

**Knowledge, attitude, and practice toward antibiotics resistance among
poultry farmers at Bancharampur Upazila in Brahmanbaria**



A clinical report submitted by

Roll No: 17/54

Reg.No: 01889

Intern ID: 45

Session: 2016-2017

A clinical report submitted in partial fulfilment of the requirement for
Doctor of Veterinary Medicine.

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August 2022

**Knowledge, attitude, and practice toward antibiotics resistance among
poultry farmers at Bancharampur Upazila in Brahmanbaria**



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August 2022

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Abstract

One of the main hotspots for the misuse of antimicrobials is poultry farming. Poultry farmers' knowledge, attitude, and practices (KAPs) are closely associated with the practical use of antimicrobials in poultry farm practices. A cross-sectional study was conducted to assess the poultry farmers' knowledge, attitude, and practices regarding antimicrobial use (AMU) and antimicrobial resistance (AMR) in Bramanbaria district at Bancharampur Upazila from January to June 2022. This study surveyed thirty-five commercial poultry farms by using a pretested questionnaire. This study observed that 48.57% of poultry owners did not know who had the right to write a prescription. Most (85.71%) farm owners did not know about antimicrobial resistance. Most (85.71%) poultry farm owners use antibiotics during brooding periods, and 51.43% of farm owners use antibiotics as growth promoters. Around 55% of farm owners obtained antibiotics from private pharmacies, and 58 % used antibiotics without a prescription from their previous experiences. The most frequently used antibiotics are ciprofloxacin (22.85%), enrofloxacin(14.28%), oxytetracycline (14.28%), and gentamycin (11.42%). Approximately (85.71%) of farm owners did not know about antimicrobial resistance and antimicrobial residue. In conclusion, poultry farm owners have a poor level of awareness regarding antibiotic use and resistance. Now it is high time to take the necessary step to protect the future generation from antimicrobial resistance by building awareness among poultry farmers.

Keywords: Antimicrobial; AMR; Poultry farms; poultry farmers; KAP.

Introduction

The poultry industry is vital in promoting agricultural development and reducing malnutrition in Bangladeshi people (Silva and Rankin, 2013; Hamid et al., 2017). The commercial poultry sector in Bangladesh is rapidly expanding to fulfil the rising demand for poultry meat and eggs. (Imam et al., 2020). It is an essential aspect of Bangladesh's agricultural system, providing direct and indirect employment and support services to over 6 million people (Ansari-Lari et al., 2010). The poultry industry supplies roughly 22-27% of the country's total animal protein (Hamid et al., 2017).

In poultry farms, antibiotics are primarily used to treat sick birds, prevent infections in healthy birds (prophylactic use), and increase growth by enhancing feed efficiency (Sawant et al., 2005; Ventola, 2015). The amount of antibiotics used in livestock agriculture in Bangladesh is unclear (Khatun et al., 2016), and data on the sale of antibiotics nationwide are unreliable (Ferdous et al., 2019). Furthermore, frequent sales of antimicrobials by feed and chick vendors and representatives from pharmaceutical companies show a lack of regulation in Bangladesh's antimicrobial use (Masud et al., 2020). Furthermore, there are no laws governing the registration and labelling of veterinary medications (DGDA, 2016). Antimicrobial usage in poultry is also not governed by precise rules (Ferdous et al., 2019). As a result of this unrestricted antibiotic use, the emergence and spread of antimicrobial resistance (AMR) significantly increased in the current decades.

AMR has grown fast in the previous decade, becoming a global problem that eventually leads to treatment failure in humans and animals (Hassan et al., 2020). The rise of AMR poses a severe threat to public health worldwide due to a lack of legal low-force acts and regulations and farmer self-prescription (WHO, 2021). Most poultry farm owners in Bangladesh are illiterate and do not know the rational use of antimicrobials in production. Many poultry farmers are influenced or forced to use antimicrobials by feed businesses, chick firms, or pharmaceutical companies (Masud et al., 2020). Antimicrobials resistance (AMR) was a globally alarming issue day after day. AMR may lead to economic losses directly through mortality and indirectly through reduced production performance. An available antimicrobial usage considerably impacts the formation and spread of antibiotic-resistant microorganisms in humans and animals. Livestock farmers in most developing countries engage in such reckless behaviour. Furthermore, farmers are not accustomed to ensuring

withdrawal after administering antibiotics to their poultry. Most 80% of poultry farmers sold eggs and broilers during and after using drugs. Consequently, antimicrobials residue was transmitted to the human body and developed antimicrobials resistance.

Poultry farms are also thought to be a hotspot for transmitting infectious diseases. Appropriate farming practices must be used to avoid or reduce antimicrobials' unnecessary and unethical usage in poultry production systems. It would be possible to prevent antimicrobial misuse and overuse using farmer education, motivation, training, and awareness campaigns. A scarcity of good, trustworthy information about farmers' antimicrobial knowledge, perceptions, and behaviours towards antimicrobial resistance development. Given this context, this study aimed to determine poultry farmers' knowledge, attitudes, and practices about the use of antimicrobials and the emergence of antimicrobial resistance.

Objectives:

1. To know the pattern of AM uses in poultry farm owners.
2. To assess the awareness level of farmers regarding AM residue and resistance.
3. To understand the farmers' knowledge and attitudes about using AM and AMR in Bangladesh.

Materials and methods

Description of the study area:

The study was conducted at the Bancharampur Upazila of Brahmanbaria district Bangladesh. Bancharampur is one of the largest Upazila in the Brahmanbaria district. This area was selected because of the many poultry farmers who developed their farms.

Study design:

This cross-sectional study was conducted from January to May 2022. A well-structured and preplanned questionnaire was adopted from previously published research with significant modifications to meet the objectives of this study. The final questionnaire was revised and finalized by suggestions following this study, and data were collected from the study population. Medium and large-size poultry farmers were given priority. A total of 35 poultry farmers were surveyed in this study.

Data collection:

This data was collected through face-to-face interviews with poultry farmers. I asked the questions in the Bengali language so they could easily understand and efficiently respond to them. The purpose of the study was kept unknown to farmers to avoid response bias. The questionnaire consists of five sections and 45 questions. Data were collected mainly on two categories of close-ended including yes and no questions on different knowledge, attitude, and practice related to AMU and AMR.



Figure 1: Data collections from the farm owners

Statistical analysis:

All raw data was compiled, sorted, and imported into Microsoft Excel 2016 before being analyzed with the STATA/SE-16.1 statistical tool (Stata Corp, 4905 Lake Way Drive, College Station, TX 77845, USA).

Result**Socio-demographic characters**

The socio-demographic characteristics of the participants are shown in Table 1. In this study, most participants were male (68.6%) and aged between 20 and 40 (74.29%). Among the 35 respondents, 48.57% of participants completed secondary education. Most of the participants' main occupations were farming (57.14%), and the type of farm was Sonali chickens (56.29%). Most of the farmers in this study belonged to the middle-income (25.71%) group. Around 80% of farm owners did not obtain any training in poultry farm management.

Table 1. Socio-demographic characteristics of poultry farm owners (N=35)

Variables	Category	Frequency	Percentage (%)
Gender	Male	24	68.57
	female	11	31.43
Age of farmer	20-40	26	74.29
	41-60	9	25.71
Level of education	Illiterate	4	11.43
	Primary	8	22.86
	SSC	17	48.57
	HSC	5	14.29
	Graduate	1	2.86
Main occupation	Agri. Farmer	8	22.86
	Poultry farmer	20	57.14
	Govt. job	1	2.86
	Housewife	4	11.43
	Student	2	5.71
Type of farm	Broiler	7	20
	Layer	7	20
	Sonali	21	56.29
Number of birds	1000	3	8.57
	1001-3000	24	68.57
	More than 3000	8	22.86
Economic status	Low income	10	11.43
	Middle income	21	25.71
	High income	4	2.86
Training on poultry farm management	Yes	28	80
	No	7	20

Sources and usage of antibiotics: Table 2 shows that most (91.43%) farm owners gave poultry antibiotics from different sources. Most farm owners brought antibiotics from private pharmacies (55%), while 22.46 and 31.33% were collected from vets and drug sellers. Most respondents

(58.33%) used antibiotics on the poultry farm without prescription due to previous experience using antibiotics. The majority (80%) of farmers used antibiotics once a month. Most of the farmers mentioned (94.29%) recent disease occurrences on their farms. Farmers (71.59%) usually did not perform post-mortem (PM) by a registered veterinarian.

Table 2: Antibiotics used for poultry in Brahmanbaria at Bancharampur Upazila by poultry farm owners (N=35)

Variables	Categories	Frequency	Percentage (%)
Have you given antibiotics for your poultry	Yes	32	91.43
	No	3	8.57
Where did you obtain the antibiotics that you gave to your poultry?	Company Representative	3	8.57
	Feed seller	2	5.72
	From vet	11	31.42
	From private pharmacy	19	54.28
Why do you use antibiotics for your poultry without prescription	Minimum cost	5	14.28
	Not have knowledge	8	22.85
	Previous experience	17	48.57
	Quick relief	2	5.72
	Do not know about vet	3	8.58
Antibiotics given/ month	Once	28	80.0
	More than once	6	17.14
	Never	1	2.86
Had been occurred disease recently on your farm	Yes	2	5.71
	No	33	94.29
Where they seek antibiotics	Company representative	17	48.57
	Feed seller	5	14.28
	Reg. vet	7	20.0
	Themselves	6	17.15
Do you perform PM by registering vets	Yes	10	29.41
	No	25	71.59

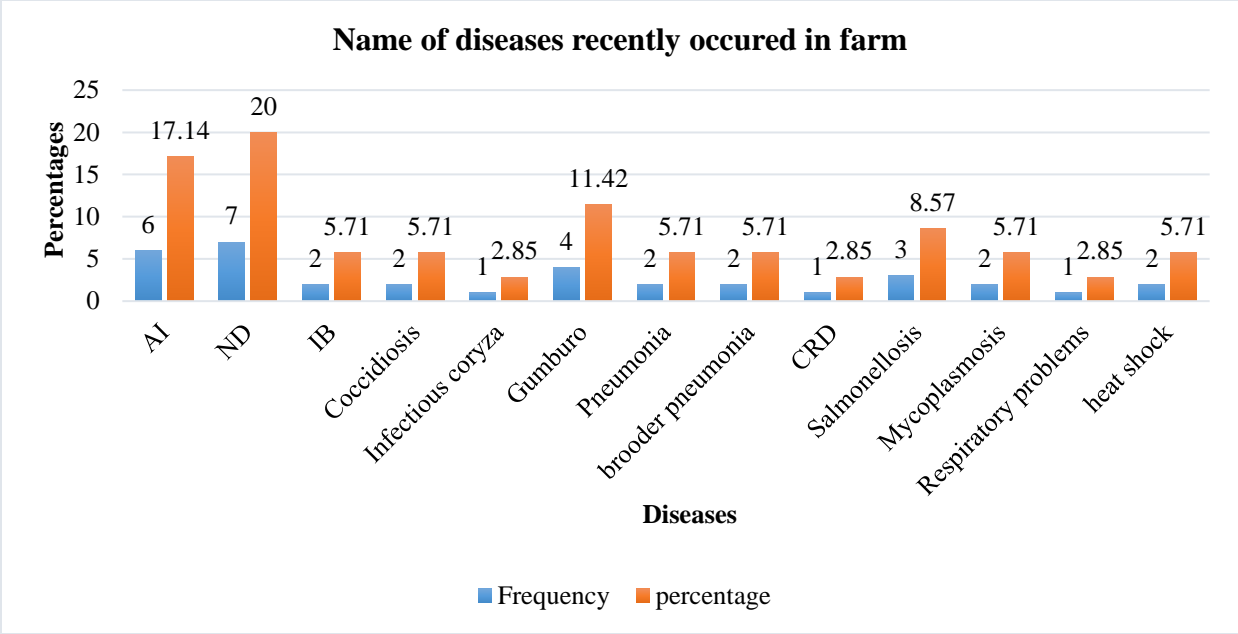


Figure 2. Common diseases occurred during the survey (N=35).

Most poultry farmers could show antibiotics brand names that they had mainly used on their farms, and someone has their drug pharmacies. Ciprofloxacin, enrofloxacin, oxytetracycline, and neomycin were the most frequently used groups of antibiotics, respectively (Figure 2)

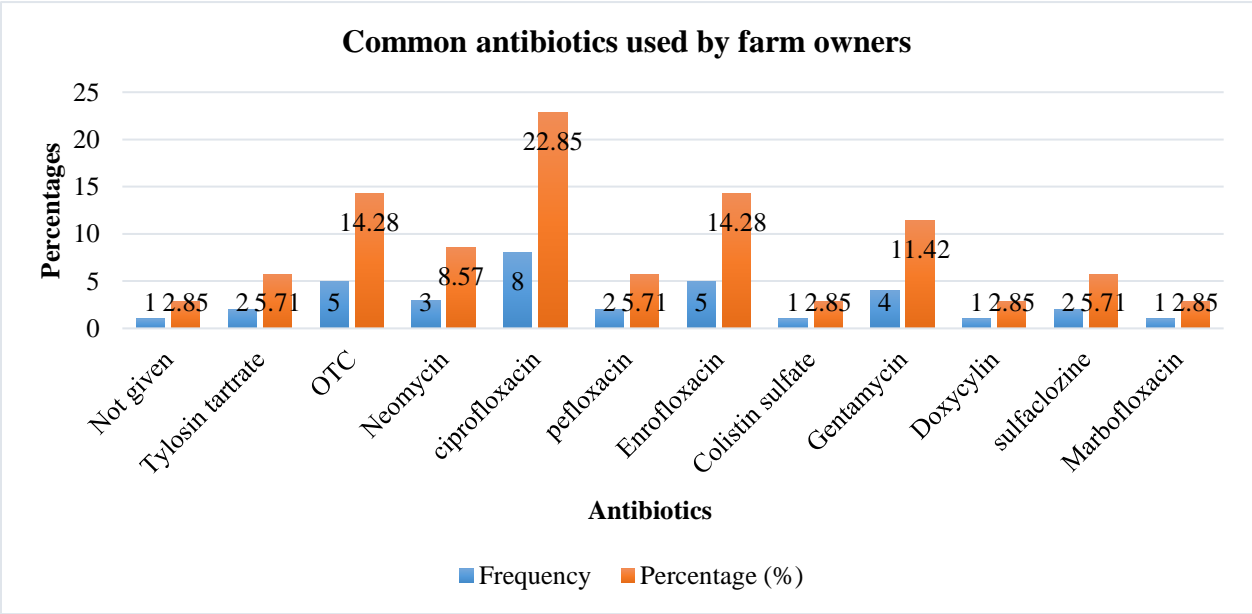


Figure 3. Common antibiotics used by poultry farm owners (N=35)

Knowledge of poultry farm owners towards AMU and AMR

The overall knowledge of the poultry farmers about antibiotic use and AMR status is summarised in Table 3. The participants asked several questions, and only 48.57% of farm owners knew who had the authority to write prescriptions. A high percentage (77.14%) of farm owners had no idea about antimicrobials. Around 85.71% of respondents did not know about AM residue and an AMR. Approximately 74.29% of farm owners did not know that specific antimicrobials act against specific diseases, while 74.29% think antimicrobials can be used for any disease. Most (88.57%) farm owners believe that AM is efficient for treating bacterial and viral infections. (60%) of farm owners think antibiotics can be used for weight gain. The majority of (91.43%) farm owners believe that all commercial antibiotics do not have the same curative action, thus frequently changing antibiotics to get the expected recovery of sick chickens. Around 62.86% of farm owners think that antibiotics do not have any side effects for poultry, therefore do not hesitate to use antibiotics randomly. Only 9% of farm owners believe that bacteria can be resistant to antibiotics. Most (88.57%) farmers had no idea about antibiotic withdrawal periods. Only 37.14% of farm owners think that AM can be passed to humans through the consumption of meat and egg of poultry.

Table 3. Knowledge of poultry farm owners towards AMU and AMR in Brahmanbaria at Bancharampur (N=35)

Variables	Category	Frequency	Percentage
Do you know who has the authority to write a prescription?	Yes	17	48.57
	No	18	51.43
Do you have any idea about antimicrobials?	Yes	8	22.86
	No	27	77.14
Do you know about antimicrobial residue?	Yes	5	14.29
	No	30	85.71
Do you know about antimicrobial resistance?	Yes	30	85.71
	No	5	14.29
Do you know about herbal drugs?	Yes	1	2.86
	No	34	97.14
Do you know any specific antimicrobials that act on specific diseases?	Yes	9	25.71
	No	26	74.29
Do you think antimicrobials can be used for any disease?	Yes	26	74.29
	No	9	25.71
Do you think antimicrobials are efficient for the treatment of both bacterial and viral infections?	Yes	31	88.57
	No	4	11.43
Do you use antibiotics for weight gain?	Yes	14	60
	No	21	40
Do you use antibiotics for all types of diseases in poultry?	Yes	19	54.29
	No	16	45.71
Have all commercial antibiotics had the same curative effects in poultry?	Yes	3	8.57
	No	32	91.43
Have any harmful effects of antibiotics on beneficial bacteria of the body?	Yes	10	28.57
	No	25	71.43
Have any side effects of antibiotics?	Yes	13	37.14
	No	22	62.86
Do you know bacteria can be resistant to antibiotics?	Yes	9	25.71
	No	26	74.29
Do you know the withdrawal periods of antibiotics?	Yes	4	11.43
	No	31	88.57
Do you think AM can be passed to humans through the consumption of meat and egg of poultry?	Yes	13	37.14
	No	22	62.86

Attitudes towards AMU and AMR of farmers

Farmers' attitudes towards AMU and AMR are shown in Table 4. The majority (80%) of farm owners agreed that inappropriate use of antibiotics might cause AMR. Nearly 65.71% of farm owners had no idea as AMR is not significant for public health. Approximately (74.29%) of farm owners have no idea that there is a close relationship between antibiotic use in poultry and the development of resistance in humans and poultry. Nearly (51%) of farm owners had no idea that restriction of antibiotics used in poultry might lead to more benefits than damages. Approximately (82.86%) of farm owners agree that AM on farms is most important for the protection of any type of disease on farms. Nearly (80%) of farm owners agree that AM should be added to poultry feed at any time to prevent birds from getting sick. Most (80%) of farm owners agree that an accurate dose of AM should be used in poultry. Approximately (85.71%) of farm owners did not know herbal or medicinal drugs could be used as alternatives to AM.

Table 4. Attitudes towards AMU and AMR of farmers.

Variables	Categories	Frequency	Percentage
Inappropriate use of antibiotics may cause AMR.	Agree	28	80
	Neutral	3	8.57
	Disagree	1	2.86
	No idea	3	8.57
AMR is not significant for public health?	Agree	1	2.86
	Neutral	11	31.43
	Disagree	0	0
	No idea	23	65.71
Use AM as a growth promoter	Agree	6	17.14
	Neutral	5	14.29
	Disagree	0	0
	No idea	24	68.57
Is there any relationship between antibiotic use in poultry and the development of resistance?	Agree	4	11.43
	Neutral	5	14.29
	Disagree	0	0
	No idea	26	74.29
Restriction of antibiotics used in poultry may lead to more benefit than damage.	Agree	3	8.57
	Neutral	14	40
	Disagree	0	0
	No idea	18	51
AM use for protection against disease on farms is the most important.	Agree	29	82.86
	Neutral	1	2.86
	Disagree	4	11.43
	No idea	1	2.86
Antibiotics should be added to poultry feed anytime to prevent birds from getting sick.	Agree	28	80
	Neutral	1	2.86
	Disagree	3	8.57
	No idea	3	8.57
An accurate dose of AM should be used in poultry?	Agree	28	80
	Neutral	1	2.86
	Disagree	3	8.57
	No idea	3	8.57
The herbal or medicinal drugs can be used as alternatives to AM?	Agree	0	0
	Neutral	5	14.29
	Disagree	0	0
	No idea	30	85.71

The practice of farm owners: Antibiotics practice related several questions were asked to assess farm owners. Approximately 85.71% of farm owners use antibiotics before consulting a vet in case of sick birds. Nearly (51.43%) of farm owners did not read the prospectus before using antibiotics. A total (85.71%) of farm owners used AM during the brooding periods. Approximately (51.43%) of farm owners use AM as a growth promoter. Most (88.57%) farm owners did not get advice from the vet about withdrawal periods. Most (91.43%) farm owners do not maintain an AM withdrawal period. A total (91.43%) of farm owners stopped applying the dose when birds felt better. Primarily 80% of farm owners sell eggs and broilers during and after using antibiotics (Table 5).

Table 5. The practice of poultry farm owners towards AMU and AMR in Brahmanbaria at Bancharampur Upazila (N=35)

Variables	Categories	Frequency	Percentage
Use antibiotics before consulting a vet in case sick birds.	Yes	30	85.71
	No	5	14.29
Do you read the prospects before using antibiotics?	Yes	17	48.57
	No	18	51.43
Do you use any AM during the brooding period?	Yes	30	85.71
	No	5	14.29
Do you use AM as a growth promoter?	Yes	18	51.43
	No	17	48.57
Did you get (seek) advice from the vet about withdrawal periods?	Yes	4	11.43
	No	31	88.57
Do you maintain an AM withdrawals periods?	Yes	3	8.57
	No	32	91.43
Do you stop the application of the dose when birds feel better?	Yes	32	91.43
	No	3	8.57
Selling eggs and broilers during and after using drugs?	Yes	28	80
	No	7	20

Discussion

The knowledge, attitude, and practices (KAP) of poultry owners regarding AMU, AMR, and at the farm level were investigated in this study. The study described demographic information of farmers, including gender, age, level of education and main occupation, economic status, and training in poultry farm management. The study revealed farm owners' KAPs of antimicrobials at the farm level. Most poultry producers in this study were below 40 years old, with males being predominant, and a high percentage of farmers were secondary school certificate holders. Other than agriculture and fisheries, poultry farming was identified as the primary occupation of most farmers (Begum et al., 2013). Many poultry producers have an average of 4-5 years of experience in the industry. Even though they have their drug pharmacies to suit their antibiotic abuse demand, most farmers are familiar with antibiotics. However, few owners were aware of antibiotic resistance. The average demographic picture of the poultry farmers was similar to several previous studies. According to research conducted in Vietnam, poultry farmers were generally between the ages of 30 and 60, with secondary school education. (Pham-Duc et al., 2019). According to a survey conducted in Bangladesh, all respondents were males between the ages of 18 and 30, had 8-12 years of farming experience, had a higher education level than secondary school, and poultry farming was recognized as the principal source of family income (Hassan et al., 2021).

Antimicrobial use was quite frequent in commercial chicken farms, according to our research, with practically all layer producers (100%) administering antimicrobials to their flocks. Antimicrobial usage has been documented despite no clinical indicators, maintenance to withdrawal periods, antimicrobial sales without a prescription from a certified veterinary practitioner, and self-medication. Even the farm owners did not keep formal records on antibiotic use history. Reliable and accurate data are scarce on how antibiotics are used in poultry production in Southeast Asia (Coyne et al., 2019; Goutard et al., 2017; Kakkar et al., 2018). According to one study, farmers routinely use antibiotics, even ones not permitted in chickens. Farmers employed antibiotics for growth promotion and prevention as a risk-management technique (Begum et al., 2013).

This study observed that a significant percentage (48.57%) of farmers used antibiotics without a prescription, and most (51.43%) had no idea who had the authority to write a prescription. Notably, a higher percentage (48.57) of farmers bought and used antibiotics based on their previous

experience. Most commercial chicken breeders obtained antibiotics directly from feed dealers or even a pharmaceutical company (Siddkiy et al, 2022), while a significant percentage of farmers (>60%) bought antibiotics without a veterinarian's prescription (Islam et al., 2016). This study found that 8.57% of poultry farmers obtained antibiotics from company representatives, 5.72% from feed sellers, and 54.28% from private pharmacies. Dealers buy production inputs from manufacturers on credit, distribute them to farms on credit, and then buy harvested products from small farmers, keeping the production cycle rolling (Mandal et al., 2017). By sourcing from large firms through their networks and self-credit, dealers establish functional relationships between input producers and smallholder farmers (Islam et al., 2016). Pharmaceutical representatives always aim to achieve the sales target and maintain ongoing liaison with dealerships. Sometimes they provide veterinarian aid to small farmers through dealers to increase the sale of antibiotics. This way, pharmaceutical corporations and their agents have successfully penetrated and promoted poultry drugs (Roess et al., 2013), thus threatening public health safety by increasing the chance of irrational antibiotic use among the farmers.

Most farmers have employed antimicrobials for medicinal and prophylactic purposes. The use of antibiotics as a growth promoter is still prevalent (51.48%) in the current study area, and 85.71% of them started giving antibiotics during brooding. Antimicrobial prophylaxis might arise due to a lack of information and frequent recommendations from the drug vendor. Farmers believed that using antimicrobials as a preventative measure would help to reduce disease load and limit the spread of common chicken diseases (Roess et al., 2013) because there has not been any vaccine against poultry diseases. Antibiotics are commonly used as a preventative measure in commercial poultry production in various Asian nations, such as Cambodia, Indonesia, Vietnam, and Thailand (Coyne et al., 2019). Farmer's awareness must be increased about the disadvantage of overuse of antimicrobials growth promotion (Islam et al., 2016).

Some antimicrobials were common and frequently administered in poultry farming in the study areas, such as ampicillin, gentamicin oxytetracycline, ciprofloxacin, amoxicillin, and tylosin. Among these, ciprofloxacin and tylosin are considered the 'Highest Precedence Critically Important Antimicrobials' for public health (WHO, 2019). Indeed, ciprofloxacin and tylosin are used as the last resort for treating infectious diseases. Tylosin treats *Salmonella*, *Shigella*, and *Campylobacter* infections (WHO, 2021). Ciprofloxacin and tylosin should not be used as first-line

therapy in poultry and should only be utilized following pathogen culture and sensitivity testing. Without clinical signs, ciprofloxacin and colistin should never be given to feed-producing animals, including poultry (OIE, 2020). Many farmers have used antimicrobials (including ciprofloxacin, tylosin, and colistin) without noticing clinical signs.

It was discovered that poultry farmers in this study used antimicrobials in their drinking water, which is consistent with previous findings (Masud et al., 2020). Bangladesh has enacted the "animal and fish feed act 2010," which forbids the use of antimicrobials in animal feed and imposes a penalty if the act is broken (MoFL, 2010). However, even if they did not admit it, some farmers may have infringed the law regarding antimicrobials in feed. Farmers (91.43%) in this study area did not maintain an antibiotic withdrawal period, and most (80%) sold eggs and broilers while birds were on antibiotics. This is consistent with the previous study where farmers sold eggs while applying antimicrobials since they did not understand the antimicrobial residual and withdrawal period (Ferdous et al., 2019). In this study, most (80%) of the farmers did not receive any training in farm management. Moreover, 17 out of 35 farmers only completed secondary school education. Lack of training, poor education, or awareness about antibiotic misuse among farmers could be associated with their irrational use of antibiotics. Besides, a lack of checking from governmental agencies was previously known as why farmers did not follow withdrawal periods (Imam et al., 2020). It is recommended that farm management techniques, as well as antimicrobial residues, should be monitored according to Codex requirements (FAO, 2020).

It is challenging to change regulatory regimes. There is currently no antimicrobial stewardship program in Bangladesh aligned with the national plan for controlling antimicrobials in food animals. A National Action Plan has been developed by the Ministry of Health and Family Welfare (2017–2022) to contain AMR in Bangladesh, but unfortunately, limited action has been taken (Orubu et al., 2020). They are also practicing over-the-counter sales of antimicrobials without a prescription from a registered veterinarian. Antimicrobial sales should only be made with the prescription of a certified physician, according to a recent judgment by Bangladesh's High Court Division of the Supreme Court are highly appreciated (Daily Star, 2019).

Conclusions:

Antimicrobials are frequently utilized in poultry farms for medicinal, preventative, and growth promotion purposes. Farmers lacked knowledge about the rational use and practice of antimicrobial drugs. The farmer's education, experiences, and age played a vital role in the sensible use of antibiotics and suitable farm management measures. Furthermore, a comprehensive regulatory approach to antibiotic use, marketing, and prescribing helps to decrease antibiotic overuse and resistance. It is advised that effective governance, motivation, training, and outreach be used to enhance farmers' knowledge, attitudes, and practices. Farmers should be informed about proper agricultural hygiene, on-farm biosecurity, and the vaccination program. All farms must be registered with livestock departments to monitor biosecurity and antimicrobial usage regimes.

Limitation:

There were a few weaknesses in this study. First and foremost, geographic representation with a modest number of farmers has been considered. The study was done in a small cluster of commercial poultry farming villages that may have different habits than other regions of the country due to geographic location, culture, and access to inputs and agricultural practices. Second, participants' recollections and self-reported traditions may have altered some of the interview data quality. Although this study looked at the knowledge, attitudes, and practices related to AMU and AMR, a more comprehensive countrywide survey is needed to understand the cultural, socioeconomic, and agroecological aspects that influence KAP in different parts of the country.

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Acknowledgement

All the praises and most profound sense of gratefulness belong to the Almighty, the Merciful, the Omnipotent, and the Beneficent but the Supreme Ruler of the Universe, who enabled me to complete my work successfully for the Internship program partially.

The author gratefully expresses first and foremost his heartiest appreciation, most profound sense of gratitude, and best regards to his internship supervisor, Dr. Marjina Akter, Professor, Department of Dairy and Poultry Science, Chattogram Veterinary and Animal Sciences University, for her advice, encouragement, constructive criticism, scholastic supervision, and intellectual guidance throughout this work continuous supervision to complete the report.

The author expresses his profound gratitude, gratefulness, and heartfelt Bancharampur Upazila for all the technical support and assistance during the two months study period. Thanks to Prof. Dr. A.K.M. Saifuddin, Director of external affairs, Chattogram Veterinary and Animal Sciences University, Khulshi, Chattogram, for their objective advice, kind cooperation, and continuous encouragement during the study. Finally, the author extended his appreciation to his parents, all patient owners, and all good wishes.

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