Management, Growth Performance and Cost Effectiveness of Japanese Quail in Khaza Quail Farm and Hatchery Limited at Chittagong in Bangladesh

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Abstract

An observational study was conducted on 650 Japanese quail chicks from hatching up to marketing age (0-6 wks) in a farm at Moij-jartack, Chittagong in Bangladesh to evaluate their management, growth and productive performance under litter floor rearing system. The total study period was 70 days. The chicks were hatched in the own hatchery farm where the hatchability rate was 71.42

Index terms— Japanese quail, hatchability, FCR, mortality rate.

1 I. Introduction

uail is the smallest and latest domesticated poultry species. There are about 131 species and 17 to 18 varieties of wild quail found all over the world, of which Japanese, Bobwhite, King and Stable quail are most important. Japanese quails are the natural inhabitant of Japan. Quails are reared in Japan from the time immemorial. The scientific name of Japanese quail is Coturnix coturnix japonica under the class aves and family Phasianoidea (Hashanuzzaman, 2013). Poultry eggs and meat provide approximately 38% of the total animal protein in Bangladesh. As compared to other countries of the world the protein consumption in Bangladesh from animal origin is significantly lower. The annual Avg. a deficit of chicken egg is 6939 million numbers and the annual average deficit of meat is 3.81 million metric ton (Andrew, 2003). With the rapid increase in total population, the demand for poultry products has been increasing. To meet up the growing demand for poultry products, the development of poultry industry is very important. The popularity of quail husbandry is increasing all over the world. In Bangladesh quail was introduced for the first time in 1988 (Das, 2004). Quail farming for egg and meat is quite popular in Japan, Hongkong, Korea, China, Singapore, India, Thailand, Malaysia, Indonesia, France, Italy, Germany, Britain, and Russia. Only Bobwhite quail and Japanese quail have been domesticated for commercial purposes and in Bangladesh, these two are commercially available. Besides, scientists developed many quail lines e.g. white egg shell line, meat line etc. Japanese quail, a recently introduced economic avian species is ideally suited for meat and egg under intensive management due to their low maintenance cost, early sexual maturity, higher exponential growth, higher heat tolerance, fitness for higher density rearing, higher disease resistance and higher egg production than that of other poultry species. Short generation interval and quick business return and the requirement of low investment attracting people to rear them. It appears that quail rearing may be important to the chicken when chicken survived in hostile climates and also for havoc like avian influenza and salmonellosis. The climate and natural condition of Bangladesh are very suitable for quail rearing. Quail can be reared in this country throughout the year with a good performance in meat and egg production. It has a shorter life cycle and its production requires less capital and land (Vali et al., 2005). Being an agricultural country the government of Bangladesh has shifted policy emphasis on poultry rearing. Quail supplies meats, eggs, and extra income also. The quail farming has the unique advantage of tapping the growing market demand for poultry products as a supplement of chicken and duck farming (Sultana et al., 2007). Nowadays a large number of quail farms have been established in Bangladesh to supply quail meats in hotels, shops, and household consumption as its demand is increasing day by day. Japanese quail is the smallest avian species farmed for meat production (Vali, 2008). The meat from broiler quail is very delicate and tasty. It is considered as a superior item in different restaurant and homes. One five-week-old broiler quail attains 140-150 gm body weight within 5 weeks of age and yields

72.5 % carcass for consumption (Das, 2004). Success in poultry farming depends on scientific breeding, feeding, management and disease control of the flocks. There is a relationship of Japanese quails (heavy body weight) line to dietary energy levels and graded essential amino acid levels on growth performance and immunocompetence (Kaur et al., 2008).

The profitability in quail farming is possible by better management due to the above reasons. Reports on quail growth and body composition are numerous. The better growth performance and meat quality of broiler quail (Japanese quail) are supported by the findings of (Kaur et al., 2008 andVali, 2008). The findings of their study clearly indicate that quail farming is a promising sector in poultry meat production. In public sector limited scope is given to a large number of educated people are looking for self-employment. The time has now come for creating alternative employment opportunities for these educated people. The selfemployment scheme is one probable answer and quail farming seems to be a promising enterprise in this direction. It is hoped that quail farming will be recognized as popular poultry sector one day in our country.

The objectives of the study were to determine the management, growth, production performance and cost effectiveness for the rearing of Japanese quail under controlled housing system.

2 II. Materials and Methods

3 a) Location and duration of the experiment

The study was conducted at a local Quail farm & hatchery known as Khaza quail farm & hatchery Ltd., Moijjartack, potia, Chittagong. It is a small local quail farm which includes three rearing units and one hatchery. During observation, the total numbers of broiler quails were 650.

4 b) Housing and management

The housing system is most important. In the case of quail farming, housing system should be wire floor or battery or cage system. In that farm,

5 i. Floor space

The floor management for rearing broiler was 55 ft long and 20 ft wide. The floor space for day old chicks up to 3 wks was 100 sq. cm/ bird and from 3 weeks up to 6 wks (marketing age) it was 170 sq. cm/bird.

6 ii. Litter materials

Wood shaving was used as litter material at the depth of 7 cm over the floor.

7 iii. Pre-incubation care of egg

Eggs were collected from the own hatchery, stored at a temperature 15°C and were fumigated after they are collected. Fumigation was done by using 25gm of potassium permanganate and 35 ml of formalin (40%) for each cubic meter of incubator space.

8 iv. Incubation and hatching

The incubation period for quail is 17-18 days, depending on the strain and the incubation procedures. Successful hatches depend upon a good understanding of incubator controls. A still-air incubator was used. The incubation temperature was 38.3°C (101°F) which did not exceed 39.5°C (103°F) temperature until hatching was completed. The temperature was measured at the top of the eggs. Humidity was less than 70%. The eggs were turned by hand at least three, and preferably five, times in a day. A pencil mark on the side of each egg helped to ensure proper turning. The eggs were hatched at 17 th to 18 th day of incubation.

v. Brooding The chicks were brooded under continuous lighting for the first two weeks and were kept within a case. Papers were used as litter and were changed every day. During brooding 100 sq. cm space was maintained per bird. 95°F temperature was maintained for 24 hrs as brooding temperature from the day of hatching up to 2 wks.

vi. Lighting management During brooding period (0-2 wks) 24 hours lighting was ensured. After the brooding period (0-2 wks), lighting program normally changed depending on the purpose of production. As those birds were reared for meat production so they were exposed to 23 hours lighting with 1-hour darkness.

vii. Temperature schedule During brooding period (0-2 wks), 95°F temperature and from 3 wks to marketing age (6 wks) 75°F temperature was maintained.

viii. Feeder and watered About 1.25-2.5 cm of feeder space were supplied for adult quail. Ample feeds were supplied. Clean, fresh water was provided at all times with a minimum of 0.6 cm of trough space per quail. Nipple drinkers and cups were supplied for adult quail. One nipple or cup was provided for every 5 birds.

9 Items

Brooding period (0-2 wks) Growing period (3-6 wks) c) Source of the standard value: (Larbier and Leclercq, 1994) The table shows that the ME of starter (0-2 wks) and finisher feed (3-6 wks) was 3000 and 3050 Kcal/kg

respectively which was lower than the standard ME requirement. Likewise, the supplied CP in the starter feed was 22% and in the finisher, it was decreased to 20% which was also lower than the standard CP% (25% & 20.5% respectively). But the Ca% & P% of supplied feed was slightly higher than the standard levels.

i. Body weight, weight gain and feed conversion ratio a. Body weight gain Average daily gains (ADG) were estimated using the formula ADG = (W2?W1)/N Where W2 is the final weight W1 is the initial weight W2 -W1=Live weight gain N is the number of days taken from initial weight to the present weight.

Live weights of the birds were recorded weekly from 0-6 wks. From this live weight, the live weight gain was calculated. And then, Avg. daily weight gain (ADG) was calculated by dividing the every obtained value per wk. with 7. Such as the hatch weight of chick was 10gm and the weight of 1 st week was 20 gm. So, lives weight gain of the 1st week = (live weight of 1 st weekhatch weight). Now the ADG at 1 st wk. = (live wt. gain at 1 st wk. /7). Similarly, live weight gain of the 2 nd week= (live weight of 2 nd week -live weight of 1 st week).

10 b. Feed Conversion Ratio (FCR)

The gain per feed intake was estimated for the first 6 weeks on weekly basis. This was estimated using the formula. Feed conversion ratio = Feed intake/ Avg. daily weight gain.

For the starter (0-2 wks): Age (days) Medicines Amount (in 1 litre water) For the finisher (3-6 wks) ii.

11 Data collection

The farm was regularly visited and data were collected by own observation & interviewing the owner Abu Sadek of the respective farm from 9 th September 2016 to 17 th November 2016.

12 III. Results

The farm was a potential commercial farm for quail rearing. The adult birds were sold after 6 weeks of age when the expected weight is acquired i.e. about 120-130 gm. During this study, the average body weight of the targeted batch of 6 weeks aged birds were 130 gm and FCR were 4.55:1. Feed intake was 5 gm per bird daily on average up to 2 weeks and 18.75 gm per bird daily on average from 3-6 wks. Mortality rate was higher at (0-2) wks.

The results of the study are based on the following data:

13 a) Hatchability

The total number of fertile eggs settled in setter was 910. Total number of chicks hatched after 18 th The feed intake was based on daily basis and it was noted for the first 6 weeks. Balanced pellet feed from the Progoti poultry feeds Ltd were supplied to the birds. The Avg. feed intake per bird per day frm 0 wk. to 6 wks. was reported 14.2 gm.

14 c) Body weight, weight gain and feed conversion ratio

The body weight was calculated by weighing the birds in a weighing tool. The hatch weight (Avg.) was 10 gm. The Avg. body weight and Avg. weight gain at marketing age (6 wks) was 130 gm and 22 gm respectively. The feed conversion ratio (FCR) was reported 4.55:1.

15 d) Mortality

The percentage mortality was estimated for the first 6 weeks on weekly basis. This was estimated using the formula Mortality rate = (No. of dead quail over the week/ No. of quail at the beginning of the week) $\times$100. The Avg. mortality rate up to marketing age (6 wks) was 2.42%. FI= Feed intake, LW=Live weight, LWG=Live wt. gain, ADG= Average daily gain, FCR= Feed Conversion Ratio, MY=Mortality, SD. = Standard value, WK. = Week.

Source of the standard feed intake value: (Das, 2004) and Standard FCR by: (Naim, 2012).

According to the above table, the feed intake of chicks at 1 st and 2 nd weeks were 2 gm and 8 gm/bird/ day respectively, where at 1 st week it was given 2 gm feeds which was below the standard feed intake levels (3-4 gm). Although, the feed intake at 3 rd wk. was 15gm but at 4-6 wks and onward in every wk. per birds were given 20 gm (Avg.) feeds/day. The live weight of birds at (0-6) wks was 20 gm, 38 gm, 58 gm, 83 gm, 108 gm and 130 gm respectively and ADG at (0-6) wks were 1.43, 2.57, 2.86, 3.57, 3.57 and 3.14 gm respectively. The table shows that, live weight gain was increasing gradually with the live weight and age up to 5 wks of age. The average weight gain of birds at marketing age (6 wks) was 130 gm. The FCgnR was 1.4, 3.1, 5.24, 5.6, 5.6 & 6.37 at 1 st to 6 th wks respectively with an Avg. of 4.55:1. The mortality % (4.62 & 4.03) was higher within 0-2 wks of age. After that, the mortality rate was decreased at a decreasing rate with an Avg. mortality of 2.42% after 6 weeks.

16 e) Cost-effectiveness of per bird rearing

The feed and water cost per bird up to 6 th weeks = 29 Tk. Litter materials= 500 Tk. Cost of equipment & electricity = 1400 Tk. Depreciation cost = 500 Tk. Total medicine cost =1120 Tk. Total Cost per bird = 34.41

Tk. The price of a bird at market age = 45 Tk. Total profit from per bird production = (45 -34.41) Tk. = 10.59 Tk. /per bird.

17 IV. Discussion

From the technical and economic points of view, quail rearing is attractive due to their rapid growth and early onset of lay, high reproduction rates and low feed intake (Seker et al., 2004). In an observational study by Dauda et al., 2014 it was found 70.48 % hatchability of Japanese quail eggs which was slightly lower than this study of 71.42 % hatchability. The storage of quail eggs at tropical temperature seems to be suitable up to 6 days when hatchability remains 70%. Due to pre-incubation mortality or early embryonic death, there is an increasing rate of unhatched eggs after one week of storage. In the study, the birds were fed formulated diet containing (20-22) % crude protein and (3000 -3050) Kcal/Kg metabolizable energy, both of which were higher than earlier study of Begum and Howlider, 2000 were provided but in the study they found that the value is lesser than the recommendation (3200 Kcal/Kg from 0-6 wks and 25 % ME in 0-2 wks) of (Larbier and Leclercq, 1994). After all, the present findings indicate that Japanese broiler quail needs a diet containing 3200 kcal ME/kg and (24.5-25) % CP during the first two weeks of age to achieve optimum growth performance.

Similarly, the dietary level of 3200 kcal ME/ Kg and (20.5-21) % CP should be offered at the finisher (3-6 wks) stages. Birds should also provide an appropriate amount of feed in every wks as mentioned by (Das, 2004). Daily feed intake recorded in the study of control feeding & choice feeding of adult quail was 24.92 gm in control feeding & 24.38 gm in the case of choice feeding (Canogullare et al., 2004). Adult Japanese quail eat between 14 to 18 gms of feed per day (Sakunthala et al., 2010). In an experimental study, Rahman et al., 2010 reported that average daily feed intake of Japanese quails was increased with increasing dietary CP level. Here, although the feed intake (FI) from 4 th -6 th wks were 20 gm average, in (0-1) wks it was 2 gm/bird only where, the FI value in 1 st wk does not support the recommendation by (Das, 2004) reported that Feed intake was higher in broiler quails than in egg-type quails due to their higher body weight (140-150 gm) as compared to that of egg-type quails (120-140 gm). However, feed intake increased with advancement in age and ranged from 3. Here, feed conversion ratio increased gradually from the initial stage of life (1.4) up to 6 th weeks (6.37) of age. The higher FCR may be due to lower intake of energy and CP in the regular feeds and also due to less feed intake (<3 gm) in the early stage supporting the statement of (Hashanuzzaman, 2013). However, an improvement in FCR in growing quails with increasing dietary energy level or increasing dietary energy to protein ratio has been mentioned by (Gheisari et al., 2011). The mortality rate decreased with age and was relatively higher in 0-2 wks (4.62, 4.03%), with the average of 2.42 % after 6 th wks. Naim, 2012 also found relatively higher mortality in 0-2 wks of age with an Avg. of 2.57 % expressing similarity to my result. The study also showed that total profit from per bird production was more than the cost of production. Therefore, quail farming is profitable. The findings on growth and productive performance of Japanese quails in this study suggest that although the housing and hatchery management is favorable to the birds daily feed intake must follow standard Japanese broiler Quail feeding guideline and ready feeds should be checked for ME and CP for their proper maintenance, optimum growth, and production. Above all, Quail rearing can serve as an alternative source of protein to the populace, thus adequate publicity is required to propagate the production of this bird to increase animal protein intake in Bangladesh.

18 V. Conclusion

Bangladesh has nearly achieved self-sufficiency in staple food. It is now actual time to make quail farming as a major profession for the growth of livelihood and sustainable development. The policy makers should, therefore, take necessary measures which would encourage the development of quail farming. Thus, this farming site will quickly spread all over the country which will make an example for this sub-continent. By combining mental strength, physical effort with few basic technical knowledge one can easily become a successful quail farmer. It is no doubt, that quail farming will become one of the main poultry industries of our country in the near future. The major advantage of quail rearing is its low investment compared to other poultry farming. The management system and performance of the studied farm is surprising. However, the quail farming is profitable and it may be an income generating source by alleviating unemployment burden, enrich our poultry meat supply and thus will meet the daily protein requirement of the nation.

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ix. Type of ration	1. Feeder 2. Plastic drinker ME(Kcal/kg)	SD. value	PGT. pellet feed	1 linear cm/ bird 0.5 linear cm/ bird SD. value	CP% PGT. pellet feed	SD. value	1 round f 1 plastic Ca%
Starter (0-2 wks)	3200	3000		25	22	0.95	
Finisher(3-6 wks)	3200	3050		20.5	20	0.95	

SD. =Standard value, PGT. =Progoti feed company, CP=Crude protein, Ca=Calcium, P=Phosphorus.

Figure 1:

1

day of

[Note: G]

Figure 2: Table 1 :

2

Figure 3: Table 2 :

3

[Note: b) Feed intake]

Figure 4: Table 3 :

Time (WK.)	FI (gm) / day (avg.)	SD. Achieved	LW (gm)	LWG (gm)	Achieved ADG (gm)	SD.	FCR
0-1	3-4	2	20	10	1.43	1.33	
1-2	7-9	8	38	18	2.57	1.93	
2-3	11-14	15	58	20	2.86	2.34	
3-4	15-18	20	83	25	3.57	2.93	
4-5	18-20	20	108	25	3.57	3.44	
5-6	20-24	20	130	22	3.14	4.01	
Total-6							

Figure 5:

In the
study, the average daily gain (ADG) and live weight gain (LWG) in 1 st wk. was 1.43 gm & 10 gm respectively and recorded maximum LWG of 25 gm and ADG of 3.57 gm in between (3-5) wks of age. The marketing age was (40-45) days after gaining 130 gm body weight. The average daily gain & live weight gain increased with chronological age up to 5 wks. The study showed that, the Avg. FCR (4.55) was found much higher than the standard FCR value 3:1 for broilers (Das, 2004). Earlier, in a study by Dauda et al., 2014 feed conversion ratio estimated 3.01:1 at week 2 resembling my findings (3.1:1) in the same age and 7.08:1 at week 6, which was slightly higher in contrast to my study.

Figure 6:

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