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Full Length Research Paper

Antimicrobial residues screening in pigs and goats slaughtered in Nsukka Municipal abattoir, Southeast Nigeria

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Antimicrobial residue in animal food products is an important index of food safety. Drug residues could result from chemotherapeutic or chemoprophylactic use of drugs in food animals. This occurrence of residue in animal food products has received enormous worldwide attention from some local, international and public health agencies. Samples of tissues/organs from pigs and goats slaughtered at the Nsukka Municipal abattoir, Southeast, Nigeria were screened for the presence of antimicrobial residues. Samples collected from the muscles, liver and kidney of 40 slaughtered pigs and 40 slaughtered goats were analysed for antimicrobial residues using the four plate agar diffusion method. 12 (30%) of the 40 sampled pigs and 10 (25%) of the 40 sampled goats were positive for antimicrobial residues. In pigs, antimicrobial residues occur more in the kidney, muscle and liver in that order, while in goats they occurred more and equally in kidney and liver than in the muscle. The result of the study clearly suggest that the rampant use of antimicrobial drugs in slaughter animals at the Nsukka municipal abattoir coupled with non-adherence to withdrawal periods is grossly practiced in Nigeria. This study further confirms the need to regulate the use of veterinary drugs in livestock production and to enforce laws guarding against drug residues in food animals.

Key words: Residues, antimicrobial, pigs, goats.

INTRODUCTION

Meat is an essential part of mans' diet and a significant percentage of meat and meat products consumed worldwide and in Southeast Nigeria in particular comes from pigs and goats. The food animals include goats for chevon and milk production, and pigs for pork production. Challenges of global population growth have led to increased efforts at finding resources to enhance animal food production to its maximum (Nonga et al., 2009). Developments in animal husbandry in the past 50 years have resulted in the proliferation of intensive production units, especially for pigs and poultry where the animals are kept in limited spaces. Such intensive units are prone to outbreak of diseases especially in underdeveloped countries where the practice of strict biosecurity measures is limited. Routine prophylaxis with low level antibiotics was therefore found necessary to prevent disease outbreak. The use of antimicrobials in animals for therapeutic and prophylactic purposes closely follows their uses in humans (Gustafason and Bowen, 1997). These drugs are generally used today not only for treatment and prevention but to enhance growth and food efficiency (Tollefson and Miller, 2000). Approximately 80% of all food producing animals currently receives medication in part or most of their lifetime (Lee et al., 2001; Pavlov et al., 2008). Antimicrobial use in food animals may result to residues in their products (meat, milk and egg) especially when the stipulated withdrawal period of the agent is not observed. This use of antimicrobial drugs in food animals has recently become a very important public health issue (Jafari et al., 2007). Reports have shown that exposure to these antimicrobial residues in food animal products could result to transfer of resistant strains of microorganisms to humans,

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distortion of the intestinal microflora and bone marrow depression among other pathologies in humans (Nisha, 2008; Jafari et al., 2007). In Southeast Nigeria, pig, goat and chicken production is the major food producing livestock farming practiced. However, there is a dearth of data on the presence of antimicrobial residues in the meat of these food animals, hence the need for this study.

MATERIALS AND METHODS

Sample collection

Samples were collected from goats and pigs slaughtered at Nsukka Municipal abattoir, Enugu State, Southeast, Nigeria. Nsukka is one of the three agricultural zones in Enugu State. 10 g each of meat (muscle), liver and kidney were collected from 40 goats and 40 pigs, totalling 120 samples from each species. The samples were packaged in polyethylene bags and labelled according to the animal from which they were collected. They were then taken to the laboratory and processed as described by Oboegbulem and Fidelis (1996), by cutting off approximately 2 g of 1 to 2 cm chunk of the 10 g collected from the abattoir. The samples were processed the same day as fresh samples.

Assay for antimicrobial residue

The antimicrobial residue screening was done with the four plate agar diffusion test (FPT) using *Bacillus subtilis* and *Staphylococcus aureus.* The presence of antimicrobial agents in each of the samples was confirmed by a complete inhibition of microbial growth in an annular zone not less than 2 mm (0.2 cm) around the piece of meat. Less than 2 mm of inhibitory zone indicate negative result.

Sensitivity test

An initial sensitivity test to cephaloxin, norfloxacin, gentamycin, erythromycin, ciprofloxacin, amoxicillin, streptomycin oxytetracycline and clindamycin was done for the stock colonies of *B. subtilis* and *S. aureus.*

Preliminary test

To assess the efficiency of the four plate test in detecting antimicrobial residue in tissue samples, a positive control as described by Oboegbulem and Fidelis (1996) was set up by injecting oxytetracycline intramuscularly into two chickens daily for three consecutive days. They were then sacrificed on the 4th day and samples from the breast/thigh muscles, liver and kidney were removed and tested by the FPT.

RESULTS

Sensitivity test

The stock *B. substilis* sample was found to be sensitive to cephaloxin, norfloxacin, gentamycin, erythromycin, ciprofloxacin, tetracycline, clindamycin, trimethoprin and streptomycin but less sensitive to amoxil and ampiclox. *S. aureus* stock sample was found to be sensitive to all the aforementioned antimicrobial agents except trimethoprin.

Preliminary test

The preliminary test with oxytetracycline showed that all tissue samples were positive for tetracycline residue as each of the four plates showed a clear zone of inhibition for the growth of *B. substilis* and *S. aureus*. No such inhibition occurred in the negative control plate showing the efficiency and sensitivity of the FPT.

Antimicrobial residues in test samples from slaughtered pigs and goats

The results of the antimicrobial residues in tissue samples from slaughtered pigs and goats showed that 12 (30%) of the 40 pig samples and 10 (25%) of 40 goat samples were positive for antimicrobial residue.

Antimicrobial residues in pig organs

Out of a total of 120 organs from slaughtered pigs comprising 40 samples from each of the three organs (muscle, liver and kidney), eight (20%) muscle samples, four (10%) liver samples and 10 (25%) kidney samples were positive for antimicrobial residues.

Antimicrobial residues in goat organs

Out of a total of 120 organs from slaughtered pigs comprising 40 samples from each of the three organs (muscle, liver and kidney), 10 (25%) muscle, 12 (30%) liver and 12 (30%) kidney samples were positive for antimicrobial residues.

DISCUSSION

Pig and goat farming are the major food producing livestock farming in Southeast Nigeria. Pigs in Nsukka area are mostly reared intensively and most of the farmers do not employ the services of a veterinarian to take care of the animals. They (farmers) tend to treat the animals themselves due to uncontrolled availability of veterinary drugs with no restriction in purchase (purchase without prescription). Goats slaughtered in Nsukka abattoir on the other hand come from two sources, the Northern part of Nigeria and locally reared West African Dwarf (WAD) breed in Nsukka metropolis. The occurrence of antimicrobial residue in goat tissues could be attributed to the practice of the indigenes selling off their mature sick goats after treating to mask clinical signs or selling off those that defied treatment. Goat owners in the rural areas also tend to sell off their sick

goats due to unavailable resources to employ the services of a veterinarian. Most times these goats are treated in the lairage awaiting slaughter. The indiscriminate use of antimicrobial substances and non observance of withdrawal period which has been reported as the major cause of violative residues in animal food products (Pikkemat et al., 2008; Riviere and Sundlof, 2001) have led to the availability of unsafe pork and chevon to consumers. Few other works done in different parts of the country also detected antimicrobial residues in different animal species (Ibrahim et al., 2010; Ezenduka et al., 2011; Dipeolu and Alonge, 2002; Kabir et al., 2002) and they also attributed the major cause of drug residue in food of animal origin to non-adherence to withdrawal periods and misuse and abuse of veterinary drugs. The lack of the enforcement of regulatory laws to veterinary drug use in Nigeria has led to the abuse and misuse of drugs in food animals. The result of this work and other works that detected residue in food animals in Nigeria will create awareness to the stake holders (government and consumers) gearing to necessitate the enforcement of adherence to withdrawal periods, effective monitoring and surveillance of drug residues in meat animals and control of drug use in food animals to prevent the occurrence of violative drug residue.

The European FPT is essentially a multiresidue technique for screening animal products; it does not however identify the incriminating antimicrobial or the quantity of residue. Despite its limitations, the use of bacteria in detecting residues has since been useful in the meat industry (Okerman et al., 1998).

REFERENCES

Dipeolu MA, Alonge DO (2002). Residues of Streptomycin antibiotic in meat sold for human consumption in some States of South West Nigeria. Archivos de Zootecnia 51:477-480.

Ezenduka EV, Oboegbulem SI, Nwanta JA, Onunkwo JI (2011). Prevalence of antimicrobial residue in table eggs from farms and retail outlets in Enugu State, Nigeria. Trop. Anim. Hlth and Prodn. 43: 557-559.

Gustafason RH, Bowen RE (1997). Antibiotic use in animal agriculture. J. Appl. Microbiol. 8:531-541.

Ibrahim A, Junaidu A, Garba M (2010). Multiple antibiotic residues in meat from slaughtered cattle in Nigeria. Internet J. Vet. Med. 8(1).

Jafari M., Khayamian T, Shaer V, Zarei N (2007). Determination of veterinary drug residues in chicken meat using corona discharge ion mobility. Spectro. Anal. Chim. Acta 581:147-153.

Kabir J, Umoh JU, Umoh VJ (2002). Characterisation and Screening for Antimicrobial Substances of Slaughtered Cattle in Zaria, Nigeria. Meat Sci. 64(4):435-439.

Lee HJ, Ryu PD, Lee H, Cho MH, Lee MH (2001). Screening for penicillin plasma residues in cattle by enzyme linked immunosorbent assay. Acta Vet. BRNO 70:353-358.

Nisha AR (2008). Antibiotic residue, a global health hazard. Vet. World 1(12):375-377.

Nonga HE, Mariki M, Karimuribo ED, Degala RH (2009). Assessment of antimicrobial usage and antimicrobial residues in broiler chickens in Morogolo munincipality, Tanzania. Pak. J. Nutr. 8(3):203-207.

Oboegbulem SI, Fidelis AP (1996). Detection of antimicrobial residues in poultry meat and slaughtered cattle in Nigeria. Meat Sci. 43(1): 71-74.

Okerman L, De Wasch K, Van Hoof J (1998). Detection of Antibiotic in Muscle Tissue with Microbial Inhibition Test: Effects of the Test Matrix. The Analyst. 123: 2361-2365.

Pikkemat MG, Van-Dijk SO, Schouten J, Rapallini M, Van Egmond HJ (2008). A new microbial screening method for the detection of antimicrobial residue in slaughter animals. The Nouws Antibiotic Test (NAT-Screening). Food Control 19: 781-789.

Riviere JE, Sundlof SF (2001). Chemical residue in tissues of food animals. In: Veterinary Pharmacol. Therapeutics. Ed. Adams HR: 8th Edition; Blackwell Publishing Professional Lowa pp.1166-1174.

Tollefson l, Miller MA (2000). Antibiotic use in food animals: controlling the human health impact. J. AOAC. Int. 83:245-256.