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A Survey on Antibiotic Usage in Pigs and Poultry Birds in Abia State, Nigeria

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ABSTRACT

A survey was conducted (June 2011 to May 2012) on antibiotic usage of 90 poultry farms and 72 piggery farms from 17 local government areas of Abia State, Nigeria. Survey questionnaires were used to identify and prioritize the antibiotics most effective and frequently used, current therapeutic and sub-therapeutic antibiotic usage patterns. The result showed that 65% of poultry and 75% of piggery farms failed to do laboratory analysis prior antibiotic usage and on most farms (70% for poultry, 65% for piggery) antibiotics were administered by the owner/manager. The mode of administration of the antibiotics was 80% through water in poultry and 80% through injection in piggery and 40% of the farmers said they always completed the course of antibiotic treatment. Twelve antibiotics including beta-lactams, streptomycin, tetracycline, macrolides, sulfa-drugs, cephalosporin etc. were used on these farms. These antibiotics were used mainly on weekly basis in poultry (65%) and fortnightly in piggery (40%). The result of this survey suggested that antibiotics are used extensively on poultry and piggery farms for therapeutics, prophylactic and growth purposes. Tetracycline and streptomycin were the most widely used antibiotics to treat mainly enteritis and pneumonia. There is a considerable variation in the management practices on poultry and piggery farms associated with antibiotic use. It is anticipated that the findings of this survey will help to develop new strategies for prudent use of antibiotics in piggery and poultry farms in Abia State, Nigeria.

Keywords: Survey, Antibiotic use, Poultry Birds, Pigs

1. Introduction

The different applications of antibiotics in food animals have been described as therapeutic, prophylactics and sub-therapeutic uses. Therapeutic uses in clinically ill animals involve using curative dose in antibiotic agents for a relatively short period of time. In appropriate doses, empiric treatment and non-submission of clinical specimens and samples from sick animals are important contributing factors to antibiotics abuse (Smith *et al*; 2005).

A study that examined the use of antibiotics on pigs and poultry birds reported that some drugs are abused especially tetracycline and streptomycin (Sawant *et al*; 2005). Antibiotics usage varies from country to country, within a country and between farms, depending on policies and desired results. International, national and local antibiotic stewardship campaigns have been developed to encourage prudent use of and limit unnecessary exposure to antibiotics; with the ultimate goal of preserving their effectiveness for serious and life-threatening infections (Balongia *et al*; 2005).

There is also considerable debate in Veterinary Medicine regarding use of antibiotics in animals raised for human consumption (food animals). An inherent consequence of exposure to antibiotic compounds, antibiotic resistance arises as a result of natural section (Aminor and Mackie, 2007). The potential threat to human health resulting from inappropriate antibiotic use in food animals is significant, as pathogenic resistant organisms propagated in these food animals are poised to enter the food supply and could be widely disseminated in food product (Garafalo *et al*; 2007 and Parveen *et al*., 2007).

While antibiotic use in food animals may represent a risk to human health, the degree and relative impact have not been well characterized. Despite the wide spread adoption of antibiotic use in food animals, reliable data about the quantity and patterns of use (e.g. dose and frequency) are not available (Sarmah *et al*., 2006). Quantity antibiotic use in food animals is challenging due to variations in study objectives - investigators may measure only therapeutic uses or a combination uses, only non-therapeutic uses or a combination thereof, depending on their outcome of interest. To understand the public health risks associated with antibiotic usage within pigs and poultry birds, it is important to define the type and specific use of antibiotic agents that are associated with on-farm management practices.

2. Materials and Methods

Study participants

The study participants were drawn from poultry and piggery farms located in the study area. Poultry birds and pigs were the animals chosen because of the experienced farm managers. A total of 90 poultry and 72 piggery farms were solicited to participate in the antibiotic usage survey. The poultry farms classified as large poultry farms and the piggery farms classified as commercial piggery farms are scattered all over the seventeen (17) local government of Abia State.

3. Survey Questionnaire

What is the contribution of animal's sources to resistance among human pathogens? One approach to answer this question has been to direct questionnaires to informed experts (Bywater, 2003). These questionnaires were developed to identify and prioritize the antibiotics most effective and frequently used by poultry and piggery farmers and to estimate the perceived contribution of antibiotic overuse (abuse) in animal agriculture to the occurrence of antibiotics resistant bacteria. The questionnaire also requested information about current therapeutic and sub-therapeutic antibiotic usage

patterns and personnel data. The questionnaire survey was administered by the researcher to the senior farm managers, while records on drug usage and other management practice, were considered. The first part of the survey was administered to 60 commercial swine farms; the second part of the survey was administered to 60 commercial poultry farms that had records on herd/flock health and antibiotic use. The survey was conducted from May 2011 to April 2012.

4. Data Analyses

Answers to the questionnaire were analyzed using regression analysis to determine the factors responsible for abuse or misuse of antibiotics. Also simple statistical methods such as frequency, bar chart and percentage were used to interpret the questionnaires. All analyses were done using SPSS (2006) version 11.5 software.

5. Results

The widespread use of antibiotics both inside and outside of medicine is playing a significant role in the emerging of resistant bacteria (Gossens *et al.*, 2005). The resistance bacteria in animals due to antibiotic exposure can be transmitted to humans through consumption of meat, from close or direct contact with animals or through the environment (Schneider and Garrett, 2009). The survey conducted in this study included questions that were helpful to gain insight regarding farm management practices associated with antibiotic usage. One important finding of this study was the observation that the commonly used antibiotics in poultry farms was tetracycline (65%), in commercial pig farms was streptomycin (45%). Figure 1 showed that the use of tetracycline was significantly ($P<0.05$) higher than other antibiotics used in poultry farms due to the availability of this drug over the counter.

In large-scale poultry production, antibiotics are usually administered through water. The weak and sick ones may not able to get enough doses, while the stronger ones will get excess. Therefore, the mode of antibiotics administration was investigated.

Figure 2 showed that most of the drugs were administered through water (80%) in poultry farming, through injection (80%) in piggery farming.

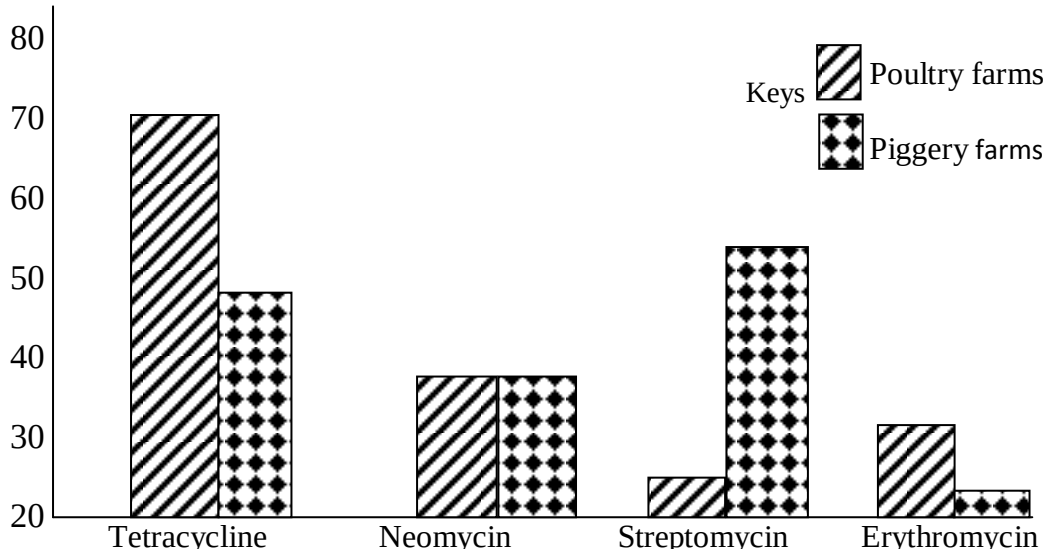

Figure 1: The most commonly used antibiotics in poultry and piggery farms

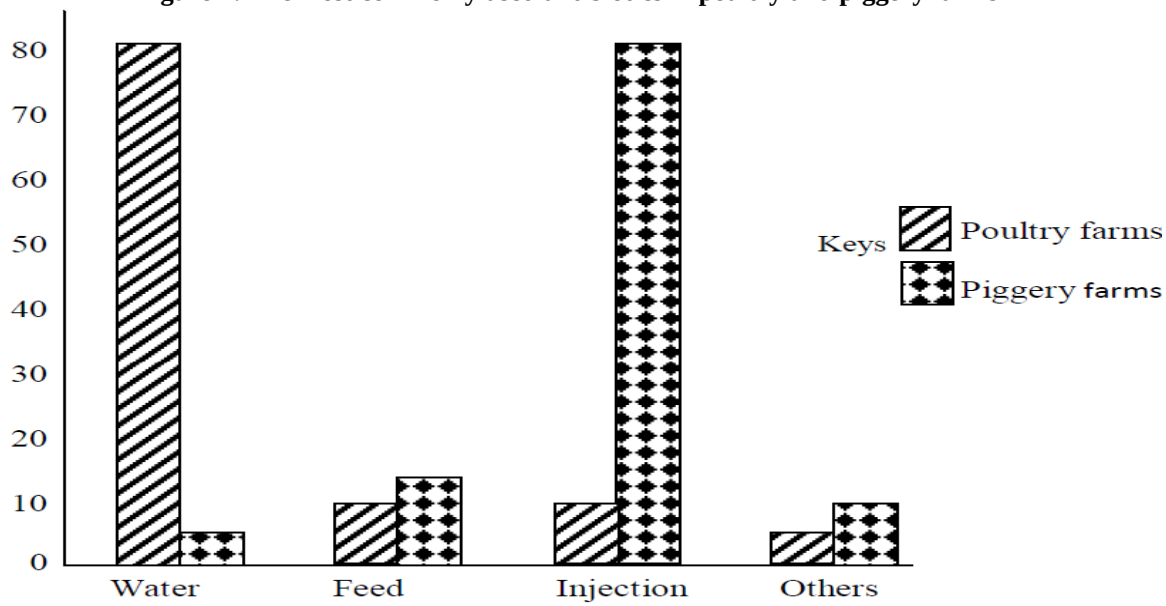

Figure 2: Modes of administration of antibiotics in poultry and piggery farms

Figure 3 showed that majority of antibiotic given was for treatment i.e. 60% for poultry birds and 65% for pigs. Figure 4 showed that majority of antibiotics used were given to pigs and poultry birds (75% and 65% respectively) without laboratory analysis done on samples to isolate aetiological agents. Administration of antibiotics without proper

identification of aetiological agents leads to inappropriate treatment and development of resistant microorganisms. The lack of diagnostic services was the major reason why most farmers do not carry out laboratory diagnosis analysis of samples before administering antibiotics in poultry birds and pigs. Figure 5 showed that antibiotics were more frequently used in poultry farms (weekly) than in piggery farms (fortnightly). This might be as a result of the more vulnerability of poultry to diseases than pigs. Figure 6 showed that personnel that make the prescription of antibiotics were the farmers/managers (70% in poultry, 65% in pigs). The tendency to rely on personal experience for antibiotic use, dosage and withdrawal period could lead to improper antibiotic usage. Responses of respondents showed that 80%of poultry farmers affirmed that the antibiotic treatment was completed according to the prescription and duration of treatment, while in piggery farms, it was 62% of farmers who affirm thus:

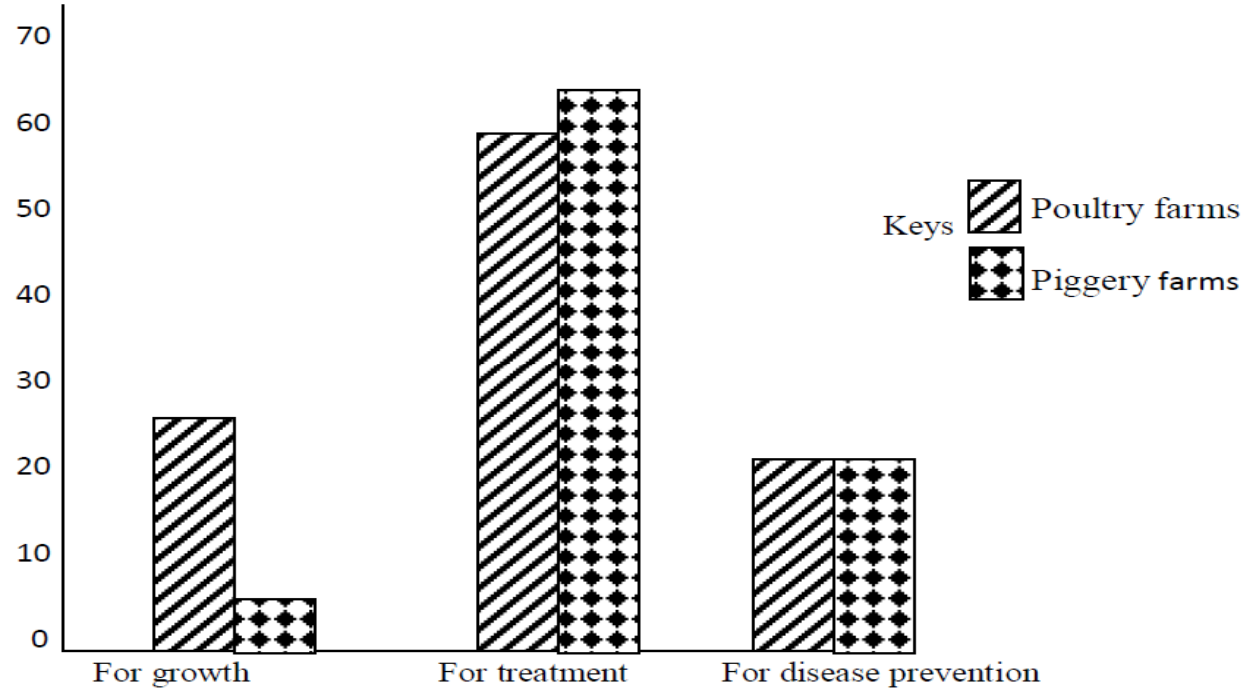

Figure 3: Reasons for the usage of antibiotics in poultry and piggery farms

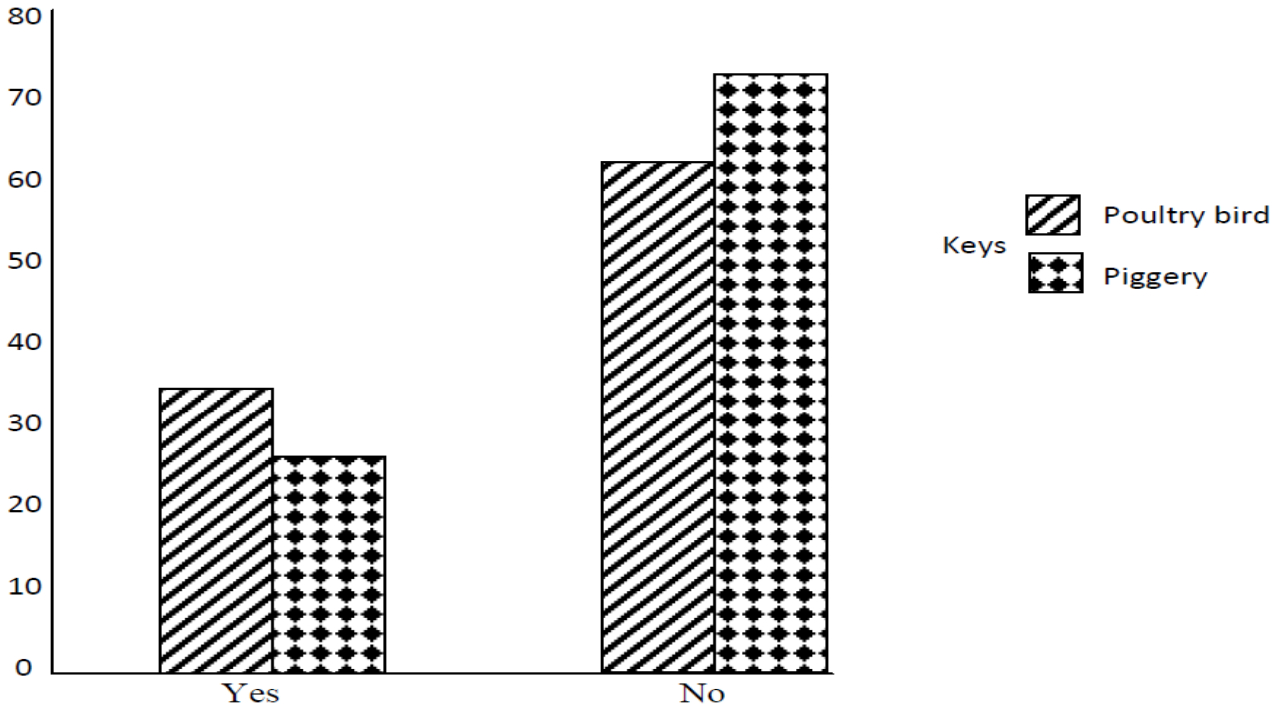

Figure 4: Laboratory analysis done prior to antibiotic use in poultry and piggery farms

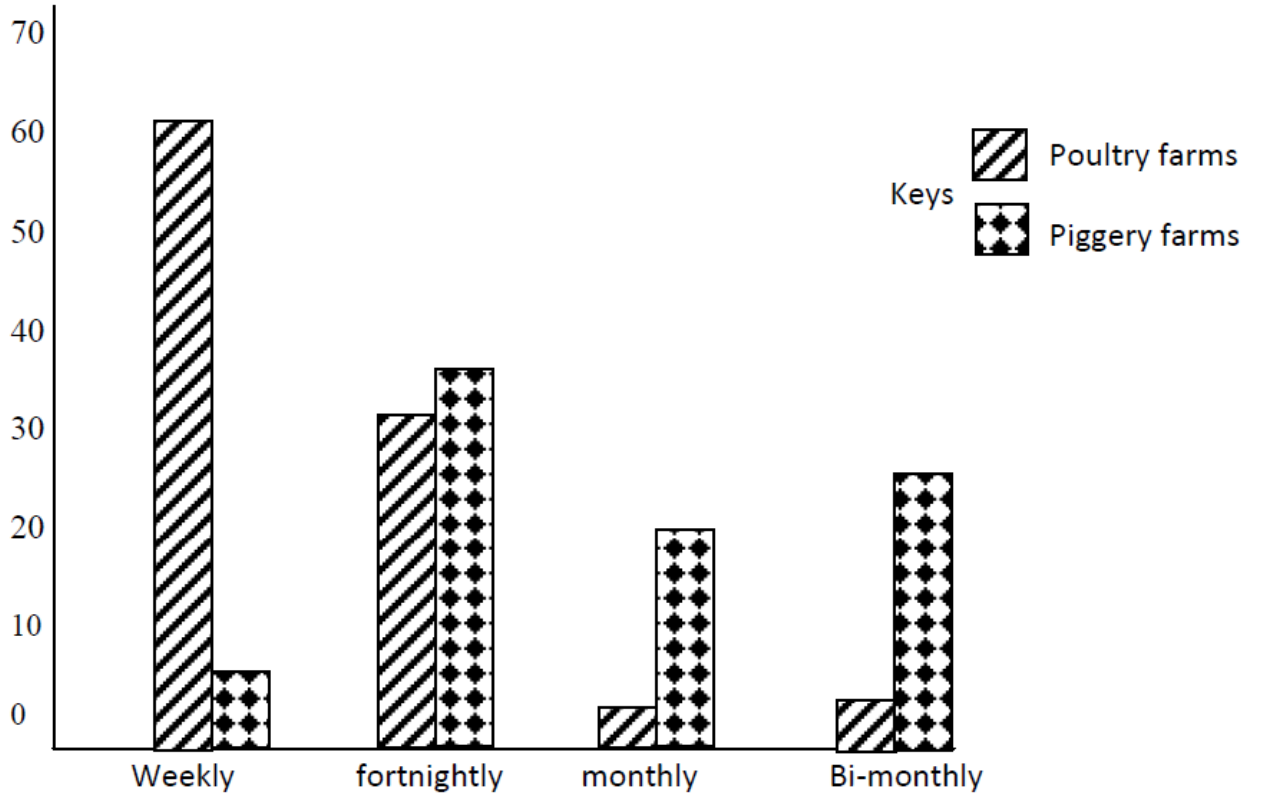

Figure 5: Frequency of antibiotics use in poultry and piggery farms

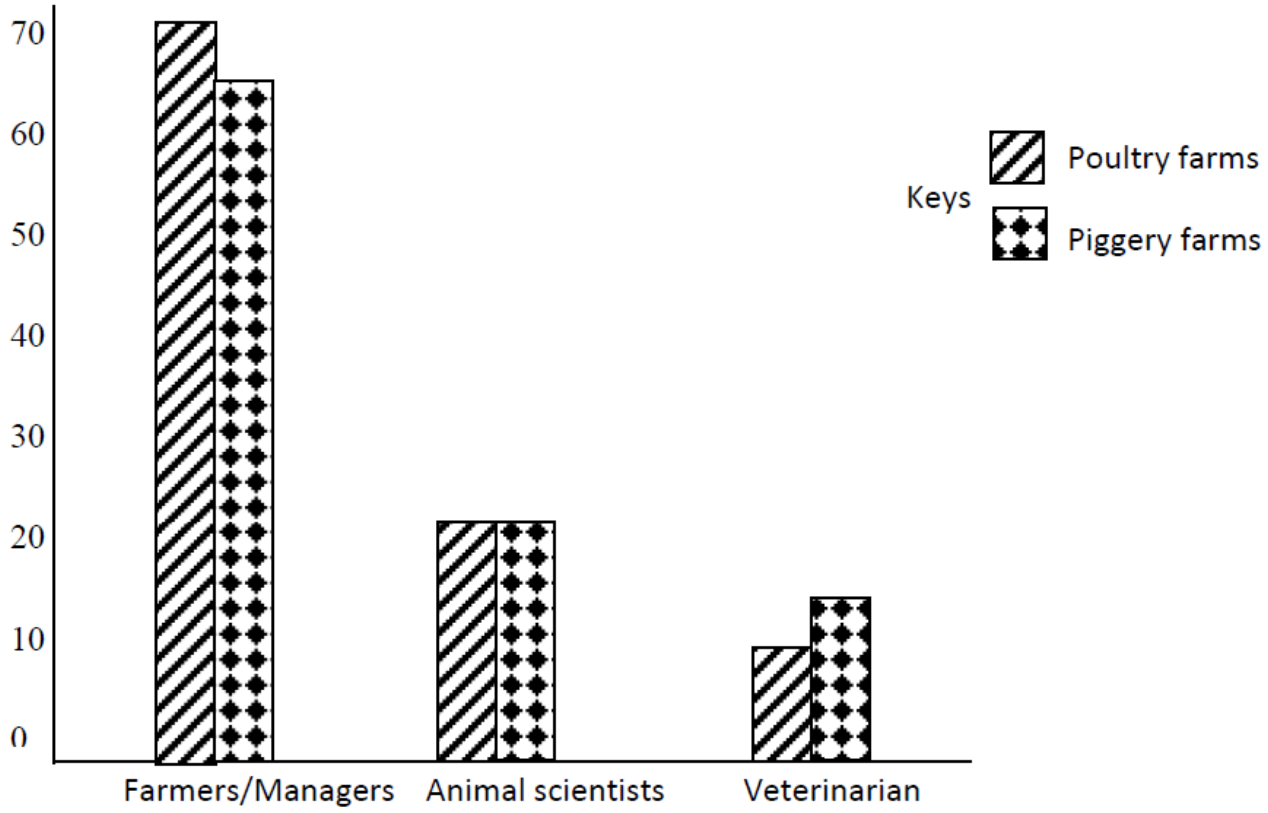

Figure 6: Personnel that makes prescription of antibiotics usage

6. Discussion

Chlortetracycline (most commonly used at 400g/ton feed) and Streptomycin (30g/ton feed) were the two most effective and frequently use antibiotics for growth promotion, prophylactic and therapeutics and were in use in poultry birds and piggery farms respectively. Twenty-eight poultry farms reported regular sub therapeutic use of neomycin, while Streptomycin and erythromycin were constantly used in one third of the poultry and piggery farms. If historical usage was also considered, tetracycline usage was most prevalent. In an earlier study, Sawant *et al*; (2005) reported that beta lactams and streptomycin were the most widely used antibiotics on livestock. Specifically, all the ten piggery and poultry farms that reported historical usage patterns has discontinued the use of tetracycline only 1 to 3 months prior to survey. Various other antibiotics were in use at sub-therapeutic levels at some of the poultry and piggery farms, including a

mixture of tetracycline, sulfathiazole, penicillin, lincomycin, virginiamycin, carbadox and tylosin. They were sometimes used simultaneously and sometimes sequentially during the production cycle, and the treatment varied in nature, dosage and duration. These results are consistent with results from a national survey performed by the National Animal Health Monitoring Survey (NAHMS) in which tetracycline, tylosin and bacitracin were the most commonly used antibiotics in grower and finisher animals (NAHMS, 2002). These results were also consistent with those of a slightly older survey of antibiotics use at Canadian swine farms in which tylosin was the most common antibiotic used in finisher animals (Dunlope *et al*., 1998).

All poultry and piggery farms visited reported therapeutic usage of antibiotics in the last 4 years. The type of antibiotics used included tetracycline (all farms), penicillins and related cephalosporins (40% poultry farms, 30% piggery farms), the lincosamide Lincomycin (30% for both farms), the macrolides (50% for both farms), sulfa-drugs (60%) for poultry farms and (40%) for piggery farms; and bacitracin (20% in both farm types). Therapeutic antibiotics were frequently used at high concentration through injection in pigs and through addition to water supply in poultry birds between 3-4 days duration. Sub-therapeutic antibiotics were routinely included at low levels in the feed of pigs and poultry birds. This may further add to the threat of antimicrobial resistance (Schjorring and Krogfeldt, 2011). Antibiotic prescriptions were mainly made by farmers/managers (70%in poultry, 65% in piggery farms). This is a contradiction on the use of chemical substances. Most of these prescriptions made without laboratory analysis done on samples for the isolation and typing of the pathogenic organism. The tendency to rely on personal experience for antibiotic use, dosage and withdrawal period could lead to improper antibiotics usage as reported by Zwald *et al*. (2004). Indiscriminate use of antibiotics may lead to the evolution of resistance by selecting directly for drug-resistant pathogens as well as for mobile genetic elements carrying resistance determinants to human and non-human animal pathogens. Antibiotics and antibiotic-resistant bacteria can be found in the air, ground water and soil around farms and on retail meat (Smith *et al*., 2005), and people can be exposed to these pathogens through infected meat, vegetables fertilized with raw manure and water supplies contaminated by farm animal waste (Acar and Moulin, 2006).

Data on drug usage is essential for the development of national and international policies for containment of antibiotics resistance. This is seen in Denmark as reported by Stage *et al*; (2003) where data are collected at the farm level to include information concerning animal species, age of animal, disease, and farm identification number, amount of medicine and date of use of medicine. Antibiotic usage data for the European countries was carried out by Grave *et al*. (2010). The rather large differences can be experienced by differences in types of animal production systems, different veterinary antibiotic policies and practices or differences in disease occurrence.

In conclusion, there was considerable variation in the management practices associated with antibiotic use on farms and reliable antibiotic use data for pigs and poultry birds are not publicly available, making it difficult to determine which drugs are used in what quantities and for what purposes. The absence of susceptibility testing and failure to consult veterinarian for treating animals, are some of the barriers to better surveillance. It can be inferred that antibiotics, particularly tetracycline and streptomycin, are extensively used for prevention and treatment of disease in pigs and poultry birds in Abia State.

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