



Review Article.

Effects of Antibiotic residues in animal products on human health and environments

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Abstract

Veterinary pharmaceutical products are among the most important components of animal feed production, especially antibiotics. the main use of antibiotics in animals is to treat and prevent diseases, and to promote growth. Antibiotic use in animals can cause residues of antibiotics in foods such as meat., eggs , and milk. These residues can cause numerous side effects such as human transmission of antibiotic resistant bacteria, pathological immunological effects, allergies, parasitic mutations, nephropathy (gentamicin), hepatotoxicity, reproductive disorders, toxicity to the bone marrow (chloramphenicol), and even carcinogenic , sulfamethazine and oxytetracycline. This analysis offers information important to veterinarians, livestock produces and public safety on the regulation of drug residues in animal products.

استعراض تأثير بقايا المضادات الحيوية في المنتجات الحيوانية على صحة الإنسان والبيئة
شذى موسى ملاغهي الصافي حلا باقر البياتي نادية كاظم الدواح سعدية صالح مهدي
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الخلاصة

تعد الأدوية البيطرية ، وخاصة المضادات الحيوية ، من أهم مكونات إنتاج الأعلاف الحيوانية. بشكل عام ، الاستخدام الرئيسي للمضادات الحيوية في الحيوانات هو علاج الأمراض والوقاية منها وتعزيز النمو. قد يؤدي استخدام المضادات الحيوية في الحيوانات إلى بقايا المضادات الحيوية في الأطعمة مثل الحليب والبيض واللحوم. قد تتسبب هذه البقايا في آثار جانبية مختلفة مثل انتقال البكتيريا المقاومة للمضادات الحيوية إلى البشر ، والتأثيرات المناعية المرضية ، والحساسية ، والطفرات الطفيلية ، واعتلال الكلية (الجنتاميسين) ، والسمية الكبدية ، والاضطرابات التناسلية ، وسمية نخاع العظام (الكورامينيكول) ، وحتى المسببة للسرطان (سلفاميتازين وأوكسي تتراسيكلين). توفر هذه المراجعة معلومات حول التحكم في بقايا الأدوية في المنتجات الحيوانية ، وهو أمر مهم للأطباء البيطريين ومنسجي الثروة الحيوانية وصحة المستهلك

Introduction:

Veterinary medicinal products, particularly antibiotics, are considered one of the most important compounds linked to the production of animal feed. Approximately 80 percent of the animals currently used to produce food are treated with veterinary medicine (1). Antibiotics as substances which can kill or inhibit the growth of micro organisms. It is produced by living organisms or by laboratory industry. The effect of the antibiotic growth promoter was discovered at the 1940s when animals fed on Streptomyces

aureofaciens fungi containing chlortetracycline residues increased their development. The primary application of antibiotics in animals is the treatment and prevention of diseases. The introduction of growth-driven antibiotics was standard practice within years.(2). Human health is directly correlated with the environment (3), particularly the nature and quality of the food. Food safety from animal products is of significant concern to public health organizations worldwide, as veterinary drugs have played an important role in animal

husbandry and agro-industry, and residues have increased, and resistance has become relevant. Veterinary drugs or veterinary medicinal products (VMPs) are urgently required to meet the challenges of supplying sufficient quantities of food for the increasing world population as drugs enhance the weight gain rate, increase feed quality or prevent and treat diseases in animal-producing foods. The advantage of increased efficiency from the use of VMPs in food-producing animals shall not be achieved without the risk of VMP residues remaining in the tissues of treated animals. When slaughtering or contaminants in products derived from animals and present a health threat to the client. The key VMPs that potentially contaminate foods of animal origin are antibacterial drugs and hormonal growth promoters.(4).

Antibiotic Residues:

Numerous classes of antibiotics are commonly administered to animal foodstuffs, including , macrolides, sulfonamide, fluorquinolone, tetracyclenes, lincosamide, aminoglycosides, beta-lactams, cephalosporins and others (5,6).at sub-therapeutic concentrations, nearly (90 per cent) of antibiotics Used for farms animals and poultry is reportedly given. Approximately 70 percent of this is for disease prevention purposes and 30 percent is for growth promotion. In developed countries, the chance of milk residue is higher compared with that of developed one. This may be linked to the lack of detection facilities and regulatory bodies which regulate the level of Residue of drugs in food as maximum residue limit (MRL).

The (MRL) is classified as the highest residue Concentrations resultant from the listed use of agricultural or veterinary chemicals that is Recommended method for legal authorisation or recognition as standard on or in a foods , agricultural products or animals feed.(7).

Consequence of antibiotic residue on environment:

Antibiotic contamination of the environment can occur in many forms, drug production phase, Throwing away of discarded drug and ampules or Manure and slurry waste application. Animals defecate a significant percentage of antibiotic (17-90%) directly into the faeces and urine as a parent

compound or its harmful metabolite, for the reason that many of the antimicrobial agents given aren't fully absorbed from the gut . (9). The survival in the atmosphere of antibiotic residues depends on the physico-chemical properties of the medication residue, climatic and Soil characteristics, temperature, humidity ,and rainfall. tetracycline (mostly tetracycline and chlortetracycline) have been found to be more determined in soil than manures (10).

Consequence on public health:

Many of the antibacterials commonly used are mildly not-toxic even at high doses, but little antibiotic present a significant, Health of the public risk. Antibiotic residues in milk are of significant Health of the public concern because there is milk commonly used up around the world by children, young people, adults. Continuing exposure for antibiotics residue in milk can contribute to altered intestinal microflora drug resistance (11). Several antibiotics are powerful antigens, or act as a haptens, and daily occupational exposure can cause allergic reactions). Antibacterials agents like tetracycline, nitro furan, sulfonamide are extensively used as feed additive in cattle feed, which can defecate on milk and sometime associated with toxicological effect on human. The nitro furans at greater concentration cause carcinogenic and mutagenic effect (12). Resistant microorganisms can get admission to human, whichever through direct interaction or from contaminated food (13).

Reduction of drug residues in the eggs :

Administering drugs to the laying of hens , The metabolites can store residues in yolk and albumen of the eggs (14). Such drugs are absorbed into the intestine, transferred to the ovary by blood / plasma, and deposited to the magnum of the oviduct in the inner yolk, For the accumulation of the albumens, The uterus and oviducts, and eventually, drugs residues deposited in egg. during plumping of the eggs. Drugs that rapidly vanish from laying The body of Hen's are often rapidly excreted from the egg portion a few days after removal or cessation of medication. In addition, Biological half -life {drugs residue decreasing time} of drug used is important for the clearance of drug residues from egg components (15). In addition, Antimicrobial

residues such as : ciprofloxacin , enrofloxacin , and chlorotetracyclines ,were Reductions by approximately 87%, 93% and 61% respectively (16) after boiling eggs at 100 ° C for 15 minutes. Strong boiling and scrambling results decreased chlorpyrifos residue by 38 per cent (17) in egg yolks. Adopting Best practices in the management of poultry farms , controlling the qualities of feed, breeding in restricted ranges will helps minimize eggs residues of pesticides (18).

Decrease of drugs Residue in the Meat :

Wild use Veterinary Drugs and insufficient measures of biosafety for the removal of drugs will Result in residues of drugs, as well a reduction of quality of meat (19). Some meat , meat products can not be a visible quantities of the human food chains but are often stored or treated. Any treatment or cooking with heat needed before raw edible animal products and by-products are consumed. Both processes result in proteins to denaturant , Loss of water and fat, pH increase, thereby helping to modify concentration of residues, Chemical composition, or solubility. Concentrations of residues of doxycycline Was shown to decrease upon cooking meat and muscle tissue residues have been excreted into cooking oil. The bioactivity of oxytetracyclines , Ampicillins and Chloramphenicol's Reduced in beef by 12 to 50 per cent Upon roasting for 20 minutes in 50 ° C–90. In addition, Kooking the beef has led for a significant reduction 36 to 94 percent in the concentrations of oxytetracycline . Specific methods of cooking at various pH levels have potential impact on Oxytetracyclines. Example, after roasting and boiling, The oxytetracyclines muscle concentration decreased dramatically by 53.6 percent and 69.6 percent respectively .as well as toasting, microwave and boiling at pH 6.0 , pH 7.2 : Oxytetracyclines decreased by 34.3, 53.2 and 67.7 percent respectively (20). Different thermal treatments of Chicken and pork ,Strong impacts of oxytetracyclines degradation .Cooking pressure accelerates the degradation of pesticides in beef (Aldrin ; 93.75%, Dieldrin ; 93.77%, Endosulfan ; 78.70%) ,(21). Yet thermal treatment has helped reduce Anthelmintic residues:

nitroxylin, 78% , 96% In fried and roasted condition muscles , Levamisoles , 11% , and for fried muscles and liver 42 per cent , Rafoxanides , For fried and roasted muscles 17 and 18 percent ,Triclabendazole, 23% and 47% , respectively, for the fried liver and roasted muscle (22).

Development of Antimicrobial resistance:

Resistant microorganisms can be accessed either through direct contact (23) or indirectly through milk, meat and eggs. Being animal-origin bacteria, they can either colonize or superimpose human endogenous flora and additional load onto the reservoir of resistance genes already present in man. The use of antibiotics as feed additives at a sub-therapeutic dose should be strictly prohibited. Fluoroquinolones and avoparzin are examples of drugs that have been shown to cause the growth of resistant bacteria in food in animals for therapeutic purposes. Resistance of microorganisms resulting from sub-therapeutic use of penicillin, tetracycline and sulfa drugs, a high priority issue is suggested by the WHO in agriculture .The development of drug resistance since each new class of antibiotics is introduced and repeated exposure to the sub-lethal antibiotic dose has been noted. However, selection of the environmentally resistant bacteria May occur if the concentration of antibiotics is more than the concentration minimum inhibitory (24) . The using of manures for fertilization of soil should be considered a major agricultural contributor to contamination of the environments and transmission of antibiotic residues, Resistant genes and resistant bacteria . Developments of antibiotics resistance genes ARG have been reported frequently as a result of overuse of antibiotics worldwide .Tetracycline and sulphonamide ARGs have been found in US rice paddy soils fertilized with swine manure.(25,26).Antibiotics are used in foods animals select antibiotic bacteria which are resistant that are using in human ,can spread to humans through food causing weak response disease treatment (27) .With the introduction of fluoroquinolone use in the poultry industry, the production *Campylobacter jejuni* and *Salmonella* spp,

fluoroquinolone-resistant strains, which have been Isolated from meat of poultry, occurs.

Escherichia coli. Multi resistant has developed from using of wide Antimicrobials spectrum in both the animals and humans. Development of the of antimicrobials resistances in *E. coli* creates problems, because of transmissions of antimicrobials resistance genes for the next generations (28).

Conclusion

Consumption of veterinary medicinal products for the disease prevention or treatments and/or improvement of manufacture lead for additional residues in animal's product. In animal products, the residues of drugs affected by numerous factors, for example physicochemical properties of drugs, animals biological process and their products. Such contaminant can cause major dangers to public health, for example cancers, hypersensitivities reactions, mutagenicity's, challenges to reproduction, bacteria resistance, and disorder of normal flora of intestinal. Therefore the concern of veterinarian and livestock's producers. To follow the correct time of withdrawal prior to the slaughters of animals, to ensure unwanted residues do not remain in food stuffs moreover, various cooking conditions, temperatures and times, fermentations and pH interactions an important part in reducing residues of veterinary drugs cooking and other processing usually do not guarantee complete removal of the product residues. But a marked decline in concentration may contribute.

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