



## Economic analysis of antibiotics use and vaccine program in commercial broiler farming of Tangail district in Bangladesh

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### Abstract

The present study was conducted to investigate the status of current antibiotics use and vaccine application program in commercial broiler farming, to understand about the current market scenario of antibiotics and vaccine related products and to identify the major problems of broiler farming and suggestions for its improvements. For achieving these objectives, 50 broiler farms and 20 antibiotics-vaccine products sellers were selected purposively from 5 selected unions of Sakhipur upazila in Tangail district. In the study area, 42% respondent had a slim idea about residual effect of antibiotics. Most of the farmers in the visited area used almost same types of antibiotics. Among the farms surveyed, 98% farms practiced proper vaccination. Among the 50 farmers, 66% farmers had idea about sound vaccination program and 98% farmer thought that vaccination is essential for their farming. In the study area, 70% farmers got their antibiotics and vaccine from dealer. The study showed that antibiotic cost is only 3.53% and vaccination cost is 1.06% of the total cost. Regarding the antibiotics use, results were alarming and found that 100% respondents used antibiotics in broiler production. Both positive and negative significant correlations were observed for different parameters. The problems related to present antibiotics and vaccination program and their probable solutions suggested by broiler farmers were also focused in this study.

**Key words:** Economic analysis, commercial broiler farming, antibiotic use

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### Introduction

Bangladesh is an agro based where population density is 1,063 people per square kilometer and upper and lower limit of poverty line is 31.5% and 17.6%, respectively. Agriculture sector contributes about 15.33% to its GDP and about 80% of total population depends on agriculture regarding occupation (BER, 2016). Among them only livestock contributes 1.66%

with a growth rate of 3.21% in GDP (BER, 2016). Due to the limited availability of grazing land, the scope for development of livestock industries of large animal is limited. To meet the protein demand for this colossal population, there is no alternative to sustainable development of poultry industry. At present, poultry farming is considered as one of the most profitable

businesses and has become a major contributor in livestock sector but with frequent ups and downs. The poultry industry plays a crucial role in economic growth and simultaneously, creates numerous employment opportunities.

Poultry farming in the past was not considered as an important profession. The villagers have been keeping the chickens mainly for their domestic consumption, sometimes with little provision of sale. Since the beginning of early 1990's, in response to the wide market opportunity, a commercial poultry sector (broiler and layer) has emerged using intensive production techniques and was getting more and more popularity. Local breeds were not commercially reared mainly due to the low productivity and high mortality (Haque *et al.*, 1999). In Bangladesh, poultry sector has emerged as most flourishing and promising commercial sector in recent years. In fact, there has been a silent revolution in the poultry sector for the last decade. It plays a crucial role in supplying nutritious food and generating income. Malnutrition prevails in Bangladesh and about 47 million people lives below the poverty line (World Bank report, June, 2016). Protein deficiency has been taken as one of the factors contributing to malnutrition. Each man requires consuming 120g meat per day but availability is only 16.5g per day with a deficiency of 50.155 and poultry sector has every potential to fill this deficiency. The per capita availability of meat and eggs for domestic consumption are respectively 8.9 kg and 115 nos. per year (BBS, 2010). The per capita consumption of animal protein (poultry meat) in Bangladesh is only 11.2 gm per day (BBS, 2010) whereas the standard requirement of 36g is recommended by UNO. The broiler industry is considered as an important avenue to reduce poverty and malnutrition as well as unemployment problems of Bangladesh. It is recognized as a profitable business and getting popularity day by day for creating employment opportunities (Amin, 2005).

Broiler farming plays an important role in improving livelihood, food security and poverty alleviation in rural and semi-urban communities in developing countries including Bangladesh. A large number of men and women are coming forward to undertake broiler farming as a means of self employment. Poultry farmers of Bangladesh use antibiotics to treat, prevent, and control poultry diseases and increase the productivity of poultry. Antibiotics are commonly used in poultry diet, both broiler and layer, as to enhance the efficiency of production with reducing the risk of diseases. Small and medium scale farmers in developing countries (e.g. Bangladesh) believe that they must include antibiotic in diet to protect poultry from disease problems. As a result, they indiscriminately use of antibiotics in production and treatment purpose without concern to the relevant experts (veterinarian) that results gap of information and statistics on the quantity and range of antibiotic used. Feeding broiler on antibiotics leads to a build-up of bacteria that are antibiotic resistant. The broilers are given very low doses of antibiotics.

Low amounts of antibiotics may be too little to kill all the bacteria, but just enough for the bacteria to survive, mature and develop resistance. About 60% antibiotics are used for therapeutic purposes in humans and 40% of antibiotics are used as growth promoters in animal farming. This large amount of antibiotics used in poultry production over a long time may possess antibiotic residues in poultry products or creates serious resistant microorganism. Human health can either be affected directly through residues of an antibiotic in meat, which may cause residual side effects of antibiotic in human health, or indirectly, through the selection of antibiotic resistance determinants that may spread to a human pathogen. But, unfortunately most of the poultry farmers of our country are illiterate as well as unconscious and they have no idea about the limit of antibiotic use and the residual effect of antibiotics in human health. On another hand, for profitable broiler production, proper use of vaccine is very important. The term “vaccine”

(from the Latin term “vacca,” meaning cow) was first coined by Edward Jenner to describe the inoculation of humans with the cowpox virus to confer protection against the related human smallpox virus and illustrates the close relationship between human and animal infectious disease sciences. The main objective of livestock vaccines is to improve overall production for the primary producers. Poultry vaccines are widely applied to prevent and control contagious poultry diseases. Their use in poultry production is aimed at avoiding or minimizing the emergence of clinical disease at farm level, thus increasing production. Vaccines and vaccination program vary broadly in regard to several local factors (e.g. type of production, local pattern of disease, costs and potential losses) and are generally managed by the poultry farmers. But a notable portion of our farmers do not have sufficient knowledge on sound vaccination program. Although antibiotic and vaccine use smoothly in commercial broiler farm, there is no established information on antibiotic and vaccination status and limited study has done on this issue in different areas of Bangladesh. Therefore, this study made attempt to find out the status of antibiotic use and vaccination program in commercial broiler farming at Sakhipur upazila under Tangail district. The objective was to make an economic analysis of antibiotics use and vaccine application program in commercial broiler farming along with preliminary idea of broiler farmers about the residual effects of antibiotics and vaccination uses on human health.

### **Materials and Methods**

For the present study, keeping the objectives of the research in mind, the study was conducted at Sakhipur upazila under Tangail district. A purposive sampling technique was followed in selecting 50 broiler farms and 20 antibiotic and vaccine sellers for collecting data to address the objectives. For the present study, data were collected during the month of August and October, 2016 through face to face interview with the

respondents. The respondents are broiler farm owners, traders and consumers from the study areas.

### **Results and Discussions**

#### ***Socioeconomic status of the commercial broiler farmers***

In this study, 50 respondents were interviewed to find out their socioeconomic condition. Table 1 revealed that majority (72%) of the respondents' main occupation was agriculture, 20% were engaged in livestock business, 4% were in service (NGO or Government) and rests of the farmers were related to other occupation. In case of sources of money, 64% of the farmers run their broiler farming business by own money, 24% took loan from bank and 12% from NGO loan. Age of broiler farmers ranged between 27 to 64 years with a mean of 43.54 and a standard deviation of 8.7673, indicating that middle aged people were engaged in broiler farming. It revealed that among the respondents, 46% were middle aged and 30% were old aged groups. So, there has an opportunity for the young group to employ themselves in this field. The middle aged sections of our society were quite keen to adopt broiler farming to solve their unemployment. Such a relation of age with farming impressed that some of capital and confidence was needed for young people to start successful broiler farming. The level of education of the respondents ranged from 0 to 16 with a mean of 7.38 and a standard deviation of 5.01. It was found that 40% had background up to primary level, and 20% were up to secondary level. The results also indicated that broiler was a major enterprise under self-employment of the educated persons in the study area. Income of the respondents referred to the earning (Tk.) by them from farming ranged from Tk. 50,000.00 to 266,000.00 annually with mean of Tk. 116,950.00 and standard deviation of 55205.4835. Among the respondents 54% had low income and 24% had medium income level.

**Table 1.** Socioeconomic characteristics of the sampled respondents

| Particulars              | Criteria                     |                   |                                   | Mean       | SD        |        |       |
|--------------------------|------------------------------|-------------------|-----------------------------------|------------|-----------|--------|-------|
|                          | Young (<35)                  | Middle (36 to 45) | Old (46 to 55)                    |            |           |        |       |
| Age distribution         | Young (<35)                  | Middle (36 to 45) | Old (46 to 55)                    | 43.54      | 8.7673    |        |       |
| No. of Respondents       | 7 (14.0)                     | 23 (46.0)         | 15 (30.0)                         |            |           |        |       |
| Educational level        | Primary (1-5)                |                   | Secondary (6-10)                  |            | 7.38      | 5.01   |       |
| No. of Respondents       | 20 (40)                      |                   | 10 (20)                           |            |           |        |       |
| Distribution of farmers' | Main occupation              |                   | Sources of money                  |            |           |        |       |
|                          | Agriculture                  | Livestock         | Own                               | Bank loan  | NGOs loan |        |       |
| No. of Respondents       | 36<br>(72.0)                 | 10<br>(20.0)      | 32<br>(64)                        | 12<br>(24) | 6<br>(12) |        |       |
| Annual income            | Low income (50,000-1,00,000) |                   | Medium income (1,00,001-1,50,000) |            |           | 116950 | 55205 |
|                          | 27 (54)                      |                   | 12 (24)                           |            |           |        |       |

Source: Field survey, 2016; Figures in the parenthesis indicates percentage of total

**Mostly used antibiotics and their dose practiced at farm level**

In visited area, most of the farmers used almost same types of antibiotic for treatment of their birds in their

flock. Name of the antibiotics that were used by most of the broiler farms and their dose that practiced at farmer level are shown in Table 2.

**Table 2.** List of antibiotics with their doses that practiced commonly at farmer level

| Antibiotic's name | Practiced dose                      | Antibiotic's name | Practiced dose                      |
|-------------------|-------------------------------------|-------------------|-------------------------------------|
| Doxacil Vet       | 1gm/2L drinking water for 3 days    | ESB <sub>3</sub>  | 2.5gm/L drinking water for 3-5 days |
| Renamycin         | 1gm/3L drinking water for 3-7 days  | Respiron          | 1ml/L drinking water for 3-5 days   |
| Tylosin-20        | 2.5gm/L drinking water for 3-5 days | Coxuril           | 2.5ml/L drinking water for 3-7 days |
| Eromycin          | 0.5gm/L drinking water for 3-5 days | Enrocic           | 1ml/L drinking water for 3-5 days   |
| Moxacil Vet       | 1gm/L drinking water for 3-5 days   | Nava cox          | 2.5gm/L drinking water for 3-5 days |
| Micol powder      | 1gm/L drinking water for 3-5 days   | Tiamul powder     | 1gm/3L drinking water for 3-7 days  |
| Sultrix powder    | 1gm/L drinking water for 3-5 days   | Ampicoli          | 1gm/L drinking water for 3-5 days   |

Source: Field survey, 2016.

**Vaccines that are mostly used for broiler**

At farmer level, all the farmers used only two vaccines. Therefore Ranikhet and Gumboro vaccines are mostly sold in the market. A good number of companies are marketing their products through highly competitive market channels. Different Ranikhet and Gumboro

vaccines with independent brand name are used in broiler. All of the farmers used same method for vaccine administration and their dose, administration time and age of administration were almost the similar. A list of mostly used Ranikhet and Gumboro disease vaccines and their company name are given in Table 3. In the surveyed area, all of the farmers used Nobilis Gumboro 228E, Cevac IBDL Izovac Gumboro 3,

Bursine plus, cBursine plus, Bursine 2 vaccines against Gumboro disease. The age of birds for vaccination, vaccine dose, methods of vaccine administration and

time of administration that usually adopted at farmers level.

**Table 3.** List of mostly sold vaccine for ranikhet and gumboro disease in the market

| Name of Vaccines    | Company Name         | Name of Vaccines      | Company Name         |
|---------------------|----------------------|-----------------------|----------------------|
| Bangla BCRDV        | FnF                  | Bursine 2             | Fortdodge (Novartis) |
| MA5 + clon 30       | Intervet             | Bursine plus          | Fortdodge (Novartis) |
| ND Killed           | Fortdodge (Novartis) | cBursine plus         | Fortdodge (Novartis) |
| Newcastle-K         | Fortdodge (Novartis) | Cevac IBDL            | ACI                  |
| IB + ND             | Fortdodge (Novartis) | Nobilis Gumboro 228E  | Intervet             |
| Hipraviar Clon/79   | Nasco                | Hiprabumboro-CH/80    | Nasco                |
| NDV                 | Arifs                | Bursaplex             | Arifs                |
| Izovac-ND           | Jayson               | TAD Gumboro Vac Forte | LAH                  |
| ND Lasota           | Bestar               | Poulshort Gumboro     | Pharma & Firm        |
| TAD ND Vac Lasota   | LAH                  | Gumboriffa            | AASCL                |
| Nobilis ND Clone-30 | Intervet             |                       |                      |

Source: Field survey, 2016.

**Factors associated with broiler farming**

The major considerable factors associated with broiler farming are strain of broiler bird, training on broiler farming, size of farm and mortality of broilers. Among all the considerable factors, strain of broiler and training on broiler farming situation have been shown in Table 2. Table 2 revealed that 92% farmers reared Cobb 500 and the rest of them (8%) selected Hubbard classic. Haque (2001) showed that 80% farmers reared Cobb-500, 10% Ross broiler, 6% Hubbard and 4% Starbro. Most of the classic farmers preferred Cobb-500 because of better performances (Rahman *et al.* 2002). Only 20% farmers received training from local YTC, ULO office, and NGOs and the rest 80% of them were not trained (Table 4). Jin *et al.* (1988) found that 45% farmers had training and about 55% did not have any training on broiler farming. So, more opportunity for training and development of training program as well as facilities should be increased.

**Farm size**

The farm size was measured by number of broilers, which was classified into three groups; 1) small (100-500), 2) medium (501-1000) and 3) large (>1000). Among those farms, 54%, 24% and 12% farms were categorized as small, medium and large. Number of broiler per farm was 725.3 with standard deviation of 360.17 and the broiler number ranged from 500 to 2500.

**Table 4.** Strain of broiler and Training associated with broiler farming

| Parameters                  | Categories      | No. of farmer | % of farmer |
|-----------------------------|-----------------|---------------|-------------|
| Strain of broiler           | Cobb 500        | 46            | 92          |
|                             | Hubbard classic | 4             | 8           |
| Training on broiler farming | Have            | 10            | 20          |
|                             | Have not        | 40            | 80          |

Source: Field survey, 2016.

Table 3 revealed that 40% farms were small, 50% farms were medium and 10% farms were in large category. Perhaps, most of the farmers thought that it was easy and affordable for them to manage a farm sized in medium category.

**Mortality of Broiler**

Standard mortality of Cobb-500 strain is 2-4% (Cobb Management Guide, 2012). But in this study, mortality of broiler was at an average of 2.64% with a standard deviation of 1.1738.

**Table 5.** Mortality percentage of broiler

| Category (Mortality %) | Broiler farmer |     | Mean (Mortality %) | SD     |
|------------------------|----------------|-----|--------------------|--------|
|                        | No             | %   |                    |        |
| 1-3                    | 42             | 84  | 2.64               | 1.1738 |
| 4-6                    | 8              | 16  |                    |        |
| Total                  | 50             | 100 |                    |        |

Source: Field survey, 2016

Table 4 also shows that 84% farmers noticed 1-3% mortality and rest 16% reported 4-6% mortality of broiler in their farm. Low mortality was occurred perhaps due to practice of proper vaccination and good management.

**Costs of Broiler Production**

The cost here refers to the total amount of funds used in production. In the present study, the total cost of broiler production was estimated at Tk. 170000 per farm per batch for 1000 birds. Table 5 represents the total costs of broiler production. Total variable cost and total fixed cost were Tk. 160400 and Tk. 9,600 that were 94.35 and 5.65% of total cost, respectively.

**Variable costs**

In this study, the average feed cost per farm per batch for 1000 birds was calculated. Most of the farmers used ready feed that was purchased mixed feed, which included fish meal, bone meal, rice bran, wheat bran, oil cake, oyster shell, minerals, salt, vitamin, etc. and some used handmade feed. The purchased feeds were valued according to the average prices actually paid by

the owners of the boiler farms. On an average, price of per kg feed was Tk. 44. Table 5 shows that the average feed cost per farm per batch for 1000 birds was Tk. 105,600 covering 62.12 percent of total cost.

Day-old-chick cost was another crucial cost item for broiler rising. The farmers of the study areas mainly collected day-old-chick from hatcheries through their local agents. The local hatchery imported parent stock from breeder farm and produced hybrid chicks for local commercial farms. It appears from Table 5 that the day-old-chick was calculated at Tk. 42,000 which covered 24.71% of total cost.

Labor was mainly used for feeding, cleaning of house, medical care, purchasing, transporting by van, rickshaw etc. and selling birds. In calculating labor cost, Table 5 shows that labor cost per farm per batch for 1000 birds was Tk. 1,000 comprising 0.59% of the total cost.

The broiler farm owners in the study area were very careful about the possibility of their broiler diseases. Table 5 shows that antibiotic cost per farm per batch for 1000 birds was Tk. 6,000 comprising 3.53% of the total cost.

Proper Vaccination is very important to keep the farm free from diseases. Table 5 shows that vaccination cost per farm per batch for 1000 birds was Tk. 1,800 comprising 1.06 percent of the total cost.

Electricity is needed for maintaining temperature inside the broiler house or for protecting the birds from hot and cold climate. It is evident from the Table 1 that the electricity cost was Tk. 1,000 which covered 0.59 percent of total cost.

Litter is essential for raising broiler. Litter is mainly used by the broiler farmers to protect birds from cold floor, absorb moisture from droppings and to help in maintaining sanitation. In selected areas, paddy husk was used as litter. The average litter cost per farm per batch for 1000 birds amounted to Tk. 1,500 which was 0.88 percent of total cost.

**Table 5.** Costs of broiler production per farm per batch for 1000 birds

| Cost items                 | Unit | Unit price | Per farm |                 | Percentage (%) of total cost |
|----------------------------|------|------------|----------|-----------------|------------------------------|
|                            |      |            | Quantity | Total cost      |                              |
| <b>(A) Variable costs</b>  |      |            |          |                 |                              |
| Feed cost                  | Kg.  | 44.00      | 2400     | 1,05600         | 62.12                        |
| Day-old-chick cost         | No.  | 42.00      | 1000     | 42,000          | 24.71                        |
| Antibiotic cost            | Tk.  | -          | -        | 6,000           | 3.53                         |
| Vaccination cost           | Tk.  | -          | -        | 1,800           | 1.06                         |
| Litter cost                | Tk.  | -          | -        | 1,500           | 0.88                         |
| Electricity cost           | Tk.  | -          | -        | 1,000           | 0.59                         |
| Transportation cost        | Tk.  | -          | -        | 1,500           | 0.88                         |
| Labor cost                 | Tk.  | -          | -        | 1,000           | 0.59                         |
| <b>Total variable cost</b> | Tk.  | -          | -        | <b>1,60,400</b> | <b>94.35</b>                 |
| <b>(B) Fixed Costs</b>     |      |            |          |                 |                              |
| Housing cost               | Tk.  | -          | -        | 1,500           | 0.88                         |
| Family labor cost          | Tk.  | -          | -        | 1,600           | 0.94                         |
| Tools & equipments cost    | Tk.  | -          | -        | 2,500           | 1.47                         |
| Others cost                | Tk.  | -          | -        | 4,000           | 2.35                         |
| <b>Total fixed cost</b>    | Tk.  | -          | -        | <b>9,600</b>    | <b>5.65</b>                  |
| <b>Total cost (A+B)</b>    | Tk.  | -          | -        | <b>1,70,000</b> | <b>100.00</b>                |

Source: Field survey, 2016.

It is evident from Table 5 that transportation cost per farm per batch for 1000 birds stood at Tk. 1,500 which covered 0.88 percent of total cost.

#### **Fixed costs**

For broiler enterprise, construction of farmhouse claims an important part of the production cost. All the farmers need one or more house or room for raising broiler. A house is required for broiler birds to protect them from sunshine, rainfall, cold weather, storms, and wild animals. It also provides comfortable condition for broiler birds. In the study areas, most of the farm houses were tin shed *pucca* floor fenced by the iron net. Average life time of farm house is considered 15 years. Table 5 shows that total housing cost per broiler farm per batch for 1,000 birds was Tk. 1,500 representing 0.88 percent of the total cost.

Family labor includes the operator himself and other working members of the family. The cost of family

labor was estimated on the basis of the principle of opportunity cost. Table 5 shows that total family labor cost per broiler farm per batch for 1,000 birds was Tk. 1,600 representing 0.94 percent of the total cost. For successful broiler farming tools and equipment are necessary. The major tools and equipment used by the broiler farmers were feeds brooder, spade balance, electrical instruments, egg tray, feeder and syringe. Tools and equipment cost was determined by applying straight line depreciation method. The tools and equipment cost per farm per batch for 1,000 birds was Tk. 2,500 which covered 1.47 percent of the total cost.

Besides those, there are some other costs which are often termed as miscellaneous cost. Table 5 shows that total miscellaneous cost per broiler farm per batch for 1,000 birds was Tk. 4,000 representing 2.35 percent of the total cost.

**Withdrawal of antibiotic and feed before marketing**

In the surveyed area, all of the farmers used antibiotic. Farmers used antibiotic indiscriminately. Most of the farmers did not have any idea about residual effect of antibiotic in human body. From the study, it was shown that 88% farmers did not withdraw antibiotic from their flock and they used antibiotic till marketing. On the other hand only 10% farmers stopped using antibiotic prior to marketing. This study revealed that only 2% farmers withdrew antibiotic at least 7 days before marketing but they did not follow it regularly. The surveyed result is shown in Table 8.

In the visited area broiler were fed on *ad libitum* basis. Farmers thought that birds the more consume feed the more the weight gained. Generally they fed broiler up to the time of marketing. From the study area it appeared that 98% farmers supplied continuous feeding at the point of marketing and the rest, only 2% farmers stopped feeding their birds before 1-3 hours before marketing. The surveyed data is shown in Table 6.

**Table 6.** Withdrawal rate of antibiotic and feed before marketing

| Time duration           | No. of farmer | % of farmer  |
|-------------------------|---------------|--------------|
| <b>Antibiotic</b>       |               |              |
| At least before 7 days  | 1             | 2.0          |
| Before less than 7 days | 5             | 10.0         |
| Not withdraw            | 44            | 88.0         |
| <b>Total</b>            | <b>50</b>     | <b>100.0</b> |
| <b>Feed</b>             |               |              |
| Withdrawal              | 2             | 4.0          |
| Without withdrawal      | 48            | 96.0         |
| <b>Total</b>            | <b>50</b>     | <b>100.0</b> |

Source: Field survey, 2016.

**Correlation Coefficients**

Correlation is a statistical technique that can show whether and how strongly pairs of variables are related. Correlations are useful because they can indicate a predictive relationship that can be exploited in practice. The main result of a correlation is called the correlation coefficient (or "r"). It ranges from -1.0 to +1.0. The

closer r is to +1 or -1, the more closely the two variables are related. If r is close to 0, it means there is no relationship between the variables. If r is positive, it means that as one variable gets larger the other gets larger. If r is negative it means that as one gets larger, the other gets smaller. Here Table 7 shows correlation among some variables to indicate the relationship.

**Table 7.** Correlation among some variables

| Variables  | Correlation (r) | Significant level |
|--|-----------------|-------------------|
| Age vs Education                                     | -0.8748         | **                |
| Age vs Training                                      | -0.5783         | **                |
| Age vs Antibiotic withdrawal                         | -0.3812         | **                |
| Education vs Antibiotic withdrawal                   | 0.5258          | **                |
| Education vs annual Income                           | 0.4010          | **                |
| Education vs Residual effects of antibiotic on human | 0.7125          | **                |
| Education vs Sound vaccination program               | 0.5722          | **                |
| Education vs Training                                | 0.6376          | **                |
| Education vs Indiscriminate use of antibiotic        | 0.6323          | **                |
| Education vs Sustainable Poultry farming             | 0.6088          | **                |
| Training vs Sustainable farming                      | 0.8069          | **                |
| Income vs No. of birds each batch                    | 0.9821          | **                |

Source: Authors' estimation based on field survey, 2016; Note: \*\* Correlation is significant at 0.05 level (2-tailed). a List wise N = 50

Table 7 revealed that age and educational level were significant and negatively correlated ( $r = -0.8748$ ), suggesting that farmers, who were young became more educated than the olds. Most old farmers were either

illiterate or less educated. Age and training were significant and negatively correlated ( $r = -0.5783$ ), suggesting that farmers, who were young took part in training than the olds. Age and antibiotic withdrawal were significant and negatively correlated ( $r = -0.3812$ ), indicating, young farmers were conscious about antibiotic withdrawal period than older farmers. The information presented in Table 7 indicated that in the surveyed area education and antibiotic withdraw were significantly and positively correlated ( $r = 0.5258$ ), indicating that educated persons were conscious about antibiotic use and its residual effect. Thus, it can be said that the more the people will be educated, they will be the more conscious about antibiotic withdrawal. A positive and statistically significant correlation ( $r = 0.4010$ ) were observed between education and annual income of the farmers. Higher educated people had more capabilities of earning profit than the less educated people. So, higher educated people earn more money than less educated people. The educated farmers were more conscious and alert about the residual effects of antibiotic on human than the uneducated or comparatively less educated farmers. Table 7 revealed that education vs residual effects of antibiotic on human were significant and positively correlated ( $r = 0.7125$ ). Educated farmers had more knowledge on sound vaccination program than uneducated. Data impressed that Education vs Sound vaccination program were significant and positively correlated ( $r = 0.5722$ ). Most of the part of educated farmers took part in training than the uneducated. Data in Table 7 impressed that Education vs Training were significant and positively correlated ( $r = 0.6376$ ). Indiscriminate use of antibiotic is very harmful for human health and one of the main causes of antibiotic resistance. The educated farmers were conscious about the indiscriminate use of antibiotic. The information presented in Table 9 indicated that in the surveyed area education vs indiscriminate use of antibiotic were significant and positively correlated ( $r = 0.6323$ ). Education vs sustainable poultry farming were significant and positively correlated ( $r = 0.6088$ ),

indicating that educated farmers had a preliminary knowledge on Sustainable farming than the uneducated farmers.

Well trained farmers had the primary knowledge about the sustainable poultry farming than non-trained farmers. The information presented in Table 7 indicated that in the surveyed area training vs sustainable poultry farming were significant and positively correlated ( $r = 0.8069$ ).

As the number of broiler increase the cost per broiler decreases and profit per broiler increases. Data in Table 7 revealed that income and number of broiler was positively and significantly correlated ( $r = 0.9821$ ), indicating that as the no. of broiler increased in each batch in the farm the profit also increased.

Different antibiotics with independent brand name are used in broiler. A good number of companies are marketing their products through highly competitive market channels. A list of mostly used antibiotics and their company name are shown in Table 7.

### ***Problems Related to Broiler Farming***

Broiler industry of Bangladesh is rapidly expanding but scenario in the broiler farming is that almost every day there are new farms coming up and some of the old ones closing down. It appears that the business environment is quite hazy and full of risk and uncertainty. Broiler industry of Bangladesh is passing crisis time as it was suffered from various problems. In the existing socioeconomic conditions of Bangladesh, there are various problems in production and marketing of broiler. The problems faced by broiler farmers and its solutions are given below:

### ***Problems of antibiotic use and vaccination program***

Many problems were identified on antibiotic program but the most important problem faced by broiler farmers was high cost of medicine. Approximately 84% of the respondents reported high cost of antibiotic and 10% reported lack of suggestion to use antibiotic. In study area, unavailability of antibiotic (4%) was also

a mentionable problem. Other problem was storage problem of some antibiotics (2%).

**Table 8.** Problems related to antibiotics use and vaccination program

| Types of problem                            | No. of farmer | % of farmer |
|---|---------------|-------------|
| <b>Antibiotics use</b>                      |               |             |
| High cost of antibiotic                     | 42            | 84.0        |
| Unavailability of antibiotic                | 2             | 4.0         |
| Storage problem of some antibiotics         | 1             | 2.0         |
| Lack of suggestion to use antibiotic        | 5             | 10.0        |
| <b>vaccination program</b>                  |               |             |
| High price of vaccine                       | 31            | 62.0        |
| Unavailability of vaccine                   | 3             | 6.0         |
| Failure/ineffectiveness of vaccine          | 4             | 8.0         |
| Short training problem                      | 2             | 4.0         |
| Lack of knowledge & training on vaccination | 10            | 20.0        |

Source: Field survey, 2016.

Although many problems were identified in the study area on vaccination program, the most important problem faced by broiler farmers was the high price of vaccine. Approximately 62% of respondents reported

high price of vaccine and 4% reported about short training problem. In study area lack of knowledge and training on vaccination (20%) also a major problem. Other problems were unavailability of vaccine (6%) and failure of vaccine (8%). The result is shown in Table 8.

***Suggestions to Improve Current Antibiotics and Vaccination Program***

In the study area, 50 broiler farmers were asked to suggest solution to the problems identified on current antibiotic program. They suggested that price of medicine should be reduced, medicine should be made available or supplied by government, training should be provided on proper antibiotic program and more suggestions should be needed from veterinarian/ livestock officer to use antibiotic. Most of the respondents suggested about the price of antibiotic should be reduced, 10% farmers said that more suggestions should be needed from veterinarians/ livestock officers to use antibiotic. About 4% farmers suggested that antibiotic should be made available or supplied by government and another 2% suggested that training should be provided on proper antibiotic program. From the study area, it appeared that farmers rarely seek advice from experts for the use of antibiotics in broiler.

**Table 9.** Suggestions from farmers to improve antibiotics and vaccination program

| Types of problem  | No. of farmer | % of farmer |
|---|---------------|-------------|
| <b>Antibiotics program</b>  |               |             |
| Price of antibiotic should be reduced   | 42            | 84.0        |
| Antibiotic should be made available or supplied by the government                       | 2             | 4.0         |
| Training should be provided on proper antibiotic program                                | 1             | 2.0         |
| More suggestions should be needed from veterinarian/Livestock officer to use antibiotic | 5             | 10.0        |
| <b>Vaccination program</b>  |               |             |
| Price of vaccine should be reduced  | 31            | 62.0        |
| Vaccine should be made available or supplied by the government                          | 3             | 6.0         |
| Training should be provided on proper vaccination program                               | 10            | 20.0        |
| More suggestions should be needed from veterinarian/ Livestock officer to use vaccine   | 6             | 12.0        |

Source: Field survey, 2016.

Farmers use antibiotic without any prescription. If they found that their birds are not of good growth, they suddenly decide to use antibiotics. Even if one or two birds become sick, then they add antibiotics in water for the whole flock. The surveyed result is shown in Table 9. The respondent farmers of the study area were asked to suggest solution to the problems identified on vaccination or to find out ways to improve present vaccination program. They suggested that price of vaccine should be reduced, vaccine should be made available or supplied by government, training should be provided on proper vaccination program and more suggestions should be needed from veterinarians/livestock officers to use vaccine. A detailed description of the suggestions shows that 62% respondents suggested that price of vaccine should be reduced, 6% farmers told that vaccine should be made available or supplied by government, about 12% farmers said that more suggestions should be needed from veterinarian/livestock officer to use vaccine and 20% farmers suggested that training should be provided on proper vaccination program. From the above results summarized in this section suggest that the farmers in study area practiced vaccination in broiler without any justification and/or recommendation by the appropriate expert.

### **Conclusion and Recommendations**

Poultry is playing a key contribution to the national economy through creating employment, generating local income and improving nutrition level of the low income people. Raising of broiler was a profitable business in the study area. Most of the poultry farmers in this area use antibiotic indiscriminately for more benefit. Lot of problems and difficulties were found in broiler production in the study area. To overcome the difficulties of broiler raising and to make broiler production more profitable in the country, the following recommendations are put forward for the improvement of existing production of live broiler. The indiscriminate use of antibiotic in broiler may cause transmission inimical effect to the consumer's health

through the broiler meat and meat products. Thus, the concerned authority should take necessary steps to avoid the contamination of broiler meat through the drug and drug residue. Necessary steps should be taken by the government to reduce price of day old- chick, moreover provide adequate financial support to establish more hatcheries throughout the country. The Livestock department should take necessary steps to increase the awareness among the poultry farmers about the side effects of antibiotic. Most of the educated farmers are conscious about the residual effect of antibiotic. So, the opportunity of being educated may be increased. All the broiler farmers investigated in this surveyed area were administered antibiotic and vaccine in their flock. So, training facilities may be helpful to the farmers to know about the limitation of antibiotic and vaccine use. The highest proportions were middle aged and they were quite keen to adopt broiler farming to solve their financial problem. So, there has an opportunity for the young group to employ themselves in this sector. The government should take initiatives for solving the problems of current antibiotic and vaccination service to raise the standard of broiler farming into a successful and profitable enterprise.

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