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Prevalence and Antimicrobial Resistance of Escherichia Coli from Chicken Meat in A Selected Public Market at Malvar, Batangas, Philippines

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Abstract

Chicken meat can be contaminated with various pathogens, with studies showing prevalence rates of bacteria like Escherichia coli (E. coli), which pose a risk of foodborne illness. The present study aimed to determine the prevalence and antimicrobial resistance of E. coli isolated from chicken meat in a selected public market in Malvar, Batangas, Philippines where the climate encourages the environmental spread of microorganisms, and outbreaks of bacterial infections continue to pose a significant economic threat.

A total of thirty (30) chicken meat samples - comprising legs, wings, thighs, breasts, ribs, and feet - were aseptically collected from three (3) chicken stalls (10 samples per stall) in a selected public market in Malvar, Batangas, Philippines and analyzed for the presence of E. coli. Identification of bacterial isolates was conducted through morphological characteristics, Gram staining, and biochemical tests. The antibiotic sensitivity of the confirmed E. coli isolates to amikacin (30 µg), cefotaxime (30 µg), ceftazidime (30 µg), ciprofloxacin (5 µg), gentamicin (10 µg), meropenem (10 µg), nalidixic acid (30 µg), streptomycin (10 µg), tetracycline (30 µg), and trimethoprim (5 µg) was determined using the standard antimicrobial disk diffusion test.

Results revealed that out of thirty (30) meat samples, five (5) were contaminated with E. coli, corresponding to a prevalence rate of 16.66%. Antibiotic sensitivity testing showed multi-drug resistance among all E. coli isolates: 100% were resistant to ceftazidime, cefotaxime, meropenem, and nalidixic acid; 80% were resistant to streptomycin and trimethoprim; 60% were resistant to ciprofloxacin and tetracycline; 40% were resistant to gentamicin; and 20% were resistant to amikacin. Additionally, 80% of E. coli isolates were sensitive to amikacin, and 60% were sensitive to gentamicin. Low sensitivity rates (20–40%) were observed for ciprofloxacin, tetracycline, and streptomycin.

In conclusion, there is a low prevalence of E. coli contamination in chicken meat samples from Malvar, Batangas, Philippines. However, the E. coli isolates demonstrate high resistance to ceftazidime, cefotaxime, meropenem, and nalidixic acid, indicating a potential public health concern.

Keywords: Chicken meat, Escherichia coli, Antimicrobial Resistance, Malvar, Batangas, Philippines

1. INTRODUCTION

Foodborne illnesses are recurring problems that we still deal with today. These issues pose considerably greater health risks to consumers in developing nations because of lack food safety regulations. Research data indicating trends in foodborne infectious intestinal diseases were said to be limited to industrialized countries. This suggests that research into microbial contamination in food products particularly meat and poultry is scanty in developing countries (Elumba et al., 2018). One of the most pervasive food sectors in the world is poultry. With more than 90 billion tons of chicken meat produced each year, chicken is the most widely farmed species. Likewise, chicken meat is one of the most consumed meats in the world, as it is free of taboo and religious restrictions (Liu et al., 2012). In most nations, poultry is raised using a wide variety of antimicrobials. In human medicine, several of these antimicrobials are regarded as indispensable. The careless application of these vital antibiotics in animal husbandry is probably going to hasten the emergence of antibiotic resistance in both commensal microbes and pathogens. In addition to causing treatment failures and financial losses, this could serve as a source of human gene pool transfer. Furthermore, the existence of antimicrobial residues in meat, eggs, and other animal products raises issues for human health (Agyare et al., 2018).

Factors such as climate, agricultural practices and sanitation determine the environmental state to which a microbial landscape is subjected. In the Philippines (including Batangas Region with a tropical climate) this is conducive to a bacterial proliferation (Bautista et al., 2024). Bacteria can grow quickly at high temperatures and humidity which also risks food contamination. This environmental state can couple to intensified poultry farming practices, which frequently utilize broad range prophylactic antimicrobials to enhance growth and prevent disease, facilitating the selection and spread of antimicrobial resistant E. coli. Additionally, handling and processing of chicken meat in public markets, especially where sanitation levels may vary, make chicken meat an additional potential source of microbial contamination and dissemination of AMR. These settings provide a perfect environment for bacteria to spread because of low practice of hygiene which increases the risks being sickened by microorganisms.

Similarly, the host state (human and animal populations) is important in the dissemination of AMR. Poultry is one of the main sources of protein in the Filipino diet and is therefore a very important pathway for transmission of resistant E. coli into humans. Contaminated dietary consumption of chicken meat can bring colonization of the human gut with resistant bacteria hence will lead infections that are difficult to treat. In the latter case, the proximity of animals and humans in agricultural settings often facilitates the transfer between these two sets of microbes, thereby increasing the threat of AMR. Not just selecting for resistant bacteria in animals, the use of antibiotics in animal feed also creates a reservoir of resistant genes that can be transferable to human pathogen. The interconnectedness brought on by this approach is essential to a 'One Health' approach whereby the health of humans, animals and the environment are synonymous (Baustista et al., 2024).

Despite extensive research on antimicrobial resistance (AMR), there remains a critical gap in understanding the extent to which the misuse of antimicrobial agents in clinical medicine, animal husbandry, and agriculture contributes to the emergence and persistence of multidrug-resistant microbial populations globally. While studies have highlighted selective pressure as a driving force for resistance (Ranasinghe et al., 2022), further research is needed to quantify its specific impact across different sectors and to develop targeted mitigation strategies

2. Objective of the Study

This study determined the prevalence and antimicrobial resistance of E. coli from chicken meat in a selected public market at Malvar, Batangas, Philippines where the climate encourages the environmental spread of the microorganisms and outbreaks of these bacterial infections continue to pose a significant economic threat. Escherichia coli is difficult to control in chicken, and historically, a mix of antibiotics, water sanitation, and farm biosecurity has been used. The study offered information on the emergence of antimicrobial resistance of E. coli presence in chicken meat and human health concerns about the presence of antimicrobial residues in poultry meat. Additionally, this study identified the necessary food safety hazards and its control measures such as management action plans in handling chicken meat products to prevent exposure to foodborne diseases.

3. Materials and Methods

This study utilized a descriptive research design to detail the distribution of specific variables—namely, the prevalence and antimicrobial resistance of Escherichia coli isolates in chicken meat—without establishing causal relationships. Microbiological analyses were conducted using standardized procedures, including the U.S. FDA Bacteriological Analytical Manual AOAC Official Method for confirmed E. coli counts in poultry, meats, and seafood, employing Petrifilm™ EC Plates for enumeration and detection. Identification and confirmation of E. coli isolates were subsequently performed. To determine the antimicrobial resistance profile, the Standard Antimicrobial Disk Diffusion Test was used, assessing the isolates' sensitivity to selected antibiotics. Overall, the study focused on evaluating the prevalence of E. coli in chicken meat samples and analyzing their resistance to commonly used antimicrobial agents.

Raw chicken meat were collected from a selected public market at Malvar, Batangas, Philippines. Raw chicken meat parts (legs, wings, thighs, breast, ribs, and feet) were collected aseptically from three (3) chicken stalls (10 samples per chicken stall) in a selected public market at Malvar, Batangas. Collection was done through the use of sterile disposable WhirlPak™ bags which were then sealed and brought to the laboratory for microbiological analyses. Analysis of samples commenced within a day of collection.

Test Suspension

A 25 g test portion was weighed into a sterile blender jar. Then, 225 mL of diluent was added, and the mixture was blended for 2 minutes at high speed (10,000 to 12,000 rpm). Decimal dilutions were prepared by adding 1 mL of the previous dilution to 9 mL of sterile diluent. Each dilution was shaken vigorously 25 times in a 30 cm arc for 7 seconds.

Analysis

A dry Petrifilm™ EC Plate was placed on a flat surface. The top film was lifted, and 1 mL of test suspension was inoculated onto the center of the film base. The top film was then carefully placed back onto the inoculum. The suspension was evenly distributed over a 20 cm^2 growth area by applying downward pressure to the center of the plastic spreader device. The plate was left undisturbed for a minimum of 1 minute to allow the gel to solidify. Plates were then incubated for 24 ± 1 hour at 35°C. During incubation, the plates were placed in a horizontal position, clear side up, in stacks of no more than 20 units. Plates were counted promptly after incubation.

Petrifilm™ EC Plates were counted using a standard colony counter. E. coli colonies appeared as blue colonies with gas bubbles. Plates containing 10 to 150 colonies were selected for counting. For plates with fewer than 10 blue colonies with gas, the exact count from the least diluted sample was recorded.

Isolation of E. coli

Blue colonies with gas bubbles observed on the Petrifilm™ EC Plates were streaked onto Eosin Methylene Blue (EMB) agar and MacConkey agar. These plates were incubated at 35 °C for 18–24 hours. After incubation, isolated colonies were examined for typical E. coli morphology: purplish-red colonies with a greenish metallic sheen on EMB agar (viewed under reflected light) and pink to red colonies on MacConkey agar.

Pure cultures were prepared by streaking onto Nutrient Agar (NA) plates. A well-isolated colony was selected and subcultured on NA slants. Twenty-four-hour cultures were used for IMViC tests, biochemical analysis, and Gram staining. NA slants were also submitted to the laboratory for antibiotic sensitivity testing.

Antibiotic Sensitivity Test Procedure

The antibiotic sensitivities of all isolates were assessed through the standard antimicrobial disk diffusion test. Briefly, the 18–24-hour well-isolated colonies of the isolates in nutrient agar plates were inoculated to 5 ml sterile 0.85% saline solution until its turbidity was comparable to that of the 0.5 McFarland Turbidity Standards (~1.5 x 10^8 CFU/mL). A sterile cotton swab was dipped into the prepared bacterial suspension. The bacterial suspension was spread evenly across Mueller-Hinton agar using lawn culture technique (streaking in three directions). The plates were allowed to dry for 5 minutes before placing the antibiotic disks. Using sterile forceps, the antibiotic disks were placed evenly on the agar surface. Each disk was lightly pressed to ensure proper contact with the agar. The plates were incubated at 35°C for 18 h and the resulting zones of inhibition (ZOI) were observed. The diameter of the ZOI was measured in millimeters using a caliper. The antibiotic sensitivity profiles of the isolates were determined following the zone diameter breakpoints and interpretative categories (susceptible or resistant) set by the Clinical and Laboratory Standard Institute standard protocol.

4. Results and Discussion

Table 1 Prevalence of E. coli contamination in Chicken Meat

Chicken Meat	No. of Samples	No. (%) of Samples Positive for E. coli
Thigh	3	1 (3.33%)
Leq Quarter	2	1 (3.33%)
Breast	5	0 (0%)
Ribs	5	1 (3.33%
Wings	6	2 (6.66%)
Legs (Drumstick)	7	0 (0%)
Chicken Feet	2	0 (0%)
Total	**30**	**5 (16.66%)**

The prevalence of E. coli contamination in chicken meat samples is shown in Table 1. Of thirty (30) meat samples, five (5) samples were contaminated with E. coli which corresponds to 16.66% prevalence; one (1) (3.33%) of Thigh, one (1) (3.33%) of Leg Quarter, one (1) (3.33%) of Ribs and two

(2) (6.66%) of wings, respectively.

The lower prevalence of E. coli contamination in chicken meat in the present study compared to other studies may be attributed to differences in hygienic practices, sample sources, storage and transportation conditions, market environment, sampling methods, and antimicrobial use in poultry farming. Stricter hygiene protocols in Malvar, Batangas, compared to Valencia City, Bukidnon (Elumba et al., 2018), and Manila City (Dimaapi et al., 2023) may have contributed to reduced contamination. Additionally, variations in meat handling, exposure to contaminants in wet markets, and differences in poultry farming practices, including antibiotic use, could influence bacterial prevalence. Proper storage and transport conditions may also limit E. coli proliferation, while differences in laboratory detection methods could impact reported contamination rates. These factors collectively highlight how environmental, procedural, and methodological variations contribute to differences in E. coli prevalence across studies.

The prevalence of E. coli isolated in this study appeared to be lower compared with previous studies conducted in other countries. For example, in a study by Bratfelan et al. (2023) in Romania, a total of thirty (30) E. coli isolates were recovered from the 100 analyzed samples (30/100; 30% prevalence), in Korea, a study conducted by Seokhwan et al. (2020), a prevalence of 47.69% (528/1107), Srilanka (Ranasinghe et al., 2022) a prevalence of 66.80% (167/250) of E. coli in chicken meats and edible organs and in Bangladesh (Md. Shariful Islam et al. , 2024), a prevalence of 95% (38/40) was recorded in chicken meat. As Islam et al. (2023) also suggested, there was a widespread prevalence of resistance genes in poultry caused by the overuse and misuse of antibiotics for which robust surveillance systems were needed to track resistance trends. The finding of the present study also supports Muktan et al. (2020) who found high rates of multidrug-resistant (MDR) E. coli in poultry, 80% resistance to multiple antibiotics, and 31.6% resistance to colistin last line defense antibiotic. Moreover, Aworh et al. (2023) suggested the horizontal transfer of resistance genes from human to animal, human to environment and animal to environment is important. This highlights why One Health approaches are needed to address AMR and include the regulation of antibiotic use, better farm sanitation, and communication to stakeholders about antibiotic use. The findings of the present study are also compatible with recent findings by Ngai et al. (2021) to support the linkage of the prevalence of resistant E. coli from the whole of the poultry production chain, from feed mill to manufacturing, all of which affect food safety. Finally, although the prevalence of E. coli contamination observed in this study is less than what has been observed in other studies, the outcome underlines the fact that there is an urgent need for more coordination among agriculture and health authorities, farmers, and innovative means to decrease AMR risks in poultry farming through surveillance, farm management, and phage therapy (Nicolas et al., 2023).

Table 2. Antibiotic Sensitivity Profiles of E. coli Isolates

Antibiotic Agent	Susceptible		Resistant	
	Zone Diameter Breakpoints, nearest whole mm	No. (%) of Isolates	Zone Diameter Breakpoints, nearest whole mm	No. (%) of Isolates
Amikacin (30ug)	≥ 18	4 (80%)	<18	1 (20%)
Cefotaxime (30ug)	≥ 25	0 (0%)	≤ 18	5 (100%)
Ceftazidine (30ug)	≥ 21	0 (0%)	≤ 17	5 (100%)

Ciprofloxacin (5ug)	≥ 22	2 (40%)	≤ 15	3 (60%)
Gentamicin (10ug)	≥ 15	3 (60%)	≤ 12	2 (40%)
Meropenem (10ug)	≥ 23	0 (0%)	≤ 19	5 (100%)
Nalidixic Acid (30ug)	≥ 19	0 (0%)	≤ 13	5 (100%)
Streptomycin (10ug)	≥ 15	1 (20%)	≤ 11	4 (80%)
Tetracycline (30ug)	≥ 15	2 (40%)	≤ 11	3 (60%)
Trimethoprim (5ug)	≥ 16	1 (20%)	≤ 10	4 (80%)

The antibiotic sensitivity test for all E. coli isolates from chicken meat revealed multi-antibiotic resistance. All isolates (100%, 5/5) were resistant to ceftazidime, cefotaxime, meropenem, and nalidixic acid. Additionally, 80% (4/5) exhibited resistance to streptomycin, and trimethoprim, while 60% (3/5) were resistant to Ciprofloxacin and Tetracycline. Resistance to Gentamicin was observed in 40% (2/5) of the isolates, and 20% (1/5) showed resistance to amikacin. These findings highlight the widespread antimicrobial resistance among E. coli isolates, posing potential risks to public health and food safety**.** The results also suggest that administering antibiotics to healthy chickens for growth promotion or disease prevention may contribute to the development of antibiotic resistance.

In the study by Elumba et al. (2018), antibiotic agents such as amoxicillin, ampicillin, chloramphenicol, and streptomycin were used to test E. coli isolates in chicken meat. It was revealed that 87.80% (36/40) are resistant to amoxicillin and 36.58% (15/41) are resistant to ampicillin. Multi-antibiotic resistance was also recorded for 29.27% (12/41) as they are resistant to both amoxicillin and ampicillin. Both the study by Dimaapi et al. 2023 and the present study recorded a high resistance rate against tetracycline (88%, 21/24, and 60%, 3/5 respectively). The former study also revealed high resistance to trimethoprim-sulfamethoxazole (83%, 20/24) while the present study recorded a 60%, 3/5 resistance rate for trimethoprim. Other antibiotic agents that recorded high resistance rates to E. coli in the study of Dimaapi et al. were ampicillin, chloramphenicol, ampicillin-sulbactam, amoxicillin-clavulanic acid, fosfomycin, and streptomycin. These antibiotic agents were not used in the present study.

In the study by de Guzman et al. (2016), 100% of the E. coli isolates from chicken meat were resistant to amoxicillin, ampicillin, clindamycin, erythromycin, and penicillin. The present study only obtained a 100% resistance rate to ceftazidine. Also, as mentioned by Mansaray et al. (2022), there is a very high prevalence of multidrug resistance (MDR) in E. coli isolates from poultry with a rate of 95.6% and 100% resistance to critical antibiotics like erythromycin, cefoxitin, streptomycin, and tetracycline. They emphasized that it's imperative that stronger strings are thrown on the use of antibiotics in the commercial poultry sector, as well as on more innovative solutions to reduce that dependence on antibiotics. Tetracycline and streptomycin (80% for tetracycline and 60% for streptomycin), as antibiotics in which a high resistance rate is observed, corroborates the present study's observations of high rates of resistance to critical antibiotics. Moreover, 74.4 percent of E. coli isolates were found to be resistant to at least one of the antimicrobials, and 69.8 percent of them were resistant to multiple antimicrobials (Ćilerdžić et al., 2024). The findings indicate that AMR in poultry is a public health concern and surveillance programs are important to monitor trends of resistance and interventions that decrease AMR in poultry production. These observations about multi–antibiotic resistance (this includes 100% resistance to meropenem and nalidixic Acid) as seen in the present studies echo well with the observations and highlight the fact that this needs to be done urgently. Overall, the present study corroborates the emerging data that the AMR in E. coli isolates from poultry is still rampant. The results

suggest increased controls of the use of antibiotics, better veterinary controls and promotion of sustainable farming to reduce the spread of resistant strains.

Table 2 shows that 80% (4/5) of E. coli isolates were sensitive to amikacin and 60% (3/5) were sensitive to gentamicin. Low sensitivity of E. coli isolates was recorded on ciprofloxacin, tetracycline, streptomycin, and tetracycline (20-40%).

The present study is contrary to the studies by Elumba et al. (2018) and Dimaapi et al. (2023). E. coli isolates were found to have a high sensitivity rate on streptomycin (97.56%) 41/50 in the study by Elumba et al. and carbapenems, ceftriaxone, cefepime, piperacillin-tazobactam, cefuroxime, cefotaxime, cetazidime, aztreonam, cefoxitin and nitrofurantoin in the study of Dimaapi et al. (2023).

Musa et al. (2021) provide background on comparing resistance levels in E. coli isolates from conventional, organic, and antibiotic-free poultry farms. Their results showed that conventional farms are more resistant than organic or antibiotic-free farms because of routine antibiotic use. The present study's findings of sensitivity to amikacin and gentamicin also mirror the finding here that certain antibiotics may still be used effectively if used judiciously and in confined environments. According to Ćilerdžić et al. (2024), it is important to develop surveillance programs to monitor changes in drug resistance, as 74.4% of E. coli isolates in their study were resistant to at least one antimicrobial and 69.8% were multidrug-resistant. Findings from the present study may be that of a temporary window of job that can close without appropriate antibiotic stewardship and interventions, especially when sensitivity to amikacin and gentamicin is observed. Therefore, while this study identified some antibiotics with relatively promising sensitivity rates, such as amikacin and gentamicin, the broader issue of antimicrobial resistance remains a growing concern. The findings suggest that the effectiveness of certain antibiotics may be attributed to stricter regulations on antibiotic use, improved farming practices, and enhanced surveillance systems aimed at preserving the efficacy of remaining antimicrobials. However, the persistence of multidrug-resistant E. coli highlights the urgent need for continued efforts in antimicrobial stewardship, responsible antibiotic use in agriculture, and strengthened monitoring strategies to mitigate the spread of resistanc

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and enhanced surveillance systems aimed at preserving the efficacy of remaining antimicrobials. However, the persistence of multidrug-resistant E. coli highlights the urgent need for continued efforts in antimicrobial stewardship, responsible antibiotic use in agriculture, and strengthened monitoring strategies to mitigate the spread of resistance.The action plan was developed from collated data from this study and related literature.

Area of Concern	Objectives	Action/s	Target Completion	Responsible	Resources	Budget Plan	Evaluation
Food safety and quality program to poultry dressing plant	To ensure the quality and safety of the produced poultry products by preventing contamination and adulteration.	1. Product Compliance Testing	Quarterly	Top management, Microbiologist, Food Safety Compliance Officer	In-house Microbiology Laboratory or outsource to third party laboratory	Included in budget allocation of the Top Management	Food Safety and Quality Plan, Quality Monitoring Scheme
		2. Water and Ice Testing	Monthly				
		3. Environmental Monitoring Program					
		3.1. Swabbing of critical areas in production facilities, tools, personnel, equipment etc.	Monthly				
		3.2. Air Testing of critical areas of the production line	Monthly				
	To improve individual competencies on food safety, hygiene	Conduct training or seminar to all the employees	Once a year	Top Management	In-house training facilitated by Food Safety and Compliance Team		Training plan
		1.Basic Food					

	and quality by providing appropriate training to meet organization and customer requirements.	Safety for Food Handlers 2.Good Manufacturing Practices 3. Food Safety Management System			and/or outsource to food safety training provider		
Food safety and hygiene program to all wet market poultry meat section food handlers and stall owners	To ensure that the poultry meat being sold are safe for human consumption.	1. Provide an update about the outcome of the study and to disseminate information on basic food hygiene for food handlers and stall owners.	Re-visit	Public market office and local government unit of Malvar, Batangas	Approved research paper and action plan	N/A	
		2. Training on basic food safety for food handlers and stall owners from transport, receiving, storing and handling of poultry products.	Annual		Training materials and certificates	Included in budget allocation of the LGU or public market office	Training plan and records
		3. Provide free service training on	Annual	Food handlers, stall owners	Approved budget by LGU or	N/A	Practical and theoretical

		how to conduct environmental swabbing for food contact surfaces such as tools, equipment, tables and hands to food handlers and stall owners.		and public market office personnel	look for donors to provide assistance on training/testing		exam results
Veterinary Drug Residues Control Program in poultry meat	To ensure that the veterinary drugs used are appropriate to their purpose and do not exceed permitted maximum residue limits (MRLs).	Only registered veterinary drugs and products are used in poultry production in accordance with the conditions imposed by competent authorities including the observance of proper withdrawal period	Monthly	Poultry farm owner/raiser, Resident Veterinarian	Veterinary Monthly Index of Medical Specialties (VMIMS)	N/A	Veterinary Drug/Medicine Record

5. Conclusion and Recommendations

The low prevalence of E. coli in chicken meat samples suggests that good hygiene practices during processing and handling are in place, helping reduce the risk of contamination and foodborne illness. E. coli isolates from chicken meat show multi-antibiotic resistance, especially to ceftazidime, meropenem, and nalidixic acid. Resistance is also observed with cefotaxime, streptomycin, and trimethoprim. Long-term or widespread use of antibiotics in poultry may contribute to this resistance. E. coli isolates remain highly sensitive to amikacin and gentamicin. Implementing a Food Safety Management System (FSMS) helps reduce bacterial contamination and foodborne illness. Regulating the use of veterinary drugs in poultry farms also helps prevent excess residues and the spread of multidrug-resistant pathogens.

Food safety precautions should be in place when preparing poultry products to reduce, if not eliminate, contamination throughout poultry processing lines. Regulations must also be implemented from poultry farms to markets. Close monitoring of E. coli throughout the chicken production chain may help identify the source of contamination and could prevent the development of antimicrobial-resistant strains. Further research might be needed to minimize contamination with resistant strains across the retail poultry meat supply chain. Public market administrations are encouraged to conduct microbiological testing on food contact surfaces, tools, equipment, and personnel hands during operations in wet markets to monitor bacterial contamination. Consumers should handle poultry meat products properly and must follow food safety procedures when buying, preparing, storing, and cooking.

Poultry farm sectors must ensure that drugs used to treat diseases are appropriate for their intended purpose and should not exceed permitted Maximum Residue Limits (MRLs) to prevent multidrug-resistant foodborne pathogens. Local government units, poultry raisers, and the academe should actively collaborate to effectively address antimicrobial resistance (AMR) in poultry food products.

It is recommended that the food and poultry industries should regularly conduct monitoring and assessments to reduce E. coli contamination and control antimicrobial resistance. They ought to focus on key performance indicators such as reduced contamination rates, compliance with MRLs, and improved hygiene practices to measure effectiveness. The Food Safety Act of 2013 (RA 10611) must be strictly enforced through annual audits and inspections of poultry farms, processing facilities, and markets. Engaging stakeholders—including poultry farmers, processors, market administrators, and consumers—is essential to identifying areas for improvement in food safety management. Additionally, data from monitoring, audits, and stakeholder feedback should be used to continuously refine and enhance food safety and antimicrobial resistance control strategies.

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