

Knowledge and practice regarding antibiotic use among poultry farmers in Abia State, Nigeria

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ABSTRACT

This study was conducted to determine factors that influence choice and application of antibiotics by broiler farmers in Abia State-Nigeria by administration of structured questionnaires to 110 farms. All 66 poultry farms that responded to questionnaires administered to them accepted that they use antibiotics on their farms. 67% of the farmers in Abia State were males, with first degree (41%), small-scale farmers (53%) and keeping broilers (74.2%) in deep litter system (77.3%). They said that drugs they use to treat their birds are prescribed by Veterinary Doctors (76.4%). Drug-formulations containing tetracycline (90%) are the ones most of the farmers used on their birds. 70.4% of the farmers had good knowledge of laws regulating use of antibiotics in raising food animals. They are also aware of the problem of Antimicrobial resistance.

Keywords: Abia State, Antimicrobial, Poultry farms

INTRODUCTION

Poultry products are among the most widespread products consumed worldwide (Heise *et al.*, 2015; Okorie-kanu *et al.*, 2016; FAO, 2019). Poultry are often raised under intensive conditions with large amounts of antimicrobials (AMs) being employed to prevent and to treat diseases as well as for growth promotion (Agyare *et al.*, 2018). An antibiotic is a drug that either kills bacteria (bactericidal) or stops growth of bacteria (bacteriostatic: WHO, 2020). Antibiotics are chemicals produced by microorganism such as bacteria and fungi (Jacob, 2015). Antimicrobials are used in poultry for therapeutic, preventive or prophylactic purposes and for growth promotion (Agyare *et al.*, 2018; Glasgow *et al.*, 2019). Use of antibiotics in food animals remains unregulated in developed countries and there is evidence that lack of education on proper use of antibiotics, limited awareness, inadequacies in management and animal husbandry practices, lack of hygiene and biosecurity measures have contributed to the high use of antibiotics to prevent or treat disease outbreaks in poultry (Oluwawemimo *et al.*, 2016; Glasgow *et al.*, 2019).

Antimicrobial resistance (AMR) is a worldwide health concern and use of AMs in animal production is a major cause of AMR in humans (Agyare *et al.*, 2018). Antimicrobial resistant poultry pathogens may result in

treatment failures leading to economic losses as well as being a source of resistant bacteria phenotypes (including zoonotic bacteria) that may represent a risk to human health (Van *et al.*, 2012; Okorie-kanu *et al.*, 2016).

Studies have demonstrated increases in resistance for bacterial organisms of Veterinary and public health importance such as *Salmonella species* (spp), *Mycoplasma spp*, *Gallibacterium spp*, *Escherichia coli*, *Ornitobacterium spp*, *Bordetella spp*, *Enterococcus spp*, *Clostridium spp*, *Mycoplasma spp*, *Erysipelothrix spp*, *Pasteuraella spp*, *Riemerella spp* etc. (Anyanwu and Obette, 2015; Bortolaia *et al.*, 2016). The indiscriminate use of AMs in poultry production has accelerated development of AMR in pathogens as well as in commensal organisms. Also, due to the emergence of AMR in bacteria from poultry production, there are human health concerns about presence of AM-residues in meat (Reig and Toldra, 2008) and eggs (Goetting *et al.*, 2011; Okorie-kanu *et al.*, 2016; Agyare *et al.*, 2018). In addition, treatment of AMR poultry pathogens will lead to high economic losses resulting from expenditure on ineffective AMs as well as the burden of resistant poultry diseases. Thus, this study was conducted to ascertain the knowledge and practices regarding antibiotic use among small scale poultry farmers in Abia State, Nigeria.

MATERIALS AND METHODS

STUDY AREA

The study was conducted in Abia State that is located between latitude 4°49.30'N and 6°02'N and between longitudes 7°08'E and 8°04'E in southeast geopolitical zone of Nigeria. The state is bounded by Rivers State in the south, Ebonyi State in the north, Imo State in the west and Akwa Ibom State in the east. The area of study is made up of largely Igbo peoples living in forest zone. The estimated population of Abia state is 4.3 million, (Okali *et al.*, 2001) while farming and trading are their major occupations (FRN, 2007). The State comprises of 17 local government areas (LGA) grouped to 3 senatorial districts, namely Abia Central, Abia South and Abia North. Wet season starts in the state from mid-April to October and dry season is from November to mid-April. Livestock commonly kept in Abia State are poultry, small ruminants and pigs (Emerole *et al.*, 2009).

INSTRUMENT FOR DATA COLLECTION

A structured questionnaire comprising of four sections (Appendix I) was developed and administered to farm attendants, farm managers and/or Veterinary doctors responsible for purchase and administration of antibiotic in the farms. The farms were classified into three categories based on total number of chickens: small (<500 birds), medium (500 to 1000 birds) and large (>1000 birds) (Xu *et al.*, 2020) and the studies included:

- 1) Farm characteristics and farm management practices
- 2) Socio economic characteristics of the farmers
- 3) Farmers' practice of poultry disease prevention and control
- 4) Farmers' knowledge and attitude to antibiotic use.

The study was approved by the ethical committee of the College of Veterinary Medicine, Michael Okpara University of Agriculture, Umudike.

VALIDATION OF INSTRUMENT

Informed consent was obtained from each participant before he/she was interviewed. Consequently, all participants gave their consent for the study. The instrument developed for data collection was validated by a senior academic staff, a veterinarian (Akpabio, Uduak) who is a specialist in Department of Veterinary Public Health and Preventive Medicine, College of Veterinary Medicine, Michael Okpara University of Agriculture, Umudike, Nigeria with interest in antibiotic use and resistance. The validated instrument was pretested in a non-study circle for clarity.

STUDY DESIGN

A cross sectional epidemiological design was adopted. A sampling frame was used to determine the number of

functional poultry farms in the selected LGAs. A total of 110 questionnaires were administered to consenting respondents.

DATA ANALYSIS

Descriptive statistics were used to examine characteristics of the poultry farms and farm management practices; socio economic characteristics of drug administrators; drug administrators' knowledge and attitude to antibiotics-use.

RESULTS

Of the 110 questionnaires sent out, 66 were returned.

SOCIO-ECONOMIC FACTORS AFFECTING USE OF ANTIBIOTICS IN POULTRY FARMS IN ABIA STATE.

FARM CHARACTERISTICS AND FARM MANAGEMENT PRACTICES

Most respondents (93.9%) use commercial feeds while 6.1% compound feeds by themselves. 74.2% of the birds kept are broilers while 25.5% are pullets/layers. Majority of the respondents were small scale farmers (53.1%) followed by large scale farmers are 34.8% while few of the respondents were medium-scale farmers (12%). Majority of the respondents (42.4%) had birds of 6-9 weeks of age in the farm, 24.2%, 4.5%, 16.7% and 12.1% had birds within the age of 3-5 weeks, 16 weeks above, 0-2 weeks and 10-15 weeks respectively. 77.3% of the respondents practiced deep litter system, 19.7% operated battery cage system while 3.1% had birds on free-range (Table 1).

SOCIO ECONOMIC CHARACTERISTICS OF THE FARMERS

Most respondents were 34- 50 years of age (28%), with 34.8% of 26-33 years old while 37.9% were between 18-25 years old. 66.7% of the respondents were males while 33.3% were females. 63.6% of the respondents had professional training in poultry farming while 36.3% were not trained. Majority of the respondents were university graduates (41%), 23% were WAEC holders, 15.4% were HND holders, 11% were second degree holders, 8% were First School Leaving holders while, 2% attended polytechnic. 62% of the respondents had less than 5 years of experience in poultry farming, 24% had 6-10 years of experience, 8% had 10-19 years of experience while only 6% had experience of 19 years and above (Table II).

FARMERS PRACTICE OF POULTRY DISEASE PREVENTION AND CONTROL

All the respondents use antibiotics in their farms to enhance growth and to treatment of diseases. Drugs commonly used were Center cipro®, Gendox®, Doxygen®, Keproceryl®, Tyloxox®, Keproceryl®, Oxytet 200®, Amoxycol® and Pantacox® (Table III). The commonest drugs are Gentamycin based drugs (Table III). Majority of the

respondents (83.6%) use antibiotics for prevention of diseases while few of the respondents (7.3%) use antibiotics for treatment of diseases. 76.4% of the respondents procure drugs with prescription by Veterinary doctors while 23.4% of the respondents did self-prescription. 61.8% of the respondents observed the withdrawal periods for antibiotics, 32.7% of the respondents do not observe the withdrawal periods while 5.5% were not aware of withdrawal periods of drugs. 94.5% of the respondents observed response to treatment when their birds were given drugs while 5.5% of the respondents observed no response to treatment. 53% of the respondents gave drugs when recommended by a Veterinary doctor, 31.8% gave drugs as they think is necessary while 7.8% gave drugs occasionally and regularly respectively. 74.5% of respondents said that their birds were not recently on any drugs while 25.5% of the respondents said that their birds were currently on drugs. Majority of the respondents give antibiotics to the birds mostly at 1-3 weeks of age (65%) followed by 4-6 weeks of age (27.3%), 7-20 weeks of age (6.1%) while few of them (1.5%) give antibiotics from 21 weeks of age and above (Table IV).

FARMERS' KNOWLEDGE AND ATTITUDE TO ANTIBIOTIC USE

Majority of the respondents (70.9%) know the withdrawal period for the antibiotics used in their farms, 54.5% were aware that Antibiotics are safe when used routinely, 89.1% knew about antibiotic resistance, 90.9% knew that animals could carry antibiotic resistant bacteria (Table V), 85.5% were aware that very frequent antibiotic use could reduce its effectiveness, 89% were aware that inappropriate use of antibiotics in chickens could lead to antibiotic resistance in chickens, 88% were aware that inappropriate use of antibiotics in chickens could lead to antibiotic resistance in humans, 70.9% were aware that antibiotics could improve the immunity of chicken, 98.2% were aware that antibiotic could cure bacterial infections and 75.9% were aware that antibiotic resistant bacteria could spread among animals and humans (Table V).

Table 1: Farm Characteristics and Management of Poultry Farms in Abia State, Nigeria.

Variable	Frequency (%)
Farm characteristics and farm management practices	
Use of commercial feeds	93.9
Compound feed	6.1
Keeping broilers	74.2
Keeping pullets	25.5
Keeping cockerels	0
Keeping turkeys	0
Small scale farmers	53
Medium scale farmers	12
Big scale farmers	34.8
0-2weeks	16.7
3-5weeks	24.2
6-9weeks	42.4
10-15 weeks	12.1
16 weeks and above	4.5
Battery cage	19.7
Deep litter	77.3
Free range	3.1

Table II: Socioeconomic Factors affecting Use of Antibiotics in Poultry Farms in Abia State, Nigeria

Variable	Frequency (%)
Age	
18-25 years old	37.9
26-33 years old	34.8
34 years and above	28
Sex	
Female	33.3
Male	66.7
Professional farm training	
Yes	63.6
No	36.3
Educational qualification	
FSLC	8
WAEC	23
HND	15.4
OND	2
First degree	41
Second degree	11
Farming experience	
Less 5 years	62
6-10 years	24
11-19 years	8
19 years and above	6

Table III: List of drugs frequently given to poultry in Abia State , Nigeria.

Antibiotics	Active Ingredients	Percentage of farms using the drug
Center CIPRO®	Ciprofloxacin	12
Gendox®	Gentamycin and Doxycycline	50
Tylodox ®	Tyrosine and doxycycline	25
Doxygen®	Doxycycline and Gentamycin	90
Amoxycol®	Amoxycillin and Colistin	32
Keproceryl®	Colistin, Oxytetracycline, Erythromycine, Streptomycin. Vitamin A,D,E & K,	30
Oxytet 200®	Oxytetracycline	22
Pentacox®	Pyrimethamine, Sulphaquinoxaline Sodium, Vitamin A	20

Table IV: Farmers Practice of Poultry Disease Prevention and Control in Abia State, Nigeria.

Variable	Frequency (%)
Reason for drug usage	
Preventive measure	83.6
Treatment	7.3
Growth promoter	9.1
Self-prescription	23.6
Prescription by Veterinary Doctor	76.4
Observation of withdrawal period	
Yes	61.8
No	32.7
Not aware of withdrawal period	5.5
Response of birds to treatment when given antibiotics	
Yes	94.5
No	5.5
How often are these drugs given	
When necessary	31.8
Occasionally	7.8
Regularly	7.8
When recommended by Veterinary Doctor	53
Birds are currently on drugs	
Yes	74.5
No	25.5
Age of the birds when antibiotic were given	
1-3 weeks	65
4-6 weeks	27.3
7-20 weeks	6.1
21 weeks and above	1.5

Table V: Farmers Knowledge of Antibiotics and Antibiotic Resistance in Poultry in Abia State, Nigeria.

	Yes	No	Not aware
Do you know the withdrawal period for the antibiotics used in your farm?	70.9	14.5	14.6
Antibiotics are safe when use routinely.	54.5	34.5	11
Do you know about antibiotic resistance?	89.1	9.1	1.8
Do you know that animals develop antibiotic resistance bacteria	90.9	8.1	1.0
Very frequent antibiotic use can reduce its effect.	85.5	9.1	5.4
Inappropriate use of antibiotics in chicken could lead to antibiotic resistance in chicken.	89.0	0.1	10.9
Inappropriate use of antibiotics in chicken could lead to antibiotic resistance in human	88	0	12
Antibiotic can improve the immunity of chicken.	70.9	18.2	10.9
Antibiotic can cure bacterial infection.	98.2	1.8	0
Antibiotic resistant bacteria can spread among animals and humans.	75.9	7.4	16.7

DISCUSSION

All the 66 poultry farmers in the study have used antibiotics on their farms at various times within the year. There are more small scale farmers, keeping boilers and practicing deep litter system in Abia State. This classification of observed farms agrees with Omotosho and Ladele (1998) and Ezeh *et al.*, (2012) that classified poultry farms of 500 birds and below as small scale farms.

The farmers were more of males within the age range of 18-25 years, first degree holders, with professional farm training but less than 5 years' experience. This is in consonance with finding of Ezeh *et al.*, (2012) who reported that there were more male youths who are small size farmers keeping broiler in Abia State. Attraction of youths towards broiler production could be viability and profit potential of the business (Chukwu, 2007). Level of education attained by a farmer not only increases his/her farm efficiency and productivity but also enhances his/her ability to understand and evaluate new production technologies (Obasi, 1991). Experience in farming is a key factor affecting production (Ezeh *et al.*, 2012). The longer the years of farming experience, the more exposed the farmer becomes and the more efficient he or she is expected to be (Nwaogu, 2006). Majority of poultry farmers in Abia state, Nigeria use antibiotics based on Veterinary prescription.

It was observed that most of the farms studied often or always use antibiotics belonging to the tetracyclines (particularly doxycycline), macrolides (tylosin and erythromycin) and aminoglycosides (Gentamicin). This observation is similar to that of Galadima *et al.* (2018) and Chah *et al.*, (2022) in which tetracycline and aminoglycoside were the most popular classes of antibiotics used by poultry farmers. The high rate of usage of these antimicrobial agents in poultry production may be attributed to their affordability as well as the fact that a greater proportion of poultry drug formulations in the Nigerian market contain the agents.

Drug formulations containing fluoroquinolones (especially ciprofloxacin) were often used in the farms. These are critically important antimicrobial agents and their use in food animals can select resistant bacteria which may be transmitted to humans through the food chain (Chah *et al.*, 2022). Apart from treatment purposes, nearly all the farmers use antibiotics for disease prevention and growth promotion. This finding is similar to those of several previous authors (Carrique-Mas *et al.*, 2015, Wongsuvan *et al.*, 2018, Xu *et al.*, 2020). Although the use of antibiotics at sub therapeutic doses in animal-production is reported to improve growth performance (Aларcon *et al.*, 2014), such application has also been found to contribute to the emergence of antibiotic-resistant bacteria. However, WHO (2017) recommended a restriction on the use of all classes of medically important antimicrobials in food-producing animals for growth

promotion and disease prevention. Many developed countries have banned the use of antimicrobial agents as growth promoters (Maron *et al.*, 2019).

However, drug formulations containing a cocktail of antimicrobial agents (including medically important antimicrobials) abound in Nigerian markets whereby poultry farmers purchase and routinely administer them to their birds via drinking water for therapeutic and non-therapeutic purposes. Thus, the high rates of resistance to penicillin's, aminoglycosides, tetracyclines, fluoroquinolones and cephalosporins among members of the Enterobacteriaceae have often been reported in chicken in Nigeria (Agada *et al.*, 2014, Nwiyi *et al.*, 2018) and this could be attributed to excessive use of these agents in poultry production.

Majority of the farmers in this study claimed that they administered antibiotics according to Veterinarians prescription. This finding is similar to Nsofor *et al.*, (2013) and Chah *et al.*, (2022). Most of the farmers also believe that there is no need to request for assistance of the veterinarian since they can follow the instructions on the drug labels. In Nigeria, as in many low and medium-income countries (LMIC), sales of antibiotics are largely unregulated (Okeke *et al.*, 2005). Both self-prescription and purchase of antibiotics without veterinary prescription promote irrational use of antibiotics and the attendant consequences (Usui *et al.*, 2014). To avoid treatment failures and development of AMR, it is best practice to perform laboratory diagnosis and antimicrobial sensitivity testing (AST) before administration of antimicrobial agent.

Greater percentage of the respondents had good knowledge of antibiotic use and resistance. This finding is similar to Chah *et al.*, (2022) who reported that although farmers in Enugu state, Nigeria have good knowledge of antibiotic use and resistance, they still engage in inappropriate antibiotic use practices.

In conclusion, most poultry farmers in Abia State use antibiotics for disease prevention and growth-promotion. Greater percentage of these farmers has good knowledge of antibiotic use and resistance but they still engage in inappropriate antibiotic practices.

CONFLICT OF INTEREST

There was no conflict of interest.

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