
ANTIMICROBIAL USAGE IN BROILER FARMS IN, PERI-URBAN, NAIROBI, KENYA

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ABSTRACT

Introduction: Increase in the use of antimicrobials in farm animal production is a public health concern as incorrect application of the antimicrobial results in residues in meat, milk, eggs and other livestock products.

Methods: A study was conducted to assess the antimicrobial usage in broiler farms in peri-urban, Nairobi, Kenya. Structured questionnaire was administered to 30 broiler farmers in the study area to obtain information on general farm demographics, broiler production structures and systems, local knowledge and understanding on the issues surrounding poultry diseases and usage of antimicrobial drugs. To determine antimicrobials used at the time of study, packaging materials such as labels, antimicrobial bottles and packets were collected at the farm and the information recorded.

Results: The study found that 80% of the participants interviewed treated the broilers by administering the drugs in drinking water. The most frequently used antimicrobial drugs were reported to be sulfonamides (59%), tetracycline (23%) and amprolium (9%) and 50% of the farmers sold broilers during the drug administration period. Majority of the farmers (87%) were

aware of the drug withdrawal period and 73% of them believed that drugs administered to broilers can be passed to consumers.

Conclusions: The study found that broiler farmers had access to common antimicrobial drugs used to treat and control diseases in broilers; they were also aware of the adverse effects of antimicrobial drug residues in broiler tissue to human health. The study recommends the relevant authorities to enforce the existing legislations to curb abuse and misuse of antimicrobial drugs by livestock farmers.

Keywords: antimicrobials, broiler farms, usage, peri-urban

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INTRODUCTION

Commercial poultry industry is well developed worldwide and is the largest supplier of animal protein in form of meat and eggs. Its significance is even greater in developing countries where poultry are relatively cheaper and can be kept in a small area, usually providing both protein and some income for a family (Law and Payne, 1996; Sirdar, 2010). Poultry meat and eggs offers considerable potential for meeting human needs for dietary animal protein supply (Amos, 2006).

Poultry meat has emerged as a good substitute for beef and mutton (Mehtabuddin et al., 2012) and therefore the higher turnover rate of poultry and the quest for white meat have given

credence to poultry in livestock farming. The need to meet the demand for poultry meat has necessitated the large scale production of poultry and subsequent use of veterinary drugs especially antimicrobials (Ezenduka et al., 2014).

Decreasing land sizes due to high population growth means that poultry production has become the investment of choice due to its low space requirement (Kingori et al., 2010). Broiler chickens in a modern production system are produced in less than six weeks, through genetic selection, improved feeding and health management practices involving use of antibiotics as therapeutic agents to treat bacterial diseases (Apata, 2009).

Commercial poultry production is one of the major livestock enterprises in peri-urban areas of Kenya due to its minimal demand for space. Lack of biosecurity measures, prevalence of infectious diseases and indiscriminate drug usage, without observing withdrawal periods, has made livestock products unsafe for human consumption (Mehtabuddin et al., 2012). Increase in the use of antimicrobials in farm animal production is a public health concern as incorrect application of antimicrobial results in residues in eggs, milk, cheese, butter and other livestock products (Tajick and Shohreh, 2006).

Antimicrobials are natural products of a micro organism or identical synthetic products or similar semi-synthetic products that affect bacteria by killing or inhibiting their growth. They are used in animals to control, prevent and treat infections as well as to enhance animal growth and feed efficiency (Tollefson and Miller, 2000; Sattar et al., 2014). Infectious diseases have been great threat to human and animal health throughout history and prominent causes of morbidity and mortality. It is estimated that today, more than half of all antimicrobials produced worldwide are used in the treatment of animals. The antimicrobials are used in clinically healthy animals, animals with clinical symptoms and for the improvement of animal growth (Magalhaes et al.,

2012). The use of antimicrobials for treatment or prevention of diseases in animals closely follow their uses in humans and today antimicrobial drugs are used to control, prevent and treat infections, and to enhance animal growth and feed efficiency (Cheong et al., 2010; Sattar et al., 2014). In Kenya, antimicrobial drugs are extensively used in livestock treatment and more commonly in intensively reared livestock such as pigs and poultry.

Antimicrobials were introduced in the veterinary field soon after the use of antimicrobials in treatment of human bacterial diseases (Darwish et al., 2013). Approximately 80% of all food producing animals receives medication for part or most of their lives (Lee et al., 2001; Pavlov et al., 2007; Darwish et al., 2013). The situation is further aggravated by the livestock producers who usually treat the entire group of livestock such as birds, fish or other animals despite the fact that only few individuals are affected. This situation therefore unintentionally and unnecessarily exposes healthy individuals to antibiotics (Darwish et al., 2013). The use of antimicrobials in animals for prophylaxis and therapy tend to increase when farm management is not optimum or when endemic diseases are not properly controlled (Sirdar, 2010). However, even if the farm is well managed, the increased density of livestock in intensive rearing operations requires an aggressive approach to disease control that can lead to heavy use of antimicrobials in control and treatment of diseases at the farm (Cheong et al., 2010; Sattar et al., 2014). The most commonly used antibiotics worldwide in food producing animals are the β -lactams, tetracyclines, aminoglycosides, lincosamides, macrolides, tetracyclines, pleuromutilins and sulfonamides (Lee et al., 2001). A study by Mitema et al., (2001) revealed that each year approximately 14,600kg of active antimicrobials are used in food animal production in Kenya of which approximately 78% are tetracyclines as well as sulfonamides – trimethoprim combinations.

There is scanty information available from past studies in Kenya on the livestock farmers' level of knowledge on usage of antimicrobial in treatment and control of the livestock diseases despite

presence of high levels of antimicrobial drug residues in meat, eggs, milk and other livestock products, hence the need for this study.

MATERIALS AND METHODS

The study was carried out in Njiru and Kasarani sub counties which are among the nine sub counties of Nairobi County. The study area was purposely selected as the two sub counties are within the peri urban area of Nairobi County with high proportion of broiler rearing enterprises/farmers. The sampling frame included all the active broiler farmers within the study area having broilers expected to mature and be slaughtered during the study period. The farms to be sampled were randomly selected from the total number of broiler farms in the two sub-counties.

The study involved administering open and close ended questionnaires to 30 broiler farmers through a face to face interview to obtain information on the general farm management, number of broilers kept, age of slaughter of broilers, common diseases/conditions affecting broilers at the farm, personnel who were treating sick broilers, common antimicrobials used and their route of administration to broilers, slaughter of broilers during antimicrobial administration period, farmers awareness of antimicrobial drug withdrawal period and source of information on antimicrobial drug withdrawal period and awareness of adverse effects of antimicrobial drug residues to consumers of broiler meat. Data was tabulated and analyzed using Microsoft Access R-studios Version 0.98.1091- © 2009-2014 Rstudios, Inc.

RESULTS

Broiler general farm management in peri- urban, Nairobi, Kenya

Of the 30 broiler farmers interviewed in this study 67% were females while male respondents were 33%. The spouses of the household heads comprised 63% of those involved in poultry farm management while only 30% of the respondents involved in farm management were household heads. Other noticeable farm managers in the study area were children and domestic workers each comprising of 3%.

Table 1: Proportions of respondents profiles by gender and household role/position

Variable	Category	Frequency	Proportion (%)
Gender	Female	20	67
	Male	10	33
Poultry farm managers	Spouse	19	63
	Household head	9	30
	Domestic worker	1	3
	Child	1	3

The average broiler flock size in the farms was 770 with a minimum number being 100 while the maximum number was 1,200. Most of the farmers sold the broilers for slaughter between 4-6 weeks of age.

Common diseases and conditions affecting broilers

The most common diseases and conditions frequently affecting the broilers were Coccidiosis followed by Pneumonia and New Castle Disease. Others included Gumboro, Fowl Typhoid, Fowl Pox (Table 2).

Table 2: Common diseases /conditions affecting broilers

Disease/Condition	Symptoms reported	Frequency	Proportion (%)
Coccidiosis	Dullness, anorexia, death, whitish Red/brown diarrhoea	27	90
Pneumonia	Crowding, respiratory distress, dullness, gasping, snoring, anorexia	18	60
New Castle Disease	Sudden death, greenish diarrhoea	9	30
Gumboro disease	Swollen bursa, watery diarrhoea, Massive deaths	5	17
Fowl Typhoid	Greenish diarrhoea, anorexia	5	17
Fowl Pox	Blister on the eyes, comb and wattle	2	7
Diarrhoea	Anorexia, watery faeces	2	7

Antimicrobial usage

Sulfonamides were the most commonly used antimicrobials comprising 59%. Another notable antimicrobial agents used in these farms were tetracyclines (23%), amprolium hydrochloride (9%) and coccidiostats (1%) (Figure 1)

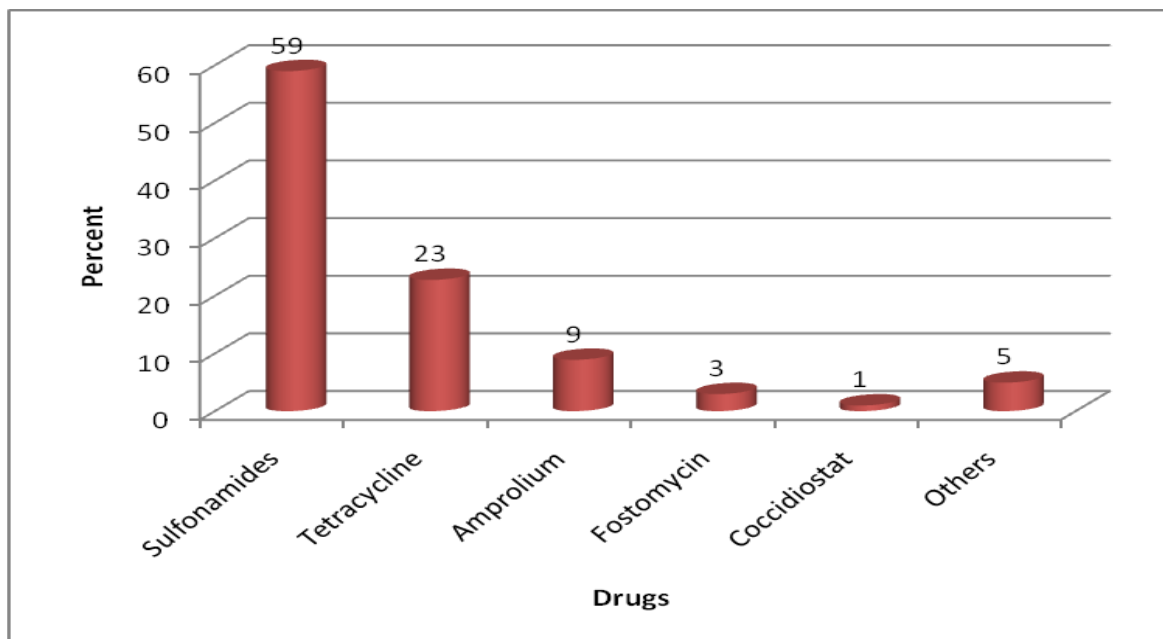


Fig 1:Antimicrobial drugs used to treat broilers in the farms.

The information on individuals who treated the sick broilers revealed that 80% of the farmers treated the sick birds by themselves and those attended by the veterinarian comprised of 63%. The other individuals who treated the broilers included para- veterinarians (57%) and farm worker (3%). Overall, the sick broilers were treated by farmers and animal health professionals. Most of the antimicrobial drugs were administered to broilers via oral route by mixing drug in drinking water.

The study revealed that 50% of the farmers sold their broilers during the drug administration period. The farmers who sold their broilers during the drug administration period did so to avoid incurring losses(100%), while the other 60% of the remaining farmers cited the need to buy feeds for the remaining broilers as reason for the sale of broilers during drug administration period. Another 7% of the farmers revealed that they sell the broilers depending on the instructions on the drug label while the final 7% believed that the antimicrobial residues may not be harmful to the consumers.

Table 3: Summary of individual treating sick broilers, route of drug administration and reasons for sale during treatment

Variable	Category	Frequency	Proportion(%)
Individual treating sick broilers	Farmers	24	80
	Veterinarians	19	63
	Para-veterinarians	17	57
	Farm worker	1	3
Route of drug administration	Drinking water	30	100
	Feed	1	3
	Injection	1	3
Reasons for sale of broilers during treatment period	Avoid incurring losses	15	100
	Buy feeds for the remaining birds	9	60
	According to drug label instructions	1	7
	Believes not harmful to consumers	1	7

Drug withdrawal period awareness by farmers

Of the farmers interviewed, 87% were aware on the need to adhere to the antimicrobial withdrawal period while 13% were unaware of drug withdrawal period. The farmers were further asked how they learnt about drug withdrawal period and 80% reported they learnt by reading the instructions on the drug packages. On the other hand, 60% of the farmers were informed by the extension officers during training seminars while 17% of the farmers were informed by pharmaceutical sales representatives.

Further analysis of the questionnaire data revealed that 73% of the broiler farmers believe that drugs used to treat broilers can result in residues in food of animal origin. In addition, 77% of the farmers interviewed were aware that antimicrobial residues passed to human food can result in harmful health effect.

DISCUSSION

The results from this study showed that female household members were the ones mostly involved in the management of the poultry farms studied. Poultry farming is also popular with women groups as income generating activity and therefore their high number among broiler keeping farmers. These results are in close agreement with the findings of Mubito et al., (2014a), who observed that of the 100 layer's chicken farmers interviewed during the survey, 54% were female and 46% were male. A similar study by Eltayb et al., (2012) in Khartoum, Sudan contrasted this study where 93% participants were males and 7% were females.

In this study majority of farmers sold the broilers from between four to six weeks of age. Broiler chickens in a modern production system are produced in less than six weeks, through genetic

selection, improved feeding and health management practices involving use of antibiotics as therapeutic agents to treat bacterial diseases (Apata, 2009). However, excessive use of antimicrobial by the farmers without the supervision of the veterinary professional can inadvertently result in presence of antimicrobial residues beyond the permitted limits. This is of great concern as the same antimicrobials are used in human medicine and for livestock treatment (Awad et al., 2005; Eltayb et al., 2012). The use of antimicrobials for therapeutic or prophylaxis of animal diseases closely follow their uses in human (Sattar et al., 2014).

Coccidiosis was the most prevalent poultry disease reported in the farms though other bacterial and viral infections were reported. In a similar study in Tanzania, Nonga, et al., (2009) reported high prevalence of several bacterial, viral and protozoal diseases in the locality due to poor poultry management system. In order to safeguard their investments, farmers use sub-lethal doses of antibiotics to prevent diseases and promote growth (Sekyere, 2014). Proper farm management helps minimise the use of antimicrobials though even if well managed, the increase of livestock in intensive rearing operations requires aggressive approach to disease control that can lead to heavy antimicrobial use (Cheong et al., 2010; Sattar et al., 2014).

From this study, sulfonamides and tetracyclines were the most widely used drugs in these farms. Mubito et al., (2014a) found out the most commonly used antimicrobial usage in Dar-es- Salaam were tetracyclines (32.2%) and sulfonamides (20.8%), this is in agreement with this study. A similar study in Sudan by Eltayb et al., (2012) showed that, tetracyclines and quinolones were the most frequently used antibiotics. In Kenya, a study by Mitema et al., (2001) reported that each year approximately 14,600kg of active antimicrobials were used in food animal production of which approximately 78% were tetracyclines and sulfonamides – trimethoprim combination. Sulfonamides have been used extensively in farm animal production due to low cost, ease of

administration and a wide range of application, resulting in a rapid rise of bacteria-resistance, cross-resistance among sulfonamides and residues appearing in animal products (Prescott, 2000; Kishida, 2007; Smith et al., 2007). Other studies have shown high prevalence of antimicrobial residues in meat and milk (Muriuki et al., 2001; Sasanya et al., 2005; Stolker et al., 2008; Sirdar et al., 2012). Increase in the use of antimicrobials in farm animal production has a public health impact. This is because incorrect application of antimicrobial results in residues deposits noticeable in eggs, milk, cheese, butter and other livestock products (Tajick and Shohreh, 2006).

The antimicrobials drugs were reported to be mainly administered to the sick birds in drinking water. The results were in agreement with the findings by Mubito et al., (2014a) where all antimicrobials used in the study were administered through drinking water. This may be due to the fact that antimicrobials formulations commonly used can easily dissolve in water even in low concentrations than mixing in the feeds. Sick birds may stop eating but tend to continue drinking water. Further, study by Nonga et al., (2009) revealed that all drugs used by farmers were administered either in drinking water or mixed with feeds.

Treatment of sick broilers was done mostly by farmers themselves though animal health professional were also involved in the treatment. This showed that farmers have access to antimicrobial drugs and therefore the risk of the farmers abusing and misusing the antimicrobial was high. Sattar et al., (2014) noted that many livestock producers treat their animals themselves; however, even if they use same drugs as veterinarians, they have little understanding of the conditions and quantities to administer or waiting period. In Morogoro Tanzania, up to 65% of farmers were reported to treat their chicken themselves after getting advice from drug sellers (Nonga et al., 2009).

Farmers interviewed agreed that they slaughtered broiler chicken for sale during antimicrobial drug administration period and therefore not observing the drug withdrawal period. This was occasioned mainly by two reasons; the fear of loss arising from condemnation during the withdrawal period and the need to buy feeds for the remaining chickens. Nonga et al., (2009) showed that majority of commercial chicken eggs sold for human consumption in Morogoro municipality contained antimicrobial residues. Sasanya et al., (2005) reported that due to poverty, majority of farmers in Kampala, Uganda were more concerned with the production costs rather than public health risks and could not think of discarding eggs for the purposes of observing withdrawal period. In Sudan, 98% of the farmers interviewed were reported to continue sell eggs while their hens were on antimicrobial treatment (Sirdar et al., 2012). Failure to observe proper withdrawal periods of antimicrobials in broilers and layers after treatment means that, meat and eggs from these birds may be contaminated with antimicrobial residues.

Most poultry farmers interviewed were aware of the antimicrobial drugs withdrawal period with most of them knowing that the drug residues could contaminate food of animal origin causing harmful health effects. However, they did not observe the antimicrobial drug withdrawal period. Indeed, Mubito et al., (2014a) also reported similar findings where chicken farmers in Dar-es-Salaam, Tanzania were aware of the antimicrobial withdrawal periods but none admitted to observe it. Nonga et al., (2009) reported that all farmers did not observe withdrawal period while selling eggs as they feared to incur economic losses associated with condemned eggs and some farmers reported to eat eggs from their own birds which were under antimicrobial treatment within the antimicrobial withdrawal periods.

On the source of information on drug withdrawal period, most poultry farmers got the information from instructions given by the drug manufacturer on drug packet/package and from

seminars organised by livestock production officers. These farmers believed that the antimicrobial residues could contaminate food of animal origin and cause harmful health effects to humans. In Ashanti region of Ghana, a study by Sekyere, (2014) on antibiotics types used and handling in disease management by pig farmers revealed that farmers were educated on the use of antibiotics by veterinarians, experienced colleagues and at veterinary shops. However, the well educated farmers followed product legends for instructions instruction on drug use. This observation agrees with the findings of this study.

Inadequate enforcement of legislation regarding antimicrobial application in farm animals as well as monitoring and control of their residues has probably led to reported high rates of antimicrobial residues in poultry products (Nonga et al., 2009; Mubito et al., 2014b). Pavlov et al., (2008) emphasised the need to protect public health against possible harmful effects of veterinary drug residues arising from the misuse and abuse of antimicrobial drugs. Therefore, there is urgent need of producers to be aware of legal and public health consequences of the products they produce and strive to use good management and veterinary practices. The regulatory authorities should enforce the laws enacted to safeguard the consumers from the adverse effects of antimicrobial residues and also formulate new laws/regulations to plug any existing gaps (Mubito et al., 2012b). This study also backs a similar proposal to help protect humans from the harmful health effects that may results from consuming chicken meat contaminated by antimicrobial residues.

CONCLUSION

The broiler farmers have access to common antimicrobial drugs use to treat and control diseases in broilers; they were also aware of the adverse effects of antimicrobial drug residues to human

health. The relevant authorities should enforce the legislations to curb abuse and misuse of antimicrobial drugs by livestock farmers.

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