

Research Article

Comparative economic analysis of ornamental birds rearing in Chattogram Metropolitan area in Bangladesh

Sumy, M. C.¹ and Islam, M. M.^{2}*

¹ Department of Agricultural Economics and Social Sciences;

² Department of Animal Science and Nutrition

Chattogram Veterinary and Animal Sciences University, Khulshi, Chattogram-4225, Bangladesh.

ARTICLE INFO

Article history :

Received : 05/07/2019

Accepted : 19/09/2019

Keywords :

Ornamental bird, profitability, net return, gross margin, income security, benefit cost ratio (BCR).

** Corresponding Author :*

Cell: +88 01712736518

E-mail: mrislamcvasu@gmail.com

ABSTRACT

The study was designed to investigate the profitability and existing system of ornamental bird rearing in Chattogram Metropolitan area in Bangladesh. Data were collected using purposive sampling technique method. After collecting a population list, a total of 28 samples of ornamental bird rearers were selected randomly in this study. A pre-structured questionnaire was used comprising four selected species namely Pigeon, Budgerigar, Love bird and Cockatiel for collecting data. The results showed that 60% bird rearers are graduated. Professionally 32% are entrepreneur and a noticeable portion is student (21%) among total rearers. The study revealed that about 31% of monthly income comes from bird rearing. Total costs of rearing significantly higher in Cockatiel and Love bird compared to Budgerigar and Pigeon ($P < 0.01$). Total return, net return and gross margin found significantly higher for Cockatiel and Love bird while it was found lower in case of Budgerigar and Pigeon ($P < 0.01$). Benefit cost ratio (BCR) is greater than one (1) for all four selected bird groups indicated that all are profitable. Moreover, Budgerigar bird rearing is more profitable compared to others. Major identified problems are lack of knowledge, lack of expert avian veterinarian, low quality chick, lack of space and diseases. Despite of these problems, ornamental bird rearing can be a new concept for developing economy in Bangladesh. In conclusion, ornamental bird rearing is not only the source of recreation but also ensures income security and employment opportunity for unemployed youth in Bangladesh.

To cite this paper : Sumy, M. C. and Islam, M. M. 2019. Comparative economic analysis of ornamental birds rearing in Chattogram Metropolitan area in Bangladesh. Bangladesh Journal of Veterinary and Animal Sciences, 7 (2): 22-31

1. INTRODUCTION

Poultry keeping is an integral part of multi-species subsistence livestock farming in Bangladesh. Keeping poultry under the subsistence farming has been characterized as the backyard poultry farming (FAO, 2006). Chicken, ducks and pigeon are the most common

backyard poultry species in Bangladesh (Dolberg, 2008). However, quail, goose, guinea fowl, turkey, budgerigar, cockatiel, love bird etc. are also kept by the people mainly as the hobby and recreational purpose.

Bangladesh has a long historical record of raising pigeon under backyard system. The weather of Bangladesh is suitable for not only pigeon but also different types of bird farming (Asaduzzaman *et al.*, 2009). The contributions of different birds (pigeon, quail, goose, guinea fowl, turkey, budgerigar, cockatiel, love bird etc.) have not yet been considered in relation to the contribution of livestock sub-sector. They are used in natural beautification and ornamental birds as source of recreation, source of pleasant, sources of bio-fertilizer especially for family gardening and used as the laboratory animal in case of genetic and hormonal studies. Hence, profitable ornamental birds rearing may be an interesting and reliable source of employment opportunity, way of family labour utilization and cash income.

Species within the parrot family range in size from the relatively small Budgerigars, Cockatiels and Lovebirds, and medium-sized Conures, and Macaws. Due to their popularity as pets; the parrot family contains a greater proportion of threat and endangered species than any other large family of birds (Gill, 1990). Some believe that it is wrong to keep parrots as pets out of concern that birds deprived of their freedom and ability to

express natural behavior such as flight (Kid & Kid, 1998), whereas others disagree, citing the human benefits of bird companionship (Voren, 1995; Kid & Kid, 1998). However, some believe that the captive breeding and private possession of parrots for pet purposes serve to conserve wild species (Desborough, 1996; Kid & Kid, 1998). There was a possibility of raising pigeons and doves reported in a study (4-h members, 2008). These birds are raised in rural, sub-urban or urban areas. They are fairly quiet, easy to raise, basically inexpensive to maintain, require very little space.

There are several types of ornamental birds found in Bangladesh. Each bird has many species. For example; the types of Pigeon species are as Lokkha, Jacobin, Promanium porter, Suachondon, Shiraji, Giribuz, King, Lahori etc. Budgerigar species were found Pure white, blue, yellow, mauve, olive and grey etc. The Love bird varieties are Black-masked, Fischer's, Black-cheeked, and yellow-collared having a white ring around the eye etc, while the Cockatiels are found as White, grey etc. However, in this study, only four categories of ornamental birds are used. They are as follows and the descriptions are discussed in Table 1.



Pigeon (Lokkha)



Budgerigar



Love bird



Cockatiel

Figure 1. Image of selected four ornamental birds (Source: Internet).

Table 1. Description of four selected ornamental birds of this study.

Name of Birds	Description	Life span
Pigeon (Lokkha/ Moyorakkhi)	The Fantail (Lokkha) is a popular breed of fancy pigeon. It is characterised by a fan-shaped tail composed of 30 to 40 feathers. The breed is thought to have originated in Pakistan, India, China, Japan or Spain.	10-20 years
Budgerigar	The Budgerigar is a long-tailed, seed-eating parrot usually nicknamed the budgie. Naturally, the species is green and yellow with black, scalloped markings on the nape, back, and wings. The male has a dark blue cere (skin at the base of the upper mandible surrounding the nostrils). In the female this is brownish when breeding and light blue otherwise.	5– 10 years
Love Bird	Lovebirds are small African parrots with a short, blunt tail, and large hooked upper beak. Those are typically green with a variety of colors on their upper body. Although many color mutations have been developed in captivity.	10 -15 years
Cockatiel	The Cockatiel, also known as miniature cockatoo is a bird that is a member of its own branch of the cockatoo family endemic to Australia. The cockatiel's distinctive erectile crest expresses the animal's emotional state. The crest is dramatically vertical when the cockatiel is startled or excited. The crest is also held flat but protrudes outward in the back when the cockatiel is trying to appear alluring or flirtatious. In contrast to most cockatoos, the cockatiel has long tail feathers roughly making up half of its total length. The face of the male is yellow or white, while the face of the female is primarily grey or light grey, and both sexes feature a round orange area on both ears. Cockatiels are relatively vocal birds, the calls of the male being more varied than that of the female. They can be taught to sing specific melodies and speak many words and phrases.	16-25 years

*Source: *Internet*

So far it was found a few studies have been conducted on production and management of ornamental birds rearing, however no study yet been found related to economics of ornamental birds rearing. Therefore, the objectives of the current study was to assess the comparative profitability and identify the marketing channel associated with their problems of rearing and suggestions for popularizing the selected ornamental birds rearing in Chattogram district of Bangladesh.

2. METHODOLOGY

The study was conducted at Chattogram Metropolitan area, Chattogram district. The purposive sampling technique was used because of two considerations, firstly, the area was selected based on the accessibility and proximity to conduct the survey and secondly, in this area smallholder bird farm owner are comparatively high. A list of bird rearer was obtained from Bangladesh bird association, Chattogram to select the bird rearer for the study. A total of 28 ornamental bird rearers were selected randomly in which 07

Pigeon owners, 07 Budgerigar bird rearers, 07 Love bird rearers and rest were Cockatiel bird rearers. The requisite primary data for this study were collected through survey method. For collecting the necessary data, questionnaire/interview schedule was prepared in the light to the objectives. Both open and close ended questions were included in the questionnaire. The information to each of the items of the questionnaire/interview schedule was assured for correct recording. If any item overlooked and misunderstood or found contradictory, these was corrected through re-interviewing on the spot or over phone.

Both primary and secondary data were used in this study. Primary data were collected by direct interviewing of bird rearer. The questions were put systematically and information was recorded directly on the schedule. Interview was done according to the convenience of the respondents. The secondary data were collected from different records kept by the farmer, books, journals etc. After collection, data were edited and coded as required. Data were then transferred

to MS Excel for processing and summarizing. Consistencies of data were checked and missing value/errors were also detected and corrected accordingly. Farm business analytical techniques such as enterprise costing and gross margin were adopted to analyze the data to achieve the objective of the study.

Total return was calculated by the total production of bird per year multiplied by price per pair bird (adult, young bird, chick) paid by buyer in Chattogram district. Net return estimated by total cost deduct from total return and gross margin calculated by total cash cost deduct from total return. BCR is the ratio of total return and total cost. The sale price of per pair young Pigeon is Tk. 1200-1500, Budgerigar Tk. 450-700, Love bird Tk. 2000-4000 and Cockatiel Tk. 3000-4000. The sale price per pair of adult/running Pigeon is Tk. 2000-2500, Budgerigar Tk. 800-1200, Love bird Tk. 5000-6000, Cockatiel Tk. 5500-7000.

Cost of different inputs regarding ornamental bird rearing divided into variable costs and fixed costs which are as follows:

Variable Costs

Labour cost Labour cost was calculated by using the prevailing wage rate (without food) of a labour in a respective area. Briefly, total working hour/day and total working days per year were estimated where eight working hours were considered as one man-day. Then, estimated labour man-days were multiplied by daily wage rate in a respective area to calculate the labour cost. Labour cost varied from Tk. 550 to Tk. 650 per man-day in those areas.

Cost of bird The cost of bird refers to the cost at which bird is purchased by the bird rearer from breeder, importer or market. The cost of adult/running Pigeon was Tk. 2000-2500/pair, Budgerigar Tk. 800-1200/pair, Love bird Tk. 5000-6000/pair and Cockatiel Tk. 5500-7000/pair.

Cost of feed, vitamin, medicine and vaccine Feed costs included feed ingredients or readymade feed, vitamins and premix. Feed cost/pair bird was calculated with multiplying the average amount of feed supplied by the price per unit paid by rearer. Cost of medicine and vaccine was varied from rearer to rearer and number of birds/species. So, this cost was estimated by taking into consideration of actual expenses incurred by the bird rearers.

Cost of electricity The cost incurred on electricity was calculated by taking into account of actual amount spent by the bird rearers.

Miscellaneous cost Costs which are not included

above but spend by the rearer for different purposes are mentioned as miscellaneous cost. It includes transport cost, costs of rope, straw, small equipment such as bulb etc.

Interest on working capital Both bank loan and own finance were considered to calculate interests on working capital. Interests on self finance was considered @ Tk. 6%/annum as standard interest rate on savings bank account (6% per year).

Fixed Costs

Cost of Housing & Equipment Housing and equipment costs were calculated by taking into account the depreciation cost on it.

$$\text{Depreciation cost} = \left[\frac{\text{Original value} - \text{Salvage value}}{\text{Life of the house or equipment}} \right]$$

Statistical analysis

At first, recorded all data were tabulated for further analysis. Descriptive statistics and social cost benefit analysis were also performed using SPSS and Microsoft Excel. From the collected data the mean and standard errors (SE) for the studied traits were estimated using the PROC GLM and PROC MIXED of SAS (SAS, 2000) and the differences in means were tested by using the least significance differences (LSD) test (Steel *et al.*, 1997).

3. RESULTS AND DISCUSSION

Socioeconomic Profile of the Respondents

Family is the oldest social unit responsible for managing a household (BBS, 2008). Family members varied from 4-5 persons among 61% bird rearers. It indicates that bird rearers in the study areas are maintained nuclear family (Table 2). Education is the pre-requisite of farmers to access and apply livestock technology perfectly (Marinda *et al.*, 2006). Table 2 shows that most of the bird rearers (61%) are graduated, whereas 14% are higher educated (post-graduate). It is a good indication and helpful for extension of this new rearing system in country as profitable business. Occupation status of bird rearers are shown in pie chart (Figure 2a). In the study area, most important occupations identified are entrepreneur (32%) and service (29%) which comprises over half of the total. A notable percentage of occupation is found as students (21%) who maintain their educational expenses as well as contribute in their household income through bird rearing (Figure 2a).

Experience ensures the profitability of any business. About fifty percent bird rearers have 1-5 years experiences whereas 32% owners had 6-10 years, 11% owners had 11-15 years experience in ornamental bird

rearing. Only 4% owners are more than 20 years experience on ornamental bird rearing (Table 2). Family members can be a great source of labour for ornamental birds rearing. About 79% of the rearers are

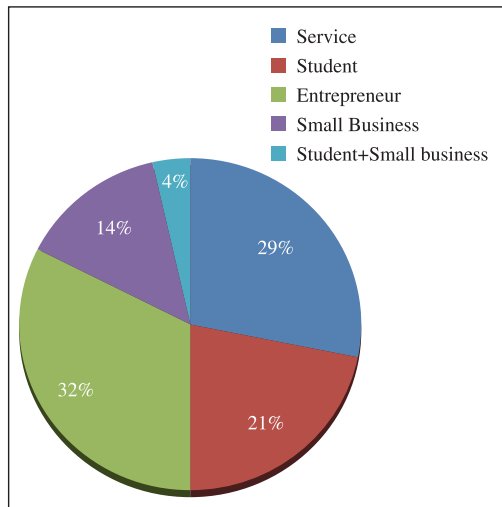


Figure 2a. Occupation of bird rearer

About 31% of total monthly income comes from bird rearing while 69% of total monthly income comes from other sources like service, business, and other activities (Figure 2b). Wallin (2016) stated that a new part-time breeder can earn monthly 500 to 2,000 US dollars from bird rearing which is supported our present study.

Sources of Bird and Management Practices

There are several sources of bird available in Bangladesh. In this study, we identified five sources are, online breeder, nupur market (station road, Chittagong), other districts (Dhaka, Khulna, Bogura, Dinajpur), breeder farm and importers. Maximum bird rearers purchase bird from breeder farm (32%) while 25% purchase from nupur market, 18% from other districts, 21% from importer and rest of 4% from online breeder (Figure 3).

Housing is the most important part of bird rearing. A typical house is the prime need for ornamental birds rearing in intensive system. The present study found that most of the owner use rooftop, bharanda or corner of their own house built with bricks, nets with colored potteries for beautification. The sitting and adequate nesting spaces also provided for breeding of the bird. In winter, bird rearers are used rubber sheet around the nets for protection of birds from cold (Zaman, 2015). Additionally, they used cages for bird separation, feeder, waterer, breeding pot as equipment. Cage size of per pair bird varied from 12" × 12", 12" × 16" and 12" × 18" in the study area.

from their family members, while 21% are combined from both family and hired (Table 2). Hired labour is not feasible due to small farm size and production, moreover they considered it as a family business to get recreation.

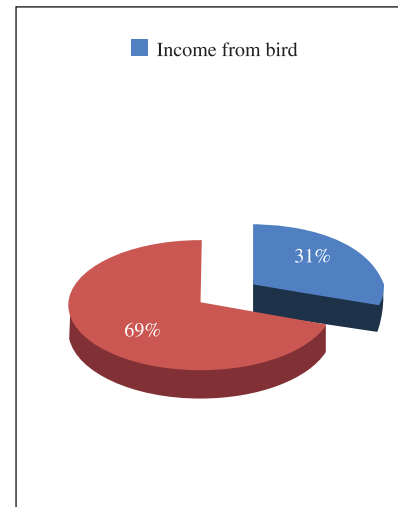


Figure 2b. Monthly income of bird rearer

Table 2. Socioeconomic characteristics of the selected bird rearers

Information	Frequency	Percentage (%)
Family size(members)		
2-3	4	14.29
4-5	17	60.71
6-7	5	17.86
8 & above	2	7.14
Total	28	100.00
Education		
Primary	1	03.57
SSS & above	6	21.43
Graduate	17	60.71
Post-graduate	4	14.19
Total	28	100.00
Experience of bird rearing		
1-5.yrs	14	50.00
6-10 yrs	9	32.14
11-15 yrs	3	10.71
16-20 yrs	1	3.57
above 20 yrs	1	3.57
Total	28	100.00
Source of Labour		
Family	22	78.57
Family+hired	6	21.43
Total	28	100.00

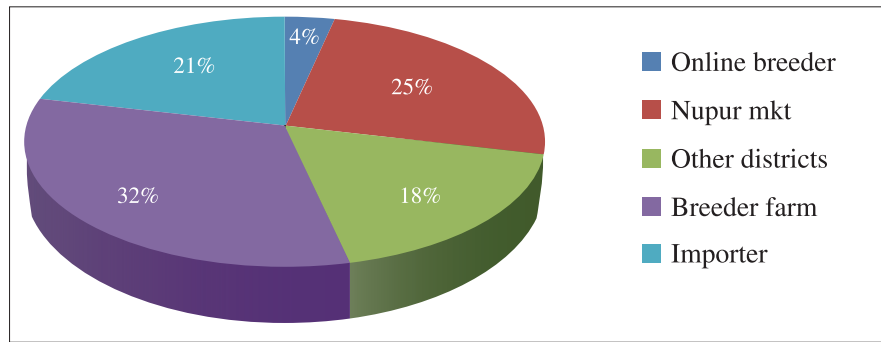


Figure 3. Sources of bird

A balanced diet is pre-requisite for healthy ornamental bird rearing. The birds are given small quantity of feed frequently from the 1st week of age. Feeds are supplied two times (morning and afternoon) in a day. During breeding season, they are provided protein rich feed (such as boiled egg, calcium) and vitamins (such as cod

liver oil, brewer yeast). Along with readymade feed, paddy, gram, maize, kaon, tishi, cheena, white mellet, red millet, leafy vegetables, lettuce, apples, bananas, butter, sunflower seeds, grit etc. are also supplied according to species requirement (Table 3).

Table 3. Different feed practices for ornamental bird rearing.

Name of Birds	Name of Feed
Pigeon (Lokkha/ Moyerakkhi)	Ready mixture, paddy, maize, raza, gram, sunflower seed, nuts, carrots, garlic greens, thawed frozen peas, kale, lettuce, sprouts and spinach leaves, grit.
Budgerigar	Ready mixture, kaon, tishi, cheena, white mellet, red millet seeds of native herbs and grasses, such as porcupine grass, sunflower seed, egg, grit.
Love Bird	Ready mixture, kaon, tishi, cheena, various fruits, vegetables, plant material, grasses , sunflower seed, grit.
Cockatiel	Ready mixture, wheat, cheena, kakon, gram, white mellet, paddy, cenari ,sunflower seed ,red millet, grit, fresh fruits, vegetables.

Production information of different species of ornamental birds is represented in Table 4. Highest

production was recorded from per pair of Budgerigar while lowest from per pair Pigeon in the study area.

Table 4. Average production information from different birds

Species	Clutches per year per bird	Number of eggs per clutches per pair of bird	Total Number of eggs per year	Incubation period (days)	Number of young bird sold per year
Pigeon	4-6	2-3	12	17-18	10
Budgerigar	4-6	4-12	32	17-19	28
Love bird	4-6	4-6	20	22-25	16
Cockatiel	2-4	4-6	14	19-23	12

Diseases

Diseases of ornamental birds can be prevented by following proper management, balanced feeding and supply pure drinking water, maintaining a sanitary

environment and cleaning practice as well. However, some common diseases were observed in study area which shown in Table 5.

Table 5. Common diseases of ornamental birds.

Name of birds	Common diseases
Pigeon (Lokkha/Moyorakkhi), Budgerigar, Love Bird, Cockatiel	Salmonellosis, common cold, diarrhea, coughing, ranikhet, fever, heat stroke, paralysis, Newcastle Disease, mites & feather disease

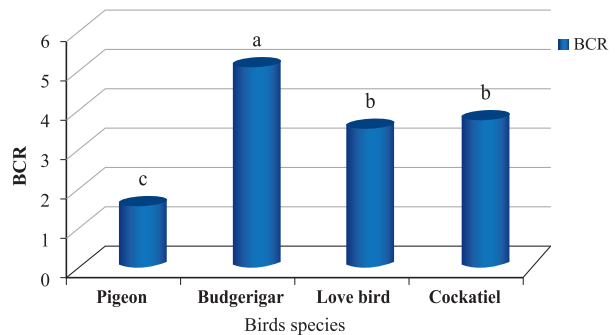
Biosecurity is the first priority to maintain the proper health of ornamental birds rearing. Most of the bird rearers in the study area maintained proper bio-security in their farm. Without maintaining proper biosecurity one cannot ensure disease prevention, transmission of zoonotic diseases and profitable rearing.

Comparative Profitability of Different Ornamental Birds Rearing

A comparative profitability of four different selected ornamental bird rearing groups are shown in Table 6. Total variable costs include the cost of bird, feed, labour, vaccine and medication, electricity, miscellaneous and interest on operating capital. Total variable cost significantly differed among the four different ornamental birds rearing group ($P < 0.01$). The highest cost incurred for Cockatiel and Love bird whereas the lowest one is for Budgerigar. No significant variation was observed in total fixed cost ($P > 0.05$) among different rearing groups. Total cost also significantly higher in Cockatiel and Love bird compared to Budgerigar and Pigeon ($P < 0.01$). Total return, net return and gross margin found significantly higher for Cockatiel and Love bird whereas it was found lower in case of Budgerigar and Pigeon ($P < 0.01$) (Table 6). Marlina (1998) reported that total cost for

per pair Cockatiel was 186 US dollar (Considered only bird, feed and vitamin costs). He also estimated return and profit from Cockatiel bird 405 and 219 US dollar, respectively which is supported the present study.

The analysis of benefit cost ratio (BCR) is represented in Figure 4 and showed that BCR is greater than one (1) in all four selected bird groups. It noticed that ornamental bird rearing is profitable for four selected bird groups in this study. In addition, Budgerigar bird rearing is more profitable compared to others ($P = 0.0002$). No significant variation was observed in BCR ($P > 0.05$) for Love bird and Cockatiel rearing groups.

**Figure 4.** BCR of four ornamental birds rearing group**Table 6.** Different costs of production per year per pair ornamental bird rearing.

Traits	Pigeon	Budgerigar	Love bird	Cockatiel	SEM	P-value
Bird cost	2071.43 ^c	978.57 ^d	5000.00 ^b	5357.14 ^a	114.07	<.0001
Feed cost	2385.71 ^a	1437.14 ^b	1207.14 ^c	1464.29 ^b	49.48	<.0001
Labour cost	3939.68 ^b	1098.99 ^c	5866.07 ^a	5347.65 ^a	420.45	<.0001
Cost of vaccination & medicine	51.70	72.93	33.09	59.66	14.23	0.450
Electricity cost	327.29	494.00	330.43	236.57	142.06	0.785
Misscelleneous	152.86	157.14	152.86	157.14	14.52	0.993
Int on operating capital	149.67 ^b	94.19 ^c	201.71 ^a	218.24 ^a	6.60	<.0001
Total cash cost	5138.66 ^b	3233.98 ^c	6925.22 ^a	7493.05 ^a	226.65	<.0001
Total variable cost	9078.34 ^b	4332.97 ^c	12791.29 ^a	12840.70 ^a	485.41	<.0001
Housing cost (Depreciation)	50.07	58.16	57.65	111.93	18.42	0.124
Equipment cost (Depreciation)	328.57	285.71	314.29	332.86	25.01	0.572
Total fixed cost	378.64	343.88	371.94	444.79	39.67	0.366
Total cost	9456.98 ^b	4676.85 ^c	13163.23 ^a	13285.49 ^a	492.85	<.0001

^{abc} Different superscript in the same row indicate significant variation ($P < 0.01$).

Data indicated the mean value of seven birds owner for each species ($n = 7$); SEM = Standard error of means.

Table 7. Profitability of rearing per year per pair of ornamental bird.

Traits	Pigeon	Budgerigar	Love bird	Cockatiel	SEM	P-value
Total Return	14342.86 ^c	22400.00 ^b	46000.00 ^a	48714.29 ^a	1923.42	<.0001
Total cost	9456.98 ^b	4676.85 ^c	13163.23 ^a	13285.49 ^a	492.85	<.0001
Net Return	4885.88 ^c	17723.15 ^b	32836.77 ^a	35428.80 ^a	2064.77	<.0001
Gross margin	9204.20 ^c	19166.02 ^b	39074.78 ^a	41221.24 ^a	1973.09	<.0001
BCR	1.55 ^c	5.07 ^a	3.51 ^b	3.72 ^b	0.35	0.0002

^{abc} Different superscript in the same row indicate significant variation (P<0.01).

Data indicated the mean value of seven birds owner for each species (n=7).

BCR = Benefit cost ratio; SEM = Standard error of means.

Marketing Channel of Ornamental Birds in Chattogram District

Marketing channels are the routes or ways to market product that consumer and business buyer purchase. The marketing channel of ornamental bird in Chattogram district is shown in Figure 5. Bird rearer purchase bird from Nupur market (station road), other districts (Dhaka, Khulna, Bogura, Dinajpur), breeder farm, importer and online shop. After rearing, they sell their chicks, young bird or adult bird to wholesaler cum

retailer or nupur market. They also sell their bird to buyer by home delivery and online. They also represent their birds in different bird’s fair, exhibition and order for sale or direct sale to the new buyer. Wholesaler cum retailer purchase birds from other districts (Dhaka, Khulna, Bogura, Dinajpur), bird rearer and sell them to buyer. Sometimes buyers directly purchase bird from home or online shop or Nupur market, Chattogram.

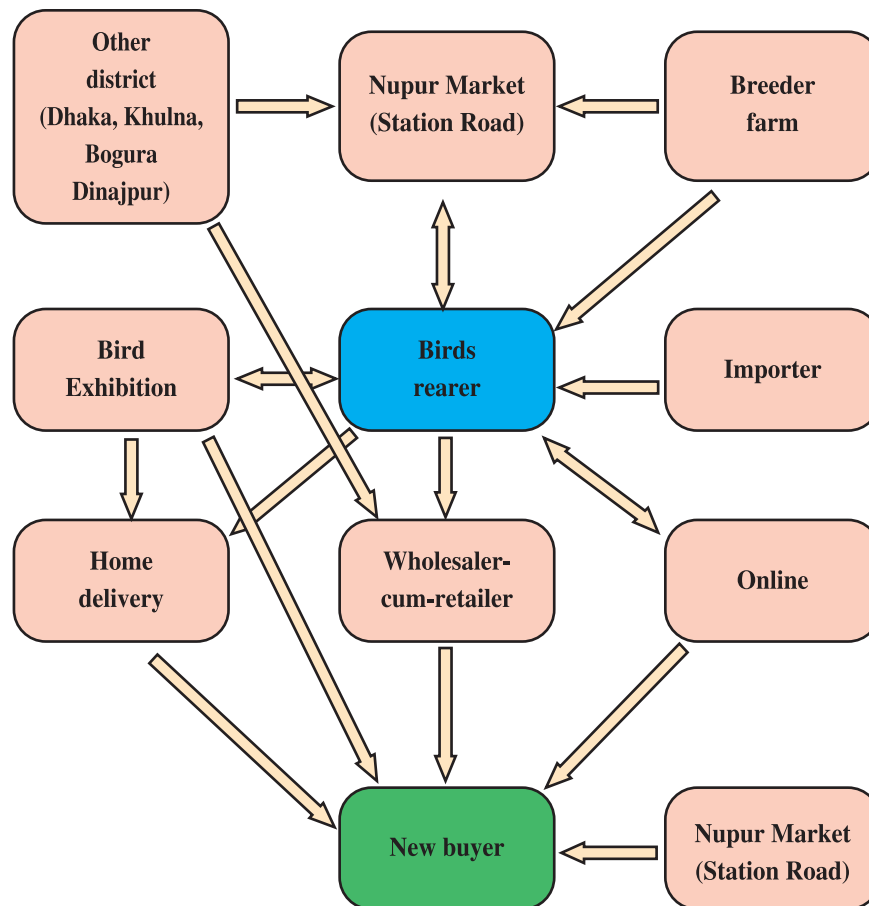


Figure 6. Marketing channel of ornamental bird in Chattogram district

Problems of Bird Rearing

- i. Lack of knowledge** In Bangladesh very few people knows about ornamental birds rearing, their varieties, nutrition, breeding and their demand in market. As a result, entrepreneurs are facing problems and risk to establish ornamental birds rearing in Bangladesh. About 60% of bird owners reported this problem.
- ii. Lack of expert avian veterinarian** About 100% bird rearers complained that there is lack of veterinary doctor and other staff for giving suggestion to a farm owner which is necessary for the development of ornamental bird rearing.
- iii. Lack of space** Birds are affected by any contagious disease due to lack of space. There is a chance of spreading zoonotic diseases among family members for bird rearing inside the house. About 30% bird rearers mentioned this problem.
- iv. Low quality chick** The suppliers often supply low quality chicks. As a result, bird owners are deprived from having good and healthy chicks. Many chicks die in their early stage of life. About 60% bird rearer faced this type of problem.
- v. Diseases** Birds are affected by many diseases like salmonellosis, common cold, diarrhea etc. When the farms become affected by any contagious disease, it affects other birds and the mortality rate of the birds is very high at that time. About 80% bird rearers faced such type of problem.

Suggestions for Improvement of Bird Rearing Practices

- i. Improve indigenous breed** About 40% bird rearers suggested that improving indigenous breeds will decrease importing bird from abroad and increase bird production and profitability.
- ii. Large place for birds** About 60% bird rearers said that a separate and large space helps to increase healthy bird rearing as well as decrease disease prevalence by any contagious and zoonotic diseases.
- iii. Avian vet specialist** About 100% bird rearers suggested to increase avian veterinary specialist to give proper care and treatment to sick bird in due time.
- iv. Separate hospital** Only 10% of bird rearers want establishment of separate pet hospital on which bird rearer get proper care and treatment in due time.
- v. Provide training facilities** About 60% bird rearers suggested government training facilities for ornamental birds rearing to improve knowledge about bird rearing and increase bird production.

4. CONCLUSIONS

Ornamental bird rearing is a new concept in Bangladesh related to poultry business. Primary purpose of rearing is recreational. Recently, few rearers are raising ornamental birds as commercial purpose. The prospects of ornamental bird rearing in Bangladesh might be popular by controlling disease, reduce morbidity and mortality rate. In this study, considering clutches per year per bird, total number of produced egg, total number of sold bird, profitability and marketing of ornamental bird rearing. The results of this study showed that all four types of ornamental bird rearing are profitable. Out of which, Budgerigar showed more profit compared to Pigeon, Love bird and Cockatiel. Ornamental bird rearing is not only increase recreation but also ensure income security and employment opportunity for the unemployed youth generation in Bangladesh. Specific species are studied in this study and further study is required in this growing field.

5. REFERENCES

- Abdullahi, E. S. 2006. Economic analysis of turkey production in Kaduna and Zaria towns of Kaduna State, Nigeria, MS thesis, Department of Agricultural Economics and Rural Sociology, Faculty of Agriculture, Ahmadu Bello university, Zaria, Nigeria
- Asaduzzaman, M. 2009. Pigeon farming in Gouripur upazilla of Mymensingh District, Bang. J. Anim. Sci., 38(1&2): 142 – 150
- Association of Avian Veterinarians (AAV). 2006. Position on the sale of unweaned birds. <http://www.aav.org/Unweaned.htm>.
- BBS, 2008. Statistical Yearbook of Bangladesh 2007, 27th edn, Bangladesh Bureau of Statistics, Planning Division, Ministry of Planning, Government of the People's Republic of Bangladesh, Dhaka.
- Desborough, L. 1996. Breeder news and views. Bird Breeder 68(4): 6-7
- Dolberg, F. 2008. Poultry sector country review, FAO animal production and health division.
- Engebretson, M. 2006. The welfare and suitability of parrots as companion animals: a review, Animal Welfare, 15: 263-276.
- FAO. 2006. The hen which lays the golden eggs: why backyard poultry are so popular? (http://www.fao.org/AG/AGInfo/projects/en/pplpi/docarc/feature01_backyardpoultry.pdf).

- Gill, F. B. 1990. A review of parrots as companion animals, Ornithology, 2nd Edition. WH Freeman and Company: New York, USA.
- Graham, D. L. 1998. Pet birds: historical and modern perspectives on the keeper and the kept. Journal of the American Veterinary Medical Association 212(8): 1216-1219.
- 4-h members, 2008. 4-H pigeon and dove project, Oregon university extension service.4-H 154.
- Kid, A. H. and Kid, R. M. 1998. Problems and benefits of bird ownership. Psychological Reports, 83: 131-138
- Marinda, P., Bangura, A., and Heidhues, F. 2006. Technical efficiency analysis in male and female-managed farms, a study of maize production in West Pokot district, Kenya.
- Marlena, D. 1998. Breeding birds for the pet industry. AgriHelp Topics. <http://www.lassickennels.com/agrihelp/petindustry.htm>
- Meyers, N. M. 1998. Perspectives on pet bird welfare from the pet industry. Journal of the American Veterinary Medical Association 212(8): 1238-1242
- Neither, C. 2000. The book of the pigeon and foreign doves, American pigeon journal co, Warrenton.
- SAS® 2000 User's Guide. Statistics. 8th ed. Cary (NC): SAS Institute Inc.
- Steel, R. G. D., Torrie, J. H., and Dickey, D. A. 1997. Principles and procedure of statistics- A biometrical approach. 3rd ed. Mc Graw-Hill Co., Inc., New York and London, pp: 139-177.
- Voren, H. 1995. Wild child. Bird Breeder Magazine, Breeder Q & A, November. <http://www.voren.com/95-11.htm>
- Wallin, C. 2016. Start A Backyard Bird Business. Extra Income Over 55. <https://extraincomeover55.com/start-backyard-bird-business/>
- Warburton, L. S. 2004. Black-cheeked lovebirds in Zambia. PsittaScene, Volume 16 (1): 10.
- Zaman, S. 2015. Ornamental bird rearing: an alternative source of income, intern report, Chattogram Veterinary and Animal Sciences university, Khulshi, Chattogram.