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EFFECT OF AQUA-BIOTA P SUPPLEMENTATION ON EGG QUALITY AND HEALTH OF BROILER BREEDER HENS

WANGCHUK*, SONAM DOLMA, SHANTI KUMARI SUNAR AND SB CHAMLING RAI

National Poultry Research and Development Centre, Department of Livestock, Ministry of Agriculture and Forests, Sarpang, Bhutan.

***Author for correspondence: shargyalwangs14@gmail.com

ABSTRACT: A study was conducted to assess the effect of supplementing aqua-biota P in broiler parent diet on egg quality and litter health. Some 300 broiler parent breeders (ROSS 308) aged 47 weeks were randomly selected and distributed into six (6) groups consisting of 50 birds in each group. Three groups were assigned as treatment groups (T1, T2, T3) and other three as control groups (C1, C2 and C3) with stocking density of 8 birds/m^2. The birds in treatment groups were supplemented with aqua biota-P @1000 mg per hen per day for the first 10 days and 400 mg per hen per day for the next 32 days. Weekly sample of 12 eggs each from the two groups were randomly selected and data on shell discoloration, egg weight, eggshell thickness, and albumin weight and height were recorded. Daily egg production during the trial period was also recorded and analyzed using SPSS 26. No significant differences were observed in shell discoloration, egg weight, egg shell thickness and the height of albumin within and between treatment and control groups on supplementation of Aqua-biota P in the broiler parent diets. However, low manure odor was observed among the treatment groups.

Keywords: Aqua biota P; broiler breeder hens; egg quality; Haugh unit; health; manure odor

1. INTRODUCTION

The use of antibiotics to maintain animal health, well-beings, promote growth and improve efficiency has been practiced for more than 50 years. However, as early as the 1950s, researchers identified concerns on the development of resistant bacteria for the antibiotics streptomycin and tetracycline used in turkeys and broilers respectively (Abd El-Hack et al. 2020).

Excessive usage of these antibiotics in farmed animals can result in development of bacterial strains which are antibiotic resistant and can be transferred to humans through consumption of their product. The spectrum may range from diarrhea without mucosal abnormality to pseudo membranous colitis. The latter is a severe form of antibiotic-associated diarrhea (caused by *Clostridium difficile*, cytotoxic strains of which may emerge after antibiotic use) (Kechagia et al. 2013). Moreover, excessive accumulation of these resistant bacteria in farmed animals decrease chicken's microbiota efficacy to absorb nutrients like calcium, a key compound for egg shell formation which results in production of fragile eggs.

According to popular social media platform "The Bhutanese" (2020), non-communicable Disease Risk factor (NCD), had reported that 44.9% of the population were obese, 28% had raised blood pressure and 11.1% had increased cholesterol level (accessed on 14 October 2020). There are many factors contributing to the conditions mentioned. Poultry product like egg plays a vital role in dietary supplementation. Although egg is a source of affordable protein, it also contributes low-density lipoprotein (LDL), or "bad" cholesterol.

The relationship between blood cholesterol and heart disease is well-established, with the lowering of serum low-density lipoprotein (LDL) - cholesterol being the primary target of preventive therapy. Furthermore, epidemiological studies report lower risk for heart disease with higher

concentrations of high-density lipoprotein (HDL)-cholesterol (Blesso 2018). To avoid antibiotics resistant bacteria, improved quality of farm products for the betterment of human and animal well-being, an alternative approach should be found.

Probiotics are defined as live microorganisms which can confer a health benefit for the host when administered in appropriate and regular quantities (Chaucheyras-Durand & Durand 2010). Further, it is defined as microbial food supplements that beneficially affect the host animal by improving its intestinal microbial balance and improves feed conversion for the target species, reduced morbidity or mortality and benefits for the consumer through improved product quality (Musa et al. 2009). Foods containing probiotic microbes for human consumption had been marketed in Japan since the 1920s and the first bacteria used were *Lactobacillus acidophilus* and *Lactobacillus casei* which were components of fermented milk products (Musa et al. 2009).

Microbiota plays a vital role in well-being of both animals and humans through improvement of metabolism and immune system (Chaucheyras-Durand & Durand, 2010). Moreover, in poultry it improves the productivity and the quality of products (egg and meat).

Gut microbiota profile influences immune homeostasis and inflammatory state, which impacts the animal's health. Chicken health and productivity is also dependent on the capacity to extract and absorb nutrients and sources of energy from feeds, in which the gut microbiota provides an extensive array of enzymes and substrates. Gut microbiota qualitative and quantitative profile have a key role in the efficiency of energy extraction from feed. Microbiota also produces short chain volatile fatty acids that modulate the metabolism of the chicken.

Aqua biota-P developed by INNOVATION LABO; a solution targeted at the modulation of chicken gut microbiota contains a blend of lactobacillus selected from over 200 strains. Feeding Aqua biota-P in poultry and evaluating the benefits of the microbiota can assist the quality products and well-being of birds which indirectly improves the human health through consumption of quality product (egg, meat).

2. MATERIALS AND METHODS

2.1 Study area and data collection

The study was carried out by National Poultry Research and Development Centre under Department of Livestock, Ministry of Agriculture and Forest, Sarpang. The study was conducted at Relangthang Broiler parent breeding shed which is located about 14 km away from the center.

A total of 300 numbers of ROSS 308 broiler breeder parents were randomly distributed into six groups consisting of 50 hens in each group. Three groups constituted treatment groups as T1, T2 and T3 while another three groups were taken as the control (C1, C2, and C3). A total of 150 hens in three treatment groups were supplemented with aqua biota-P in their feed and were fed for 42 days. The birds were 47 weeks on the commencement of the feeding trial.

2.2. Housing and stocking environment

The hens were housed in a modern poultry housing system with galvanized wire mesh for partition within the replicas in both groups. The birds were stocked accordingly to international standard of stocking parameter of 8 birds/m^2 and the floor of sheds was provided with approximately 1.3 cm thickness of saw dust as bedding material.

2.3. Feeds and feeding

Commercial parent breeder pellet manufactured by Karma Feeds was used for feeding the birds. The birds in the control groups were fed the commercial parent breeder pellet while the Birds in treatment groups were fed with the mixture of aqua biota-P @1000 mg per hen per day for first 10 days and 400 mg per hen per day for the next 32 days. Fresh, clean water was provided ad-libitum through nipple drinking system.

2.4. Data collection, interpretation and analysis

Weekly 12 eggs from two different environment (treatment, control) groups were randomly

collected and evaluated against the test parameters as in the guide provided by INNOVATION LABO. Eggs were evaluated against the following parameters; egg shell discoloration, egg shell thickness, albumin height and egg weight using Vernier caliper, petri dish, stainless steel millimeter scale and digital weighing balance (AN ISO:9001:2008 Certified Company). Daily egg production as hen day production was recorded for the full trial period. Weekly collected data were computed in excel sheet and statistically analyzed using SPSS 26.

2.5. **Haugh Unit and albumin thickness**

Haugh unit (HU) is the measurement of the quality of an egg by measuring its weight and thickness of egg white (Eisen et al. 1962).

Haugh Unit and corresponding egg grades universally accepted is as follows:

AA: 72 or more
A: 71 - 60
B: 59 - 31
C: 30 or less

The HU is calculated using the formula:

$$HU=100*log\ (h-1.7w^{0.37}+7.6)$$

Where: *HU* = Haugh unit

h = observed height of the albumen in millimeter

w = weight of egg in grams

3. RESULTS AND DISCUSSION

3.1. Probiotic, egg quality and litter health

Supplementation of aqua-biota P in the broiler parent diets were done for 42 days (six weeks). From the results, it was observed that there were no significant differences in egg shell discoloration, egg weight, egg shell thickness, albumin thickness and albumin height within the treatment groups and between the treatment and control groups. Similar findings were reported by Panda et al., in 2007 on feeding probiotics on the quality of eggs. However, the manure odor in the treatment groups was found lower (1) than in the control groups (2) as per the odor scoring system of: (0 = no odor, 1 = slight odor, 2 = moderate odor, 3 = strong odor, 4 = very strong odor) although the litter in the control sheds was found relatively dry. This indicated that feeding probiotics to the birds could have induced better digestion of feed resulting to less odor in the feces and hence positive effect on the litter health. Wet litter leads to higher accumulation of ammonia in the poultry sheds which is harmful to birds and humans.

3.2. Probiotic and Haugh unit

The average measurements of HU of the two different groups were given in the figure 1. It was observed that the average HU of treatment groups was recorded at 83.33 while it was 79 for the control groups. However, the difference in HU of the treatment and control groups were not statistically significant (t =1.23, p = .24).

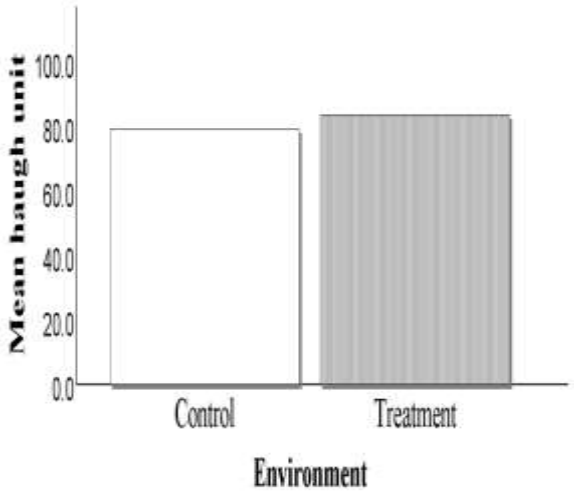

Figure 1: Haugh unit measurement

3.3 Egg shell thickness and discoloration

Brown shelled egg is graded on the intensity of the shell tint as per the color scoring system of 0 = even color, 1= slight discoloration, 2= moderate discoloration, 3 = severe discoloration. It was observed that there were no significant differences in shell thickness and shell discoloration between the treatment and control groups (Figure 2).

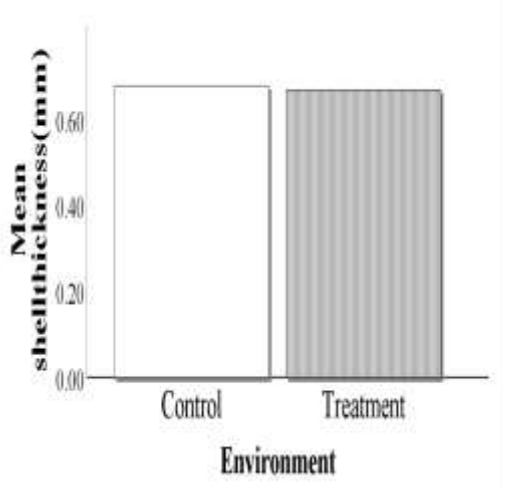

Figure 2: Comparison of egg shell thickness

There was no improvement of egg shell color and egg shell thickness (Figure 3) on feeding of aqua biota P in broiler breeder parents.

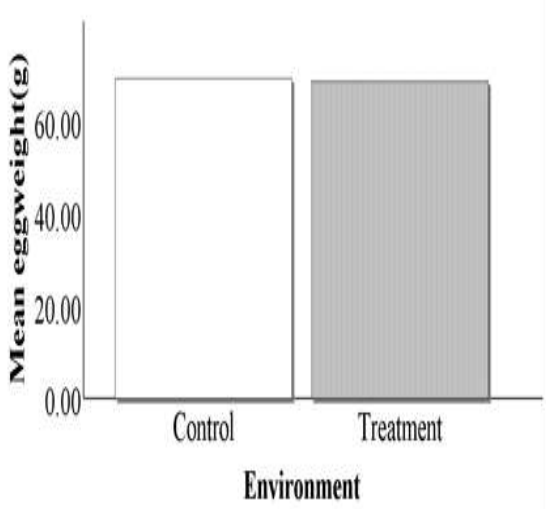

Figure 3: Comparison of egg shell thickness

3.4 Egg production and egg weight

The mean daily egg production of treatment and control groups were 83.3 eggs and 86.2 eggs respectively. Similarly, the mean egg weights of treatment and control groups were recorded at 68.8 gm and 69.4 gm respectively.

There were no significant differences in daily egg production and egg weight between the treatment and groups (Figure 4.)

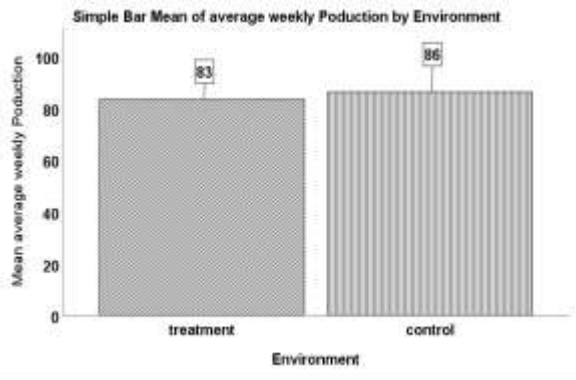

Figure 4: Comparison of daily egg production

4. CONCLUSIONS & RECOMMENDATION

The study was conducted to determine the effect of supplementing Aqua-biota P on the quality of eggs and production in broiler parents. It was found that there were no significant differences in egg shell discoloration, shell thickness, egg weight, albumin thickness and egg production as a result of supplementing probiotic "aqua-biotic P" in broiler ration. Form of feed (pellet or mash) played a vital role in influencing the quality of eggs since pellet feed did not facilitate homogeneous mixture of the probiotics and the feed. Low litter odor in treatment groups indicated positive effect of the probiotic supplementation in birds. Further research needs to be carried out to study the efficacy of the probiotics on egg production and egg quality in future.

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