



## **A Study on Production Performance of Local Ducks and Identifying the Constraints of Duck Rearing at Farmer's Level**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. Author FK designed the study. Authors AR and HB managed the literature review searches. All authors read and approved the final manuscript.*

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### **ABSTRACT**

Poultry play a significant role in the subsistence economy of Bangladesh. Ducks are one of the most important poultry species in Bangladesh. Duck rearing is most suitable, popular and profitable in riverine country like Bangladesh. The study was conducted at Babugonj upazila of Barishal district, Bangladesh to evaluate the production performance and constraints of duck rearing under semi-scavenging system at farmer's level. Farmers were selected randomly and were divided into control followed by minimum (30%) and maximum (60%) level of supplemental feeding regimes. It was observed that natural feeds were not available *ad-libitum* all the year round as per the requirement for rearing ducks. It was revealed that the average duck mortality (%) was higher in control group than that of treatment groups. It was observed that the mortality rate of ducks was higher in

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minimum supplemental group than that of maximum supplemental group of the whole experimental period. It was also observed that the supplemental feeding lowered the rate of duck mortality irrespective of age groups. The study showed that the average live weight gain (g/d) was significantly higher in treatment groups as compared to control group. The average live weight gain of ducks was higher in maximum supplemental group ( $8.24 \pm 0.65$ ) than that of minimum supplemental group ( $7.86 \pm 0.74$ ). It was observed that the average DM intake (g/d) was significantly higher in maximum supplemental group ( $58.32 \pm 1.20$ ) followed by minimum supplemental ( $52.02 \pm 2.69$ ) and control group ( $38.26 \pm 2.77$ ). It was also observed that the average egg production (eggs/duck/year) was significantly higher in treatment groups than that of control group of ducks. It was found that the average egg production was higher in maximum supplemental group ( $181.80 \pm 4.55$ ) than that of minimum supplemental group ( $175.60 \pm 6.39$ ). The average egg weight (g) was higher in supplemented groups as compared to control group of ducks throughout the experimental period. The results revealed that natural feeding alone was unable to satisfy the nutritional requirement of ducks under semi-scavenging system at farmer's level. It was concluded that supplemental feeding had a significant effect on production performance of ducks under farmer's condition.

*Keywords: Ducks; production; constraints; farmer's level.*

## 1. INTRODUCTION

Bangladesh is an agricultural country. Poultry play a significant role in the subsistence economy of Bangladesh. Ducks are one of the most important poultry species and duck rearing is a popular and profitable livelihood option in the country. Ducks give us eggs and meat that are sources of animal protein rich in essential amino acids. According to BARC the present per day egg production in Bangladesh 1.66 million against the requirement of 12.06 million, indicating a demand-supply gap of 87 percent [1]. Any improvement in poultry production would certainly help to minimize the existing gap between the lower production and higher demand of animal protein to provide balanced diet for the people. Poultry meat and eggs are the most desirable form of animal protein and therefore, a small change in their production performance may be financially important. At present, prices of meat and eggs are beyond the buying capacity of poor people. Increased duck egg and meat production can play a vital role in solving these problems in the shortest possible time. In the country there are about 85 million chickens and 33 million ducks [2]. More than 90% of these birds are raised in the backyards and 96% of the poultry meat and eggs come from village poultry reared in scavenging system by landless and small landholder farmers [3].

The poor village people of our country rear ducks under zero or low input management. Most of the farmers do not give any nutritional supplemental to their ducks. They can get maximum return by giving minimum supplemental diets to their

ducks. Until now, the poultry development activities in Bangladesh focus on the improvement of native stock with the introduction of exotic breeds or varieties through cross breeding/upgrading program. Little or no attention is given to the nutritional status of scavenging ducks. Non genetic factors like nutrition are reported to have greater effect on production parameters than genetic influence for the improvement of ducks under scavenging system of rearing [4]. Huque and Hossain were suggested that improved feeding of scavenging ducks can achieve optimum production. The prospect of duck rearing in Bangladesh in particular lies in the southern region because of the large areas of low-lying water reservoirs where water stands throughout the year. These water reservoirs contain various aquatic weeds, fishes, snails, insects and fallen grains etc., which are the only feed material for ducks reared under scavenging system [5]. There is a great potentiality in improving the productivity of ducks in these areas through better feeding and management practices. Feed supplementation increased the egg production of indigenous ducks. Improving duck production at farmer's level is closely related with the availability of natural feeds and development of supplemental feeding [6]. Men reported that when the scavenging area was limited or the presence of natural feed was scarce, supplementary feeding might be necessary. There was also a great potential in improving the productivity of ducks in low-lying areas through better feeding and management practices [7]. Khan reported that indigenous ducks were well adapted to management in rural conditions of Bangladesh

and their meat yield was excellent [8,9]. No information is available on the nutritional status and availability of natural feeds for local ducks in our country. Therefore, an urgent approach is needed to know the production system of local ducks and to identify the constraints of duck rearing at farmer's level. The study also aims at optimizing the productivity of ducks in different areas of Bangladesh with proper supplemental feeding regimes and thus encourages the rural farmers to undertake duck production for income generation and poverty alleviation.

## 2. MATERIALS AND METHODS

The experiment was conducted at Babugonj upazila of Barishal district, Bangladesh during the period of July 2019 to June 2020. Fifteen small and marginal farmers engaged in duck rearing with a minimum of 5-10 ducks of ages from 0 to 12 months reared under semi-scavenging system were selected for the study on a random basis. Five farmers were selected as control group of ducks and they were not given any supplemental feed and were reared under semi-scavenging system with naturally available feed ingredients. Out of the remaining 10 farmers, five farmers each were selected as treatment groups. Supplemental feed was provided to them twice a day as wet mash before and after scavenging at two different levels of feeding viz., 30 percent of daily requirement (minimum) to the first group and 60 percent of daily requirement (maximum) to the second group. The supplemental feed was prepared using locally available feed ingredients and supplied to the ducks depending upon the scarcity of scavenging feed and the daily requirement of ducks. Ducks were vaccinated against duck plague and duck cholera. During the experimental period naturally available feed resources were identified, physically evaluated. Regular weekly follow up and monitoring of the duck groups were undertaken to identify the naturally available feed resources to the ducks scavenged on and any scarcity in these scavenging feed sources was also observed. Data was collected on number of ducks alive, DM intake, total number of eggs produced and average egg weight on daily basis. Time of first lay, mortality of the ducks under different age groups as well as their body weight gain was also recorded on weekly basis.

### 2.1 Statistical Analysis

The experimental data for different parameters were analyzed using Student's *t* test for interpretation of results.

## 3. RESULTS AND DISCUSSION

### 3.1 Production System of Local Ducks

The year round availability of natural feed resources at scavenging for local ducks under farmer's premises is depicted in Table 1. The production of local ducks was mainly depended on organisms of water origin like snails, oysters, algae, small fishes and homestead wastes to meet their daily feed requirements at farmer's level. It was observed that mostly small and marginal farmers were rearing the ducks and being poor, no supplemental feed was provided to the ducks. Natural feeds were also not available *ad-libitum* as per requirement for ducks throughout the year. Some of the farmers were supplied supplemental feed to the ducks in the form of rice polish, broken rice, whole paddy, maize etc., but the feed was not balanced with nutrients and hence the ducks remained underfed and the observed growth and egg production always remained sub-optimal. They were also unaware of the concept of balanced ration to the ducks and their feed requirement at different stages of production. Depending upon the availability of natural feeds at scavenging, the grazing season of ducks was divided into three major periods in a year which were lean or summer (March to June), abundance or rainy (July to October) and moderate abundance or winter (November to February). It was observed that the rainy season appeared to be the best season for rearing ducks, followed by winter and summer. In summer maximum level of supplementation was needed due to the scarcity of scavenging feed. On the other hand, in rainy season no supplementation was needed due to availability of sufficient scavenging feed for ducks. During winter, natural feed resources were available, but insufficient for the optimum performance of ducks and hence a minimum level of supplementation was provided.

### 3.2 Mortality of Ducks

The mortality rate of ducks of different age groups belonging to the control and treatment groups is depicted in Table 2. It was observed that the mortality rate was higher in 0 to 3 months of age (1<sup>st</sup> quarter) followed by 3 to 6 months of age (2<sup>nd</sup> quarter) and 6 to 12 months of age (3<sup>rd</sup> and 4<sup>th</sup> quarter). Irrespective of supplementation under study it was also showed that the highest mortality rate was observed in 1<sup>st</sup> quarter than those of 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> quarters. It was also observed that the mortality rate was

higher in control group than that of supplemented groups. It was also found that the mortality rate of ducks was higher in 30 percent supplemented group (minimum supplementation) than that of 60% supplemented group (maximum supplementation) during the experimental period. The study revealed that the supplemental feeding of ducks reduced the rate of mortality irrespective of the age of ducks.

### 3.3 Production Performance of Local Ducks

The production performance of local ducks with and without feed supplementation is depicted in Table 3. It was showed that the average live weight gain (g/d) was significantly higher in treatment groups as compared to control group. It was also observed that the average live weight gain of ducks was higher in maximum supplemental group ( $8.24 \pm 0.65$ ) than that of minimum supplemental group ( $7.86 \pm 0.74$ ). It was also showed that the average DM intake (g/d) was significantly higher in maximum supplemental group ( $58.32 \pm 1.20$ ) followed by minimum supplemental ( $52.02 \pm 2.69$ ) and control group ( $38.26 \pm 2.77$ ). It was observed that the control group of duck was spent more time (days) to go under first lay when the supplemental groups was went to first lay spending less time. On the other hand, the maximum supplemental group was spent less time ( $145.40 \pm 4.04$ ) to go under first lay as compare to minimum supplemental group ( $153.60 \pm 5.22$ ) of duck. It was revealed that the supplemental feeding of ducks significantly

affected the time of first lay. It was showed that the average egg production (eggs/duck/year) was significantly higher in treatment groups than that of control group of ducks. It was also showed that the average egg production was higher in maximum supplemental group ( $181.80 \pm 4.55$ ) than that of minimum supplemental group ( $175.60 \pm 6.39$ ). It was observed that the average egg weight (g) was higher in supplemented groups as compared to control group of duck throughout the experimental period. It was also observed that the average egg weight was higher in maximum supplemental group ( $57.26 \pm 2.03$ ) than that of minimum supplemental group ( $58.42 \pm 1.35$ ). It was showed that the average ducks mortality (%) was higher in control group (without supplementation) than that of treatment (supplementation) groups. It was revealed that the lowest duck mortality was observed in maximum supplemental group ( $5.02 \pm 2.68$ ) as compared to minimum supplemental group ( $6.25 \pm 3.18$ ). It was showed that the supplemental feeding had effects on duck mortality. It is concluded that supplemental feeding of ducks greatly effect on production performance under farmer's condition. It was observed that production performance of ducks was higher in supplemental groups as compared to non-supplemental group (control group). It is revealed that supplemental feeding of ducks is one of the most important criteria for rearing ducks under semi-scavenging system at farmer's level. It is revealed that supplemental feeding is essential for profitable ducks rearing under semi-scavenging system at farmer's level.

**Table 1. Natural feed resources available for local ducks at scavenging**

Season	Natural Feeds	Level of Supplementation
Lean season (summer)	Duck weed, green grass, small fishes etc.	Maximum supplementation
Abundance season (rainy)	Snails, oyster, small fishes, duck weed, azolla, green grass, tadpole, crabs, weed seeds, earth worm, insects etc.	No supplementation
Moderate abundance season (winter)	Different grains, whole paddy, weed seeds, small fishes, green vegetables etc.	Minimum supplementation

**Table 2. Mortality of local ducks of different ages in control and treatment groups**

Groups	Mortality %		
	0 - 3 months	3 - 6 months	6 - 12 months
Control	18.33	10.91	5.83
30% supplementation	9.17	6.72	2.86
60% supplementation	7.83	4.72	2.50

**Table 3. Production performance of local ducks**

Parameter	Control	Supplemental group		Level of significance		
		30% supplementation	60% supplementation	ab	ac	bc
Average live weight gain (g/d)	6.38±0.78	7.86±0.74	8.24±0.65	*	**	ns
Average dry matter (DM) intake (g/d)	38.26±2.77	52.02±2.69	58.32±1.20	**	**	**
Time of first lay (d)	164.80±5.67	153.60±5.22	145.40±4.04	*	**	*
Average egg production (eggs/duck/year)	95.20±7.36	175.60±6.39	181.80±4.55	**	**	ns
Average egg weight (g)	56.08±2.73	57.26±2.03	58.42±1.35	ns	ns	ns
Average mortality (%)	11.69±6.29	6.25±3.18	5.02±2.68	ns	ns	ns

<sup>ab</sup>Statistical difference between control and 30% supplemental group; <sup>ac</sup>Statistical difference between control and 60% supplemental group; <sup>bc</sup>Statistical difference between 30% and 60% supplemental group; \* $p < 0.05$ ; \*\* $p < 0.01$ ; <sup>ns</sup>Not significant

#### 4. SUMMARY AND CONCLUSION

It was observed that mostly small and marginal farmers were reared ducks. But they were very poor and they reared ducks without any supplemental feed and mostly depended on natural feeds. Natural feeds were not available *ad-libitum* throughout the year as per requirement for rearing ducks at scavenging. In rural areas most of the farmers reared their ducks without any supplemental feed because most of them were poor, and had no ability to supply additional feeds to ducks except natural feeds. Sometimes supplementation in the form of rice polish, broken rice or maize was used in duck ration which might not fulfill the nutritional requirement of ducks. Most of the smallholder rural farmers were not aware of nutritional requirement and available commercial feed for rearing ducks. Besides most of the time they are unable to buy feed for the ducks due to poverty. The production of local ducks was mainly depended on organisms of water origin like snails, oysters, algae, small fishes and homestead wastes to meet their daily feed requirements at farmer's level. A large number small-scale farmer raised relatively few free ranging ducks that foraged for most or all of their feed. Sometimes the farmers were provided supplementary feeds to the ducks since frequently they are underfed on scavenging system. It was observed that only scavenging cannot fulfill the nutritional requirements of growing and productive ducks. It was also

showed that the supplementary feeding was needed to maintain the optimum production of local ducks.

It was observed that the mortality rate was higher in control group than that of supplemented group of ducks. It was revealed that the supplemental feeding of ducks reduced the rate of mortality irrespective of age groups. It was showed that the average live weight gain was significantly higher in treatment groups as compare to control group. It was also observed that the average live weight gain of ducks was higher in maximum supplemental group than that of minimum supplemental group. It was also showed that the average DM intake was significantly higher in maximum supplemental group followed by minimum supplemental and control group. It was observed that the control group of duck was spent more time (days) to go under first lay when the supplemental groups was went to first lay spending less time. On the other hand, the maximum supplemental group was spent less time to go under first lay as compared to minimum supplemental group of duck. It was revealed that the supplemental feeding of ducks significantly affected the time of first lay. It was showed that the average egg production (eggs/duck/year) was significantly higher in treatment groups than that of control group of ducks. It was also showed that the average egg production was higher in maximum supplemental group than that of minimum supplemental group. It was observed that the average egg weight (g)

was higher in supplemented groups as compare to control group of duck throughout the experimental period. It was also observed that the average egg weight was higher in maximum supplemental group than that of minimum supplemental group. It was showed that the average duck mortality percent was higher in control group (without supplementation) than that of treatment (supplementation) groups. It was revealed that the lowest duck mortality was observed in maximum supplemental group as compare to minimum supplemental group. It was showed that the supplemental feeding effects on duck mortality. It is concluded that supplemental feeding of ducks greatly effect on production performance under farmer's condition. It was observed that production performance of ducks was higher in supplemental groups as compared to non-supplemental group (control group). It is revealed that supplemental feeding of ducks is one of the most important criteria for rearing ducks under semi-scavenging system at farmer's level. It is revealed that supplemental feeding in essential for profitable ducks rearing under semi-scavenging system at farmer's level.

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#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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