preferred Karma feeds for their birds. However, majority (79.2 %) were not aware of feeding regime and other management aspects including changing of litters, and requirement of ventilation in the sheds. The study recommends imparting adequate knowledge and hands-on skills amongst poultry farmers on modern commercial layer farming management practices to enhance domestic egg production in the country.

Keywords: Commercial layers; downtime; management practices.

1. INTRODUCTION

Poultry production is an important and lucrative business worldwide. The short rearing period and quick return from investments in poultry outweigh other livestock farming (Sanusi et al. 2015). Poultry production remains a foundation to the livelihood of many households in most developing countries providing family income and employment opportunity year round (Guéye 2005). Planned poultry farming in Bhutan started with introduction of improved breeds since 1961 with an aim to improve nutritional intake and alleviate poverty of the rural population (Nidup and Wangchuk 2007). Prior to introduction of exotic poultry breeds, Bhutanese farmers mainly practiced subsistence poultry farming rearing small number of native birds called *Yubja* (Nidup 2007). Over the years, rearing of exotic breeds of layers and broilers had gained popularity compared to other livestock species (Department of Livestock [DoL] 2015). In 2019, there were 1,299,810 poultry birds in Bhutan that produced 141 million (M) eggs and 1926.4 metric ton (MT) of chicken (DoL 2019).

The layer birds start laying at the age of 20 weeks and reaches the peak egg production in the first production cycle and the egg production decreases with age (Yaseen 2014). The layers performances are assessed through feed consumption, egg production, feed conversion ratio, and mortality (Afandi et al. 2018). The table eggs quality is dependent on diverse influences before and after oviposition (Mazzuco and Bertechini 2013). The health and age of layer, diet quality and housing environment are intrinsic aspects that determine the quality of eggs (Afandi et al. 2018). A review by FAO (2013), reported lack of feed quality, vaccines, trained professional

and proper housing system as an impediment in obtaining optimum performance of egg production at laying stage.

However, study on layer management practices at farmers' level has not been conducted in Bhutan. This has resulted in information gap in understanding how the layer farms are managed in the field and what aspects needs to be rectified to improve animal welfare and increase egg production. Therefore, this study was aimed to understand and document the existing layer management practices that will enable standardization of layer farms in southern districts of Bhutan.

2. MATERIALS AND METHODS

2.1 Study areas and respondents

The sites for the study were purposively selected based on existence of high number of poultry farms in Bhutan.

In total 14 subdistricts from five districts, viz., Gelephu, Dekiling, Samtenling and Shompangkha under Sarpang District; Goserling, Tsholingkhar, Kilkhorthang and Dunglagang under Tsirang District; Tashiding and Dagapela under Dagana District; Phuentsholing and Samphelling under Chukha District and Norbugang and Samtse under Samtse District were selected for the study. From, amongst 200 layers farms recorded, a total of 77 farms were purposively selected and the owners were interviewed for the study. The climatic condition of study sites ranges from warm subtropical to warm temperate.

2.2 Data collection

The data were collected from identified layer rearing farmers through face-to-face interview using a semi-structured questionnaire from November to December 2018. To obtain accurate data, interviews were conducted in the premises of layer farms.

2.3 Data Analysis

The data gathered were descriptively analyzed and associations amongst variables were measured using Chi-square and Pearson's correlation in Statistical Package for the Social Sciences (SPSS) Version 23 (IBM n.d.).

3. RESULTS AND DISCUSSIONS

3.1 Respondent profile

Table 1 indicates respondents' profile in the study areas. The respondents were evenly distributed amongst different age groups. The results showed respondents were distributed as 39 %, 23.4% and 20.8% in age groups of 36-45, 46-55 and 26-35 years, respectively. This indicates that majority of the respondents are in productive age. The study also revealed that 36.4% had primary level education while 24.7% had secondary school qualification. The remaining 26% did not attend any form of education. Mamman et al. (2016) also observed similar age group and education levels (primary to secondary) of respondents involved in poultry farming in Nigeria.

Table 1: Demography of respondents (n=77)

Variable	Category	%
Age	15-25	2.6
	26-35	20.8
	36-45	39
	46-55	23.4
	Above 56	14.3
Education	NFE	7.8
	Primary	36.4
	Secondary	24.7
	Diploma	1.3
	Degree	3.9
	No education	26

3.2 Breed type, farm size and location

The study revealed that 20.8% of the layer farms were established before 2008 and 29.2% started between 2009 and 2012; while the rest 50% became operational since 2012 onwards. More than 50% of these farms reared two types of commercial layer birds while 18.2% reared three different types of commercial layers such as Hy-Line Brown, Hy-Line Silver Brown and BV-380. Only 24.7% of the respondents reported to have reared only Hy-Line Brown. The Day-Old Chicks (DoC) demands for these farms were met from the government nucleus farms.

Majority of the farms (55.8%) has flock sizes of 500-1000 birds/farm, while some 44.2% of farms had flock sizes of 1001-5000 birds/farm. In the Bhutanese context where enterprises are

usually of smaller size, this indicates majority of the respondents are operating semi-commercial to commercial level layer farms. The housing system followed by most farms (97.4%) are open sided house with deep litter system.

Table 2 presents the farm location in the study areas. It revealed that 67 (87%) of the respondents have their farms in proximity to the human settlements; while 13% of farms were located away from the human settlements and highways. This result is in agreement with Alabi et al. (2014) who reported that the majority of poultry farms are located within a distance of 100 meter from the living houses. This implies that there is huge risk of disease outbreak and transmission due to close proximity to human settlements and calls for stricter biosecurity measures in the farms.

Table 2: Location of Poultry farms

Location	Respondent (no.)	% Respondent
Nearby settlement	67	87.00
Away from settlement	5	6.50
Nearby highway	5	6.50
Total	77	100.00

3.3 Stocking density

Majority (81.8 %) of the respondents were aware of the importance of stocking density and 18.2 % respondents had little or no knowledge about the stocking density. It was observed that 35 (45.5%) of the respondents stocked the birds on self-estimation and 41 (53.2%) based on shed capacity.

3.4 Lighting of sheds

Majority of the respondents did not follow standard commercial layer lighting requirements. Study revealed that 89.6 % of the respondents provided 24 hours of lighting to chicks between the age of 0-6 weeks, and 5.2% of the respondents provided 10-18 hours lighting. These indicate that layer farmers did not give importance for lighting period in chicks to laying period. According to Hy-line International (2018), chicks have to be provided 22 hours of lighting when they are in between 0-3weeks of age with 2 hours of darkness. The Hy-line International guidelines states that chicks at 4-7 weeks should be provided 21hours of lighting with three hours of darkness in a day. This was mainly designed to help the chicks to acclimatize in housing environment, to identify feed, water and to sense them about the darkness. These guidelines were not followed by the respondents probably due to lack of awareness. The study also revealed that there was no significant association between education level and lighting standard followed in the study areas ($p > 0.05$). When birds attained the age of 7-15 weeks of age 53.2% had provided 24 hours lighting, while 39 % provided 15-18 hours of lighting and 7.8 % provided only day lights. This result was supported by Van Staaveren et al. (2018) where they have observed on an average, birds received 15.1 ± 0.72 hours of light per day.

Similarly, 16.9 % of respondents provided 12 hours of lighting to the birds of 16-72 weeks, while 39 % of the respondents provided 16 -24 hours of lighting when birds were at laying stage. This indicated that layer poultry farmers were not aware on the importance of lighting in poultry birds. Lighting of sheds in poultry were not in accordance to the recommendation of Hy-line International (2018) which recommended to provide light stimulation when flock reached the body weight target of 1.35–1.40 kg. At about 16-19 weeks of age, lighting should be increased by half an hour weekly. From 21 weeks till the end of laying period, 16 hours of light and 8 hours of darkness have to be maintained at all times without fluctuation.

3.5 Litter management and downtime period

Van Staaveren et al. (2018) recommended to remove the litters at least once per week in furnished cage and multi-tier systems to prevent ammonia concentrations from reaching harmful levels in poultry shed. Further, Banday et al. (2015) had the view that maintaining good bedding materials (litters) serves as an insulator in maintaining uniform temperature, absorb moisture and promote drying which is essential for comfort of the birds. However, majority (85.7 %) of the respondents reported to have sufficient litters at all times and 14.3 % reported otherwise (Table 3).

In the study areas, 54.5 % of the respondents changed the bedding materials more than two times in a year, 27.3 % changed bedding

twice a year and 15.6 % changed bedding once a month. In contrast, Van Staaveren et al. (2018) recommended to remove the litters at least 1× per week in furnished cage and multi-tier systems to prevent ammonia concentrations from reaching harmful levels in poultry shed. Further, Banday et al. (2015) had the view that maintaining good bedding materials (litters) serves as an insulator in maintaining uniform temperature, absorbs moisture and promotes drying which is essential for comfort of the birds.

Table 3: Litter management in study areas

Variables	Response	Respondent (No.)	%
Litter's availability	Yes	66	85.7
	No	11	14.3
Frequency of changing litter	Weekly	2	2.6
	Monthly	12	15.6
	Bi-annually	21	27.3
	More than twice in a year	42	54.5

In the study areas, about 91% of respondents had reported to have observed the downtime between the flocks. However, it was observed that 75.3 % (58) of the respondents had kept the downtime of more than one month. Only around 9.1% of the respondents observed downtime of two to three weeks, while only 6.5% of the respondents observed downtime of one week (Table 4).

The findings on the downtime in this study is higher than Mohammed et al., (2016) that observed downtime between productions cycles of 4-7 days. The reduced downtime can increase the production cycles among the flocks.

Table 4: Importance and duration of downtime

Variables	Response	Respondent	Percent
Importance of downtime	Yes	70	90.9
	No	7	9.1
Duration of downtime	Less than one week	5	6.5
	Two weeks	7	9.1
	Three weeks	7	9.1
	More than one month	58	75.3

3.6 Feeds and feeding management

In the study areas, all the respondents provided manufactured poultry feed purchased from different feed plants. Majority of the respondents (84.4 %) provided Karma Feed, followed by BMG and Samrat with 7.8 % each. Similarly, 84.4 % of the respondents have feed stores, while 15.6 % did not have separate feed stores.

Majority of the respondents (79.2 %) provided feed *ad libitum* and respondents were not aware of feeding regime in the study areas. Moreover, 70.1% of the respondents had concern on feed particles and 29.9% do not have knowledge on importance of feed particles. However, more than 65% of the respondents were aware of feeding time. The study found that 67.5% of the respondents fed the birds between 7-8 AM, followed by 19.5% that fed *ad libitum* and 11.7% that fed between 5.30 to 6 AM.

3.7 Furnishing of perches and laying box

Majority of the respondents (67 %) did not provide perches in the study areas. Only 17 % of the respondents had provided perches at growing and while 16% at starter period. Similarly, laying boxes were either introduced at the point of laying or at rearing period. About 29% of the respondents introduced laying boxes at 16 weeks of age. In contrast, Van Staaveren et al. (2018) found the use of perches in Canada at 100%. Campbell et al. (2016) also reported that perching can improve leg bone strength, create floor spaces and address the welfare issues.

3.8 Records on humidity and ventilation

The findings on humidity and ventilation of the study are presented in Table 5.

Majority of the respondents do not have proper records on humidity and ventilation of the birds. Only few respondents have records of temperature and ventilation. This indicates that poultry farmers were not aware of the importance of humidity and ventilation to the birds. Van Staaveren et al. (2018) recorded using of fan and natural ventilation in their study in Canada. Zdziarski (1982) stated that it is necessary to increase the air velocity for physiological consequences of panting.

Table 5: Records on humidity, vaccination and ventilation in study areas

Variable	Response	Respondent (No.)	%
Humidity	Yes	4	5.2
	No	73	94.8
Ventilation	Yes	24	31.2
	No	53	68.8

3.9 Water management and flock uniformity

In the present study, majority (83.1%) of the respondents provided water as *ad libitum* as majority of the poultry farmers were using bell drinkers. Only 16.9% of the respondents had provided water once and twice daily. It was observed that 98.7% of the respondents had sufficient drinkers in the study areas. Hy-line International (2018b) reported that if there is decrease in flock water consumption, it could be the first sign of health problems and decline in production. Similarly, 75.3 % of the respondents were concerned about the flock uniformity. However, 24.7 % were not aware of the flock uniformity. Flocks should have at least 90% uniformity at the time of transfer to the laying facility (Hy-line International 2018b).

4. CONCLUSION

Majority of the respondents were into semi-commercial and commercial farming and are adopting open sided house with deep litter system. Over 75 % of respondents have kept the downtime of more than one month which needs to be reduced to two weeks. Although poultry feed accounted to about 65-70% of the total production cost, farmers were still not aware on the importance of feeding regime. Further, many respondents were not aware of the basic layer farming management practices. Thus, it is recommended to provide adequate knowledge and skills through hands on training on modern commercial layer farming management practices to improve the overall farm efficiency.

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