Journal of Agriculture and Veterinary Sciences
Volume 6, Number 1, 2014
ISSN: 2277-0062

Antibiotic Residues in Poultry Slaughtered in Monday Market in Maiduguri City of Borno State, Nigeria.

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ABSTRACT

Wrong used of antibiotics have the tendency or inclination to deposit some residues in the tissues of animals for human consumption. This research was undertaken to look into the importance and presence of antibiotic residues in poultry meat in Maiduguri. One hundred and fifty-five samples of poultry meat were collected from various poultry slaughter units. Five grams of each sample was subjected to thin layer chromatography for detection of antibiotic residues. The samples were crushed and squeezed in 5ml of ethanol. They were clarified by centrifuging the solvent and evaporated completely using water bath. They were later loaded and run on silica gel plates and developed by putting in developing tank containing 50ml of methanol and acetone. This was lastly put in the iodine tank for chromatography to be developed for observation. The results showed that 21 (13.54%) of the samples were positive for oxytetracycline while 3 (1.93%) of them were positive for procaine penicillin. In conclusion, antibiotic residues are common in hybrid birds; proper attention should be given to the breed in terms of management. It is recommended that the use of antibiotics should follow withdrawal period in relation to marketing period. Proper professionals should be employed to handle the administration of antibiotics to birds.

Keywords: Antibiotic Residue, Chicken Meat, Poultry Slaughtered, Thin Layer Chromatography.

Introduction

Antibiotics are group of complex organic chemicals which are initially produced by micro-organisms during their growth which in small amounts have detrimental effects on the organisms. They are metabolites produced by bacteria, and moulds and have effects against living bacteria, some rickettsia, viruses, fungi

and few helminthes (Lee *et al.,* 2000). Antibiotics are chemical compounds derived from living or synthetic forms of organisms which in small amounts or concentration inhibit the life process of microbes. To be useful, an antibiotic should be action specific and stable in body fluids and enzymes as well as having low tissue toxicity while not giving rise to resistant strains (Bronden, 2001).

Antibiotics have been used in therapy of animal diseases since 1950s but there is now a general realization by the registration authority and veterinarians that their use be continually reviewed so that they can be employed in the best therapeutic manner, so that their use in animal therapy should in no way be harmful in their use for the control of human diseases (Brander and Pugh, 1973).

In veterinary pharmacology, is a short discussion about common problems of livestock and human antibiotics, incorrect application of antibiotics deposit noticeable residue in meat, egg and other livestock products; human as the non target organism of this drug receives different amounts of them as residues which can cause private changes in the intestinal micro flora and elimination of some useful bacteria strains (Tajick and Shohreh, 2002).

Another danger of receiving antibiotics as residues is microbial resistance of body micro flora to common antibiotics which may cause serious problems when microbial infections occur. There are some problems for soil micro flora which receives antibiotic residue in birds manure (Lee *et al.,* 2000). Non detected effect of this problem in humans is a widespread spectrum of resistance of antibiotic as a chronic effect (Tijck *et al.,* 2002).

Administration of drugs to food producing animals requires not only considerations of effects on the animals but also the effects on humans who ingest food from these animals. After food animals have been exposed to drugs in order to cure diseases and promote growth, the effects of residues such drugs cause in humans should be known. These residues consist of compound or compounds derived from parent drugs or both (Kotretsu, 2004) concern expressed by (Black, 1984) about the possible harmful effects on human through the use of drugs as follows:

i. Drug residues in food (edible tissues)
ii. Increased microbial drug resistance
iii. Drug toxicity
iv. Allergic reactions

v. Sensitization to antimicrobial drugs

Antibiotics to be used for addition to animal feed without prescription should be restricted to:

i. Those that are of economic value in livestock production,
ii. Those with little or no value as therapeutic agents in man or animals and
iii. Those that will not impair efficacy of a prescribed antibiotic through development of resistance strains of organisms (Lee *et al.,* 2000).

Veterinary drugs are considered public health hazard. Procaine Penicillin was reported to have caused severe anaphylactic reaction in a consumer (Thai and Zervous, 1999) skin allergies in subjects hypersensitive to sulfonamides could occur after consumption of foodstuff like eggs containing high concentration of sulfonamides residues (WHO, 1990). Nitrofuran drugs commonly employed for the treatment of salmonellosis and other bacterial infections in poultry are banned for use in livestock in many countries including Nigeria, because of their mutagenic potentials WHO also recommended the prohibition of the use of chloramphenicol in all food producing animal and birds (WHO, 1990).

An outcome of this residue effects is the need for new antibiotics for controlling infectious diseases of human. This produces huge costs for government to buy newer antibiotics and to sponsor researches (Kotretsu, 2004). In this study a simple and fast method was employed for the detection of antibiotics residues in poultry tissues. Thin layer chromatography is a sensitive and exact method for monitoring low amounts of different biological and chemicals. Illumination of antibiotics against UV light helps as a simple detector for this mean; to generate information or results which will help the regulatory body to control the use of antibiotics in poultry production in the study area especially as it relates to human health.

Materials and Methods

Study area

The study was conducted in Maiduguri, Borno state capital. It lies within latitude 11^0 - 15^0N and longitude 30^0 - 05^0E (Alaku, 1983). It covers an area of about 69, 436sqkm, and is located in the north-eastern part of Nigeria and shares borders with Chad and Cameroon Republic to the northern and east respectively. Within the country, it shares borders with Adamawa, Yobe, Gombe to the south-east, west and south-west respectively. The climate is generally

hot, dry, windy, and dusty for the greater part of the year in its northern part but the south is a bit milder.

Sampling: About 155 chickens (80 hybrid and 75 local breeds) collected from different poultry slaughter houses in Maiduguri Monday Market. The samples comprises of mainly poultry liver, kidney and muscle.

Antibiotic extraction: 5gr of different tissues of liver, kidney and muscle in 5ml of ethanol (Et-OH 96^0) crushed and squeezed fine in a Chinese mortar. The solvent transferred to 15ml falcon centrifuge tubes and centrifuged at 7000rpm for 10 minutes. The clear supernatant transferred to fresh glass test tubes and evaporated in contact with N2 stream. After drying, the deposits resolved in 0.2ml Met-OH. The samples were ready to point on silica plates (Tijck *et al.,* 2002).

Preparation of Silica Plates: Glass plate washed in acetone bath had 10 x 20cm dimensions. For each plate 2 grams of silica gel F256 (Merck, Germany) mixed in 5ml DW and shake thoroughly to produce fine paste by TLC gel spreader system (Shandon, England) in 0.25mm thickness plates activated in 120^0C for two hours (Boyer, 1993).

Standard Preparation: For comparison of extracted residues with raw antibiotics routine poultry antibiotics were prepared by dissolving of 0.1g of each powder in 4ml methanol (Thangadu *et al.,* 2002).

Pointing, running and detection: About 50µl of methanol dissolved deposits were pointed on silica plates. Treated plates transferred to TLC tank containing acetone-methanol (1:1) as a mobile phase after receiving of solvent, front to end of plates chromatograms observed on UV light at 256nm (Thangadu *et al,* 2002).

Results

The results of detection of oxytetracycline and procaine penicillin are shown in Table 1 below; indicated that out of one hundred and fifty five samples examined, 21 (13.54%) were positive for oxytetracycline in the Hybrid poultry and local breeds. As such, the local breed has 4 (2.58%) positive samples while 17(10.96%) were hybrid. However, 3 (1.98%) were positive for procaine penicillin from the hybrid birds. The total number of positive samples sums up to 24 with a percentage of 15.48.

Table 1: Residues of Oxytetracyclone and Procaine Penicillin in Poultry Tissue

Samples Tissue	Breed	No. of Samples Examined	Antibiotic Detected	
			Oxytetracycline (%)	Procaine (%)
Liver	Hybrid	40	14 (9.03%)	3 (1.93%)
	Local	40	4 (2.58%)	0
Kidney	Hybrid	20	0	0
	Local	20	0	0
Muscle	Hybrid	20	3 (13.54%)	0
	Local	15	0	0
$Total_1$	-	155	21 (13.54%)	3 (1.93%)
$Total_2$	-		24 (15.48%)	-

Source: Laboratory Analysis UNIMAID, 2012

Discussion

The detection of antibiotics shows that, the hybrids are more prone to the indiscriminate use of antibiotics than the local breeds mainly because of their commercial values.

The predominance of these residues in the hybrid birds is also associated to oxytetracyline being a drug of choice and the ease of obtaining it. The animal health auxilaries are involved in complicating the situation because of unethical and unprofessional use of drugs in treating most diseases associated with unknown causes due to improper diagnosis. The same applies to the use of these agents as feed additives in an attempt to boost productivity.

In Nigeria, drug legislation is not enforced to full capacity as prescription drugs such as antibiotics are at the disposal of everyone. The wrong use of these therapeutic agents with regards to dosage and route of administration is compounded by disregard for withdrawal periods which may be another reason for these residues in the area of study. As a consequence, man the non-direct target of the therapeutics is exposed to cumulative quantities of these drugs in the tissues consumed, this builds chronic health hazards over time. The most common being development of acquired resistance to drugs. Acquired resistance is a type developed in the cause of treatment mainly by mutation and adaptation. The importance of subject is too clear for all food producers and veterinary specialist. Furthermore, there is resistance in human microbes antibiotics may induce resistance in avian and livestock bacterial pathogens (White *et al.,* 2002; Mckeller, 1998; Thai and Zervous, 1999). For escaping this problem, basic and advanced education of poultry and livestock workers is necessary. More analytical techniques are complement of reducing or eliminating drugs residue danger. Different methods are reported for the detection of oxytetracyline, and procaine penicillin which are found present in the study area. This indicated

that, it is obvious that drugs residue in livestock products especially milk and meat is an important problem in most countries (Levy, 1998, Gustavson *et al.,* 2000; Bertini *et al.,* 2003). This therefore, required the best method of detection. Report methods by (Gustavson, *et al.,* 2003) shows that thin layer chromatography is a simple non expensive and exact technique which can execute easily in most laboratories.

Conclusion and Recommendations

In conclusion, detectable ocytetracycline and Penicillin are present in the poultry tissue used as food in the study. And the higher numbers of samples were tested for oxytetracycline than procaine penicillin for various reasons outlined in the study. It was also discovered that local breeds of poultry are less exposed vis-à-vis the breeds as earlier specified.

Recommendations

The following recommendations are forwarded with regards to the study in relation to residues in edible poultry tissues:

1. All label instructions on dosage, course of therapeusis and withdrawal periods should be adhered to,
2. All poultry intended for slaughter should not be treated with these agents around consumption period and eggs should not be harvested from birds undergoing current treatment with these agents,
3. Poultry farmers and other stakeholders should register with a regulatory body so that it will be easy to test the presence of these drugs during sale of meat and eggs,
4. Veterinarians should be empowered to run researches into better and easy means of co-ordinating and running tests alongside with regulatory body.

Acknowledgement

The authors are most grateful to Dr. H.I. Musa and Dr. N.N. Atsandh, Department of Veterinary Public Health and Preventive Medicine, University of Maiduguri for their constructive criticisms in order to make the work successful. Their effort is highly respected and appreciated.

References

Alaku, S.O. (1983). Body and Carcass Losses in Goats During the Advanced Period of West African Sahelian Dry Season. *World Rev. Animal Production* 19: 49 – 54.

Bertini, S. Fierrero, S. and Berny, P. (2003). A New Improve High Performance Thin Layer Chromatography (HPTLC) Method for Detection of Ionophore Antibiotic in Feeds and Animals Tissue: *J. Liquid Chromat. Relat. Tec.* 26"147-156.

Black, W.D. (1984). Drugs and Chemical Residues in Edible Tissues of Animals in: Veterinary Pharmacology and Therapeutics. 5th Edition Bouth, NH and McDonald, L.E. Pp. 1063-1113.

Boyer, R.F. (1993). Modern Experimental Biochemistry. 2nd Edition. Benjamin Cummings Publishing Company, Redwood City CA550p.

Brander, G.C. and Pugh, D.M. (1973). Veterinary Applied Pharmacology and Therapeutics. Third Edition. Pp. 308-314.

Broden, E. (2001). Blacks Veterinary Dictionary. 20th Edition.

Choma, M.I. (2003). TLC Separation of Flouroquenolones: Searching for Better Selectivity. *J. Liquid Chromat. Relat. Tec.* 26:2673-2685.

Gustavson, E.A., Bjurling, P. Deglean, J. and Strrenjon, A. (2002). Analysis of B-lactam Antibiotics Using Microbial Receptor Protein Based Biosensor Assay Food and Agric. Immunol. 14:121-131.

Kotretsu, S.I. (2004). Determination of Aminoglyco Side and Quinolones in Food Using Tandem Mass Spectrometry: A Review Crit. Rev. Food Sci. Nutr. 44:173-184.

Lee, H.J., Lee, M.H., Ruy, P.D. (2009). Public Health Risk: Chemicals and Antibiotic Residues. Asian-Aust. *J. Animal Sci.* 14:402-413.

Lee, W. Z.H. Vakulenko, Li, S. and Mobashery, S. (2000). A Light Inactivited Antibiotic. *J. Med. Cem.* 43:128-132.

Levy, B.S. (1998). Antimicrobial Resistance: Bacterial on Defence. BMJ 317:612-613.

McKeller, Q.A. (1998). Antimicrobial Resistance: A Veterinary Perspective. MBJ 317:610-611.

Ramos, M. Amanda, A. Pozuelo, M. and Reuvers, T. (2003). Chloramphenicol Residues in Food Samples, their Analysis and Stability During Storage: *J. Liquid Chromat. Relat. Tec.* 26:2536-2449.

Tajick, M.A. and Shohreh, B. (2006). Detection of Antibiotics Residues in Chicken Meat Using TLC: *International Journal of Poultry Science.* 5(7):611-612.

Tajick, M.A. Rahimian, H. Alizadeh, A. and Rezaein, V. (2002) Analysis of Isolated Lipids from Sclerotia of *Rhizoetonia solani* AG-1-1A Using TLC. Proceeding of 14th Iranian Plant Protection Congress. Kermashah, Iran. Pp. 291.

Thai, L.A. and Zervous, J.M. (1999). Occurrence and Epidemiology of Resistance to Virginiamycio and Streptogramins. *Journal of Antiomicrobial Chemotherapy* 3:171-176.

Thangadu, S., Shukia, S.K. and Anjaneyuku, Y. (2002). Separation and Detection of Certain B-lactams and Floroqunolones Antibiotic Drugs by Thin Layer Chromatography. *Analytical Sciences* 18:97-100.

White, G.D., Piddock, L.J.V., Maurer, J.J., and Zhao, S., Ricci, V. and Thay, G. (2000). Characterization of Flouroquenolone Resistance among Veterinary Isolates of Avian *Escherichia coli.* Antimicrobial Agents and Chemotherapy; 44:2897-2899.

WHO (1990). Evaluation of Certain Veterinary Drug Resistances in Food. 36th Report of the Joint Food Agricultural Organization (FAO)/World Health Organization (WHO) Expert Committee on Food Additives. WHO Technical Report Series. No. 799 Geneva.

References to this paper should be made as follows: Sewond, B. *et al* (2014), Antibiotic Residues in Poultry Slaughtered in Monday Market in Maiduguri City of Borno State, Nigeria. *J. of Agriculture and Veterinary Sciences,* Vol. 6, No. 1, Pp. 59 – 66.