Feed Me!
Antibiotic Additives in Chicken Feed

Alyson Hoffman
Beloit College, Beloit, WI

Abstract

For the past several decades farmers have added small amounts of antibiotics to poultry feed in order to stimulate muscle growth in chickens. If these antibiotics are fed to chickens in high enough doses they would show up in their meat and then be consumed by people. This poses a risk of increased antibiotic resistance by pathogens to chickens and humans. Based on information from peer-reviewed journals and other sources, the issue of antibiotics in chicken feeds has proven to be a complex one. One concern is that inadequately cooked chicken retains antibiotics. Other concerns include development of antibiotic resistant bacteria and appearance of antibiotics in eggs. Though some residues of antibiotics have been found in raw chicken, it is generally accepted that they are destroyed by cooking processes. A table of proper cooking instructions is included.

Introduction

Chicken is generally considered a healthy choice of meat. It contains far less saturated fat than red meat and serves as a good source of protein as well as selenium, phosphorus, and some B-vitamins (9). Furthermore, chicken is inexpensive (6). The use of growth promoting antibiotics in chicken feed, which enable the chicken's body to more efficiently utilize carbohydrates, protein, and vitamins, allows for greater productivity and lower cost (8). It is argued that adding antibiotics to chicken feed maintains a low cost on supermarket shelves by keeping production levels high, much the same as pesticides do with produce (6). The question is whether or not the potential health risks associated with poultry feed additives outweighs the economic benefits. Several types of antibiotics are in use today (see table), and laws dictating which types may be fed to which animals vary from country to country (7).

Several diseases are commonly associated with chicken including, but not limited to: Campylobacter infections, Salmonellosis, and Salmonella enteritidis (1,2). Some strains of Salmonellosis have already been shown to be resistant to certain antibiotics (2). Between 1957 and 1960, increased use of tetracycline additives caused a heightened incidence of tetracycline-resistant E. coli disease was observed in the broiler fowl population in Britain (7). If these antibiotics are fed to chickens in high enough doses it is worried that they would show up in their meat and then be consumed by people, however, many studies show that it is unlikely that these antibiotics would cause harm to man, either residually or by increasing antibiotic resistance.

Method

Much of the research for this topic originated from peer-reviewed journals including the *American Journal of Clinical Nutrition*. Other sources include government sponsored websites, largely for information on diseases and government policy regarding antibiotic levels in feed. Claims by the egg and poultry industry were gathered from the American Egg Board and the National Chicken Council websites. A personal interview was conducted with the owner of a feed mill. The information was then compiled and compared leading to the results.

Results

One published study states that, "[the] addition to feed of small amounts of the tetracyclines, penicillin, streptomycin, and chloramphenicol was shown to increase the rate of growth and to improve the efficiency with which animals utilize their dietary nutrients" (8). It has been shown that low levels of antibiotics in poultry feed increases the weight of each bird by about 10% and also increases egg production (6). Laws have been created concerning the types and amounts of antibiotics given to chickens and other poultry. For example, by 1961 neither of the antibiotics nystatin nor 3-nitro-4-hydroxyphenyl-arsonic acid may be fed to hens producing eggs that will be sent to markets (6). Many antibiotics must be withdrawn from the chicken feed several days before they are slaughtered in order to allow time for the antibiotics to run through their bodies (6). This prevents the antibiotics from appearing in the meat.

It is, in general, considered safe to eat chicken and eggs, but important to maintain only moderate consumption of these foods. Proper cooking of these foods destroys not only diseases such as E. coli and Salmonella, but also has been shown to destroy any residual antibiotics in the tissue (6). A table of proper cooking temperatures follows.

In today's poultry industry it is difficult to know exactly what chickens are fed. Many antibiotics are added to feed or drinking water as preventative measures (10). Other antibiotics are used to cure disease in a flock as the label dictates (10). However, extralabel use of antibiotics is not unheard of (10). Extralabel, as defined by the FDA, is "the actual use or intended use of a drug in an animal in a manner that is not in accordance with the approved labeling" (4). Precisely how much extralabel use of antibiotics occurs has either not been thoroughly researched or else has not been released to the public. The poultry industry states that, "antibiotics may be given to prevent disease and improve the bird's ability to benefit from its feed" (3).

Table 1: Antibiotics Used in Poultry Feed (6)

Antibiotic	Classification	Antibiotic	Classification
Aterramin	O.D.	Nystatin	N.D.
Bacitracin, zinc bacitracin	C.A.	Oleandomycin chloroform adduct	N.D.
Chloramphenicol	C.A.	Oxytetracycline	O.D.
Chlortetracycline	C.A.	Penicillin, procaine penicillin	C.A.
Erythromycin thiocynate	O.D.	Streptomycin, dihydrostreptomycin	C.A.
Hygromycin B	N.D.	Tetracycline	C.A.

O.D. - old drug; N.D. - new drug; C.A. - certifiable antibiotic

References

1. National Center for Infectious Diseases/Division of Bacterial and Mycotic Diseases. Centers for Disease Control. http://www.cdc.gov/ncidod/dbmd/diseaseinfo/campylobacter_t.htm. 2005.
2. National Center for Infectious Diseases/Division of Bacterial and Mycotic Diseases. Centers for Disease Control. http://www.cdc.gov/ncidod/dbmd/diseaseinfo/salmonellosis_g.htm. 2005.
3. National Chicken Council. http://www.nationalchickencouncil.com/consumerInfo/detail.cfm?id=16. 2002-2006.
4. U.S. Food and Drug Administration. Department of Human Services. http://www.fda.gov/bbs/topics/NEWS/2006/NEW01339.html. 2006.
5. U.S. Department or Agriculture. http://www.foodsafety.gov/~fsg/fs-cook.html. 1999.
6. Bird, H. R. "Additives and Residues in Foods of Animal Origin." *American Journal of Clinical Nutrition* (1961): 260-268.
7. Smith, H. Williams. "Effect of Antibiotics on Bacterial Ecology in Animals." *American Journal of Clinical Nutrition* (1970): 1472-1479.
8. Berman, Harris A. and Louis Weinstein. "Antibiotics and Nutrition." *American Journal of Clinical Nutrition* (1971): 260-264.
9. Nutrition Data. http://www.nutritiondata.com/facts-B00001-01c20B8.html. 2006.
10. R. Roofer. Personal communication. Washington Feed Mill, Apr. 5, 2006.

Discussion

March 20, 2006 the United States Food and Drug Administration issued a statement advising that two classes of drugs used to treat influenza in humans be prohibited for extralabel use in poultry. (4) The two classes of drugs, which are approved for use in humans, are not approved for animal use (4). The FDA proposal follows concerns expressed by international health organizations that repeated misuse of anti-viral drugs may lead to disease outbreak should viruses mutate and become resistant to the drug (4).

Though this case concerns antiviral medication and not antibiotics, it proves that extralabel use occurs with enough frequency to alarm the FDA. Why then have there seemingly been no published studies on the issue since the 1970's? Lack of interest? Or could the government simply not be funding this type of research for one reason or another? By far, the most disconcerting aspect of this issue is the lack of information concerning it, not the potentially harmful drugs fed to a major commercial food source. The amount of unqualified information on the internet is astounding. The American Egg Board and the National Chicken Council maintain that antibiotics have no effect on people, while organic and natural food purveyors adamantly state that the public is fed toxic levels of them. Where this information originates from is a mystery, however, because very few qualified studies exist.

At least at one feed mill antibiotics are not added to the feed. The Washington Feed Mill in Wisconsin carries feed without antibiotic additives, and even some feed with no additives whatsoever (10). However, many types of feed contain coccidiostats to prevent a parasitic disease known as coccidiosis (10). The development of coccidiostats greatly improved the quality and quantity of birds (6). Other compounds that are or have been added to poultry feed are arsenicals and estrogens, both of which are very controversial (6). Whether antibiotics are a safe additive or not, it is important to know about all aspects of what is in food.

Generally, poultry and eggs should be safe for consumption, provided they are cooked properly. Hygienic kitchen habits are vital to personal health. While an unfortunately inadequate level of qualified information exists on this topic, simply using common sense should be enough to ensure health.

Table 2: Proper Cooking Temperatures for Poultry and Eggs

Product	Temperature*
Ground Turkey/Chicken	165
Chicken, whole	180
Turkey, whole	180
Poultry breasts, roast	170
Poultry thighs, wings	180
Stuffing (cooked alone or in bird)	165
Duck & Goose	180
Egg dishes	160
Eggs	Until yolk and white are firm

Table information adapted from US Dept. of Agriculture website (5)

*When done, in ^{o}F