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Antibiotic Residues - A Global Health Hazard

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Abstract

Use of Antibiotic that might result in deposition of residues in meat, milk and eggs must not be permitted in food intended for human consumption. If use of antibiotics is necessary as in prevention and treatment of animal diseases, a withholding period must be observed until the residues are negligible or no longer detected. The use of antibiotics to bring about improved performance in growth and feed efficiency, to synchronize or control of reproductive cycle and breeding performance also often lead to harmful residual effects. Concern over antibiotic residues in food of animal origin occurs in two times; one which produces potential threat to direct toxicity in human, second is whether the low levels of antibiotic exposure would result in alteration of microflora, cause disease and the possible development of resistant strains which cause failure of antibiotic therapy in clinical situations. A withdrawal period is established to safeguard human from exposure of antibiotic added food. The withdrawal time is the time required for the residue of toxicological concern to reach safe concentration as defined by tolerance. It is the interval from the time an animal is removed from medication until permitted time of slaughter. Heavy responsibility is placed on the veterinarian and livestock producer to observe the period for a withdrawal of a drug prior to slaughter to assure that illegal concentration of drug residue in meat, milk and egg do not occur. Use of food additives may improve feed efficiency 17% in beef cattle, 10% in lambs, 15% in poultry and 15% in swine. But their indiscriminate use will produce toxicity in consumers. WHO and FAO establish tolerances for a drug, pesticide or other chemical in the relevant tissues of food producing animals. The tolerance is the tissue concentration below, which a marker residue for the drug or chemical must fall in the target tissue before that animal edible tissues are considered safe for human consumption. Tolerances are established based on extensive toxicological studies of potential hazards of consumption to human.

Keywords: Antibiotic, Residues, Global Health, Hazard, Meat, Milk, Egg, Drug, Animals, Human, Toxicology, Treatment, Withholding period.

Antibiotics as Growth Promoter

The antibiotics nowadays used for improved performance in growth especially in broilers and fatteners. They may produce improved growth rate because of thinning of mucous membrane of the gut, facilitating better absorption, altering gut motility to enhance better assimilation, producing favorable conditions to beneficial microbes in the gut of animal by destroying harmful bacteria and partitioning proteins to muscle accretion by suppressing monokines. Antibiotics also favour growth by decreasing degree of activity of the immune system, reduced waste of nutrients and reduce toxin formation. In most of the cases only young growing animals and poultry are responsive to antibiotic mediated growth promotion.

Antibiotics in Therapeutics

Indiscriminating use of antibiotics in all cases of pyrexia, inflammation, wounds and viral diseases have widespread residual effects on edible tissues. The use of antibiotics only in specific conditions is justified because the roll of microbial agents is mainly to kill the rapidly dividing invading cells.

Antibiotics in Prophylaxis

Animals and poultry are receiving sub therapeutic levels of antibiotics to prevent possible infection. But the antibiotics are specific to their

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spectrum of activity only in the active multiplying stage of bacteria. But it will not provide overall protection. Only in certain cases like dry cow therapy and surgical procedures are wanting of antibiotic prophylaxis.

Miscellaneous use of Antibiotics

Antimicrobials are used either directly or indirectly during the production processing and storage of milk and milk products. Direct contamination of milk may occur from air and water during processing, storage and transportation. Besides feed given to animals is also source of indirect contamination. Man will be the ultimate consumer of these antibiotic residues.

There are some causes of miscellaneous use like lack of awareness, lack of extension activities, inadequate literature supplied by manufacturers, lack of safer drugs and exploitation of more production and profit from animals.

FDA prohibits the extra label use of chloramphenicol, furazolidone, nitrofurazone, sulphonamide drugs, and flouroquinolones in lactating animals.

Techniques used for Detection and Analysis of Drug Residues

- ELISA
- HPLC
- Liquid chromatography
- Gas chromatography
- Paper chromatography.

Pathological Effects produced by Antibiotic Residues in Food

- Transfer of antibiotic resistant bacteria to the human.
- Immunopathological effects
- Autoimmunity
- Carcinogenicity (Sulphamethazine, Oxytetracycline, Furazolidone)
- Mutagenicity
- Nephropathy (Gentamicin)
- Hepatotoxicity
- Reproductive disorders
- Bone marrow toxicity (Chloramphenicol)
- Allergy (Penicillin)

Table. - 1. Maximum Residues Limit (MRL) (ug/kg) for veterinary residues.

ANTIBIOTIC	MRL
Benzyl penicillin	4
Ampicillin	4
Amoxycillin	4
Oxacillin	30
Cloxacillin	30
Dicloxacillin	30
Tetracycline	100
Oxytetracycline	100
Chlortetracycline	100
Streptomycin	200
Dihydrostreptomycine	200
Gentamycine	200
Neomycin	100
Sulphonamides	100
Trimethoprime	50
Spiramycin	200
Tylosine	50
Erythromycine	40
Quinalones	75
Polymyxine	50
Ceftiofur	100
Cefquinome	20
Nitrofurans	0
Nitromidazoles	0
Other chemotherapeutics (Chloramphenicol, Novobiocine)	0

Residues Prevention

- The first step in residue prevention is to make individuals and organizations aware of the problem through education by veterinary personnel, organizations, and literatures and governmental agencies.
- Rapid screening procedures for the analysis of antibiotic residues and instant grading and prohibition of food containing antibiotics more than MRL.
- Processing of milk help for the inactivation of antibiotics. Refrigeration causes disappearance of penicillin. In pasteurization most of antibiotics will loose activity.
- Use of activated charcoal, resin and UV irradiation also help for antibiotic inactivation.
- Irrational use of antibiotics in field veterinary practices should be avoided.
- Development of simple and economic field test to identify drug residue in edible animal products.
- Ethno-veterinary practices may be promoted.
- Nation wide monitoring and periodic surveillance of microbial residue in edible tissues and milk.

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A human case of rabies reported to have survived in Brazil

On 14 Oct 2008, the Department of Epidemiological Surveillance (DES), Department of Health Surveillance, Ministry of Health (MOH), through the state Department of Health of Pernambuco, was notified of a suspected case of human rabies from the municipality of Floresta. The epidemiological investigation was initiated by Epidemiological Surveillance of the city, together with the Pernambuco Department of Health. This is a boy of 15 years, with report of aggressive attack by a hematophagous bat and the initiation of symptoms on 6 Oct 2008, who was then transferred to the University Hospital Osvaldo Cruz of the University of Pernambucoon 10 Oct 2008. The patient received 4 doses of vaccine against rabies before the start of symptoms (the USA CDC recommends 5 doses of vaccine post-exposure). The incubation period was approximately 29 days. A hair follicle biopsy of the region of the nape of the neck was tested positive for rabies virus through reverse transcription polymerase chain reaction (RT-PCR), nested PCR and genetic sequencing, at the Pasteur Institute-SP Laboratory. The patient was transferred to the intensive care unit on 11 Oct 2008 and on 13 Oct, 2008 the patient was intubated and the Milwaukee treatment protocol was initiated, which was used in a patient with rabies in 2004 in the United States. On 30 Oct 2008, he was brought out of the induced coma and on11 Nov 2008, the patient is unsedated and is clinically stable. The successful outcome of this patient, as well as the cure observed in the patient in the United States, opens rather promising prospects for treatment of this disease, which so far is considered to have a case fatality rate of 100 percent. Survival in children who received treatment with rabies-immune serum or immunoglobulin before the onset of symptoms is well recognized. The factors that lead to survival are not well known, however, passive and active immunization, above a certain age seem to be important determinants **Source: <http://www.promedmail.org>**