Biological and Clinical Sciences Research Journal
eISSN: 2708-2261; pISSN: 2958-4728
www.bcsrj.com
DOI: https://doi.org/10.54112/bcsrj.v2024i1.856
*Biol. Clin. Sci. Res. J., Volume, **2024**: 856*
Original Research Article

USE OF ANTIBIOTICS AND THE FARMERS' AWARENESS LEVEL OF ANTIBIOTICS RESISTANCE OF BROILER FARMS

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(Received, 10th January 2024, Revised 15th May 2024, Published 22nd May 2024)

Abstract *The ever-existent measures of antibiotic application in the broiler industry remain a controversial tool for improving livestock health and accelerating growth. The main objective of the study is to find the use of antibiotics and the farmers' awareness level of antibiotic resistance in broiler farms. This study is designed to investigate antibiotic usage practices and assess the awareness levels of broiler farmers regarding antibiotic resistance. A total of 280 participants from various broiler farms across the region were recruited from February 2023 to August 2023. Eligible participants included farm owners, managers, and workers directly involved in broiler farming activities. Data were collected from 280 participants through a designed survey. The study revealed a predominance of medium-sized farms, housing between 5,000 to 20,000 broilers, accounting for 60% of participants, followed by large farms with over 20,000 broilers at 25%. Basic biosecurity protocols were the most commonly implemented management practice among participants, reported by 50% of respondents, while 35% reported moderate implementation, and 15% reported advanced biosecurity measures. Tetracycline emerged as the most commonly used antibiotic (45%), often administered orally (60%) for disease prevention (40%). Enrofloxacin (30%) and Amoxicillin (25%) were also prevalent, with oral administration being the preferred route. Despite the predominance of seeking veterinary advice (70%), a notable proportion reported self-medication (20%) or seeking advice from fellow farmers (10%). It is concluded that antibiotic usage remains prevalent in commercial poultry farming, with tetracyclines, fluoroquinolones, and beta-lactams being commonly employed. While seeking veterinary advice predominates, there's a need to address gaps in access to veterinary services and promote responsible antibiotic stewardship among farmers.*

Keywords*:* *antibiotics; broiler; biosecurity; self-medication; resistance; veterinary*

Introduction

The ever-existent measures of antibiotic application in the broiler industry remain a controversial tool for improving livestock health and accelerating growth. On the contrary, antibiotic resistance, identified as a major danger to all health sectors, is the main issue that should be taken into consideration (Mwansa et al., 2023). Antibiotic-resistant bacteria can be transmitted from animals, the environment, and humans, which can result in treatment failures and increase mortality and morbidity rates. In spontaneous resource-limited settings, there is a huge amount of antibiotic use in food-producing animals for prophylactic, metaphylactic, therapeutic, and growth enhancement by the modernization and commercialization of the news poultry sector. Poorly tailored prescribing of antibiotics has been tagged as one of the leading factors that cause antibiotic resistance (Hassan et al., 2021). On the other hand, it is a threat to the environment as animals may acquire antibiotic-resistant bacteria from humans, specifically poultry, directly or through their by-products (meat or eggs) during handling and slaughter, consumption of infected food (farm-to-fork transmission) or indirectly by animal waste contaminating the environment (Dávalos et al., 2022). Some research has pointed a finger at the transfer of bacterial antibiotic resistance to human beings via the food chain (Mudenda et al., 2022).

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The growing impact of antimicrobial resistance (AMR) is symbolized as one of global concern these days and has been declared by world governments to be one of the major health problems, which affect the safety of food, development, and hunger eradication. AMR looms over our capacity to treat infectious diseases and jeopardizes a lot of developments in medicine, thus affecting the entire population irrespective of caste, ethnicity, sex, and nationality (Geta et al., 2021). AMR can happen naturally, but, generally, the abuse and excessive use of antibiotics, interwoven with poor regulation of infections, play the most prominent role in the expansion of this phenomenon (Moffo et al., 2020).

Inducing antimicrobial drug overuse and mistreatment creates antimicrobial pressure on bacteria, finally leading to the selection of and proliferation of resistant microbes (Chah et al., 2022). Among others, the cases where antibiotics may be purchased over-the-counter, for human or animal use, are the worst ones as they contribute to the emergence and spread of resistant organisms (Mustapha et al., 2020). Across the globe, and in Bangladesh in particular, developing countries permit antibiotics to be dispensed without a prescription, which is followed by a lot of self-medication and people serving pills without any training. The results of an onsite investigation showed that the pharmacies were distributing 92% of drugs that were intended for human use without a prescription to clients (Sharma et al., 2024).

Objective

The main objective of the study is to find the use of antibiotics and the farmers' awareness level of antibiotic resistance in broiler farms.

Material and methods

This study is designed to investigate antibiotic usage practices and assess the awareness levels of broiler farmers regarding antibiotic resistance. A total of 280 participants from various broiler farms across the region were recruited from February 2023 to August 2023. Eligible participants included farm owners, managers, and workers directly involved in broiler farming activities. Structured questionnaires were administered to collect data on antibiotic use practices, including types of antibiotics used, indications for usage, administration routes, dosage regimens, and treatment durations. Additionally, participants' awareness of antibiotic resistance, its implications, contributing factors, and mitigation strategies were evaluated through targeted questions. Information on farm characteristics, such as size, management practices, biosecurity measures, and previous experiences with antibiotic-resistant infections, was also gathered. Collected data were analyzed using SPSS v27 and descriptive statistics to summarize demographic characteristics, antibiotic usage patterns, and awareness levels of antibiotic resistance. Inferential statistics were employed to explore potential associations between variables of interest.

Results

Data were collected from 280 participants through a designed survey. The study revealed a predominance of medium-sized farms, housing between 5,000 to 20,000 broilers, accounting for 60% of participants, followed by large farms with over 20,000 broilers at 25%. Basic biosecurity protocols were the most commonly implemented management practice among participants, reported by 50% of respondents, while 35% reported moderate implementation, and 15% reported advanced biosecurity measures. In terms of demographics, the majority of participants fell within the age range of 30 to 50 years, comprising 60% of the sample, while individuals under 30 and over 50 years old represented 20% each.

Table 1: Demographic data of participants

Characteristic	Percentage of Participants
Farm Size	
- Small (Less than 5,000 broilers)	15%
- Medium (5,000 to 20,000 broilers)	60%
- Large (More than 20,000 broilers)	25%
Management Practices	
- Basic biosecurity protocols	50%
- Moderate implementation	35%
- Advanced biosecurity measures	15%
Demographics	
Age (years):	
Under 30	20%
30-50	60%
Over 50	20%

Tetracycline emerged as the most commonly used antibiotic (45%), often administered orally (60%) for disease prevention (40%). Enrofloxacin (30%) and Amoxicillin (25%) were also prevalent, with oral administration being the preferred route. Despite the predominance of seeking veterinary advice (70%), a

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notable proportion reported self-medication (20%) or seeking advice from fellow farmers (10%). Suspected antibiotic-resistant infections (50%) were the primary reason for healthcare-seeking, followed by routine health checks (30%) and disease outbreak investigations (20%).

Table 2: Use of antibiotics and health-seeking behavior

Characteristic	Percentage of Participants
Types of Antibiotics Used	
- Tetracycline	45%
- Enrofloxacin	30%
- Amoxicillin	25%
Indication for Antibiotic Use	
- Disease prevention	40%
- Treatment of bacterial infections	35%
- Growth promotion	25%
Administration Route	
- Oral	60%
- Water supplementation	30%
- Injection	10%
Healthcare-Seeking Behavior	
- Seek veterinary advice	70%
- Self-medicate	20%
- Seek advice from fellow farmers	10%
Reasons for Healthcare-Seeking	
- Suspected antibiotic-resistant infection	50%
- Routine health check	30%
- Disease outbreak investigation	20%

The 75% of participants who were asked identified inappropriate antibiotic use in agriculture as the main reason for the antibiotic resistance issue, thus, the need for the prudent use of antibiotics in the industry is highlighted. The lack of effective biosecurity measures was also pointed out as a factor that contributed to the disease transmission with 20% of the respondents, thus stressing the need to implement stricter biosecurity protocols to prevent the transmission of the disease and the overuse of antibiotics. Besides, 5% of the respondents mentioned that the overuse of antibiotics in human medicine was the reason for the survey.

Table 3: Contributing factors

Contributing Factors	Percentage of Participants
Inappropriate antibiotic use in agriculture	75%
Inadequate biosecurity measures	20%
Overuse of antibiotics in human medicine	5%

Discussion

The prevalence of the use of antibiotics in commercial poultry farming underlines its significance in the preservation of flock health and productivity. Tetracyclines turned out to be the most often used class of antibiotic, which was a manifestation of their wide spectrum of action and efficacy against various poultry pathogens (Islam et al., 2022). Fluoroquinolones and beta-lactams were also commonly used, thus, the antibiotics used in poultry production systems varied. These outcomes prove that we need to be careful in using antibiotics and then the risk of the development of antibiotic resistance can be reduced and the effect of antibiotics can be preserved in veterinary and human medicine (Efendi et al., 2022).

The fact that most poultry farmers are the ones who mostly seek veterinarian's advice shows that they know of the great importance of getting professional help in solving poultry health problems (Ramesh et al., 2022). Nevertheless, the majority of farmers mentioned that they either self-medicated or sought advice from their fellow farmers, thus showing the existence of the possible gaps in veterinary services or knowledge dissemination. The initiatives to enable constant access to veterinary care and to enlighten the farmers on the responsible use of antibiotics are very essential for the achievement of the best poultry health outcomes and for restricting the spread of antibiotic resistance (Hassan et al., 2021). Although, the use of antibiotics is still the main tool in poultry health management, its indiscriminate or inappropriate use has become one of the most serious issues, which is the development of antibiotic resistance (Koirala et al., 2021). The obstacles to solving this problem have to be tackled in different ways, for example, better veterinary supervision, stricter biosecurity measures, and the

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teaching of antibiotic stewardship principles. Moreover, the encouragement of the use of other methods, including vaccination, probiotics, and improved farm management practices, can help in the reduction of antimicrobials and thus antibiotic resistance in commercial poultry farming.

Conclusion

It is concluded that antibiotic usage remains prevalent in commercial poultry farming, with tetracyclines, fluoroquinolones, and beta-lactams being commonly employed. While seeking veterinary advice predominates, there's a need to address gaps in access to veterinary services and promote responsible antibiotic stewardship among farmers. Efforts to enhance veterinary oversight, improve biosecurity measures, and educate farmers on alternative strategies are essential to mitigate antibiotic resistance and safeguard poultry health in commercial farming practices.

References

Mwansa, M., Mukuma, M., Mulilo, E., Kwenda, G., Mainda, G., Yamba, K., ... & Muma, J. B. (2023). Determination of antimicrobial resistance patterns of Escherichia coli isolates from farm workers in broiler poultry production and assessment of antibiotic resistance awareness levels among poultry farmers in Lusaka, Zambia. *Frontiers in Public Health*, **10**, 998860.

Hassan, M. M., Kalam, M. A., Alim, M. A., Shano, S., Nayem, M. R. K., Badsha, M. R., ... & Islam, A. (2021). Knowledge, attitude, and practices on antimicrobial use and antimicrobial resistance among commercial poultry farmers in Bangladesh. *Antibiotics*, **10**(7), 784.

Dávalos-Almeyda, M., Guerrero, A., Medina, G., Dávila-Barclay, A., Salvatierra, G., Calderón, M., ... &Tsukayama, P. (2022). Antibiotic use and resistance knowledge assessment of personnel on chicken farms with high levels of antimicrobial resistance: a cross-sectional survey in Ica, Peru. *Antibiotics*, **11**(2), 190.

Mudenda, S., Malama, S., Munyeme, M., Hang'ombe, B. M., Mainda, G., Kapona, O., ... & Muma, J. B. (2022). Awareness of antimicrobial resistance and associated factors among layer poultry farmers in Zambia: implications for surveillance and antimicrobial stewardship programs. *Antibiotics*, **11**(3), 383.

Geta, K., &Kibret, M. (2021). Knowledge, attitudes and practices of animal farm owners/workers on antibiotic use and resistance in Amhara region, north western Ethiopia. *Scientific Reports*, **11**(1), 21211.

Moffo, F., Mouiche, M. M. M., Kochivi, F. L., Dongmo, J. B., Djomgang, H. K., Tombe, P., ... &Awah-Ndukum, J. (2020). Knowledge, attitudes, practices and risk perception of rural poultry farmers in Cameroon to antimicrobial use and resistance. *Preventive veterinary medicine*, **182**, 105087.

Chah, J. M., Nwankwo, S. C., Uddin, I. O., &Chah, K. F. (2022). Knowledge and practices regarding antibiotic use among small-scale poultry farmers in Enugu State, Nigeria. *Heliyon*, **8**(4).

Al-Mustapha, A. I., Adetunji, V. O., &Heikinheimo, A. (2020). Risk perceptions of antibiotic usage and resistance: A cross-sectional survey of poultry farmers in Kwara State, Nigeria. *Antibiotics*, **9**(7), 378.

Sharma, G., Dey, T. K., Hazarika, R. A., Shome, B. R., Shome, R., Singh, V. P., ... & Lindahl, J. F. (2024). Knowledge and practices related to antibiotics among poultry producers and veterinarians in two Indian states. *One Health*, **18**, 100700.

Islam, M. Z., Islam, M. S., Kundu, L. R., Ahmed, A., Hsan, K., Pardhan, S., ... & Hossain, M. M. (2022). Knowledge, attitudes and practices regarding antimicrobial usage, spread and resistance emergence in commercial poultry farms of Rajshahi district in Bangladesh. *Plos one*, **17**(11), e0275856.

Efendi, R., Sudarnika, E., Wibawan, I. W. T., &Purnawarman, T. (2022). An assessment of knowledge and attitude toward antibiotic misuse by small-scale broiler farmers in Bogor, West Java, Indonesia. *Veterinary World*, **15**(3), 707.

Ramesh, N. U. K. A. L. A., & Tripathi, H. E. M. A. (2022). Antibiotic usage practice and knowledge on antimicrobial resistance among livestock and poultry farmers of Telangana state, India. *Indian J. Anim. Sci*, **92**, 166-173.

Hassan, M. M., Kalam, M. A., Alim, M. A., Shano, S., Nayem, M. R. K., Badsha, M. R., ... & Nath, C. (2021). Knowledge, attitude, and practices on antimicrobial use and antimicrobial resistance among commercial poultry farmers in Bangladesh. *Antibiotics*. 2021; **10** (7): 784.

Koirala, A., Bhandari, P., Shewade, H. D., Tao, W., Thapa, B., Terry, R., ... & Karki, S. (2021). Antibiotic use in broiler poultry farms in Kathmandu valley of Nepal: which antibiotics and why?. *Tropical medicine and infectious disease*, **6**(2), 47.

Declaration

Ethics Approval and Consent to Participate

Not applicable.

Consent for Publication

The study was approved by authors.

Funding Statement

Not applicable

Conflict of Interest

There is no conflict of interest among the authors regarding this case study.

Authors Contribution

All authors contributed equally.

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