

Antibiotic is defined as a medicine (such as penicillin or its derivatives) that inhibits the growth of or destroys microorganisms. These antibiotics are intended for limited use and not an everyday drug to take for life. However, overuse of antibiotic in livestock and in human treatment both lead to antibiotic resistant bacteria. There is not enough scientific evidence to convince that one is the sole causation, but rather both have a correlating trends with the increase of resistant bacteria. Since the resistant bacteria has adapted and evolved, we must adapt and evolve our medicine and approach towards this biological threat

Since the 1900s, the demand for meat has continued to increase overtime.[1] The FDA and government had to create a way to meet these demands and one of the solutions was to use antibiotics in animal feed and water. This allowed the ability to overpopulate farms with animals in a close vicinity without the transmission of disease from one animal to another and to humans. The use of antibiotics made our food supply safer and voluminous. More meat that is disease-free seems great for us because it meets our demand however the concern of overusing and abusing antibiotics is the fear and fruition of antibiotic-resistant bacteria. For over 40 years the FDA has approved the use of antibiotics in livestock and poultry.[2] This led to a possibility of overuse of antibiotics yet there is no substantial evidence. The reason being that farmers were never required to receive prescriptions, report amount and type of antibiotics used. According to "The Trouble With Antibiotics" video[3], the animals are given antibiotics daily in water and or feed. The daily, continuous and undocumented amount of antibiotics on animals allowed the bacteria to adapt and evolve to become resistant to the medicine creating the resistant strands.

However in recent times, the FDA has issued a guide to eliminate the use of antibiotics for growth enhancement. Under FDA guidance, antibiotics to treat, control or prevent illnesses in animals will need to be prescribed by a veterinarian.[4] This new rule can help with the overuse of antibiotics for unnecessary reasons. Two big corporations in poultry production and distribution have recently pledged and commercialized their new approach to antibiotic free poultry. Both Perdue [5] and Tyson[6] have vowed to only use antibiotics on sick birds with a veterinarian to supervise. This is important to note because the FDA has not made it mandatory to dismiss or limit antibiotics to the possible minimum but rather allowed it to be a voluntary step for farmers. Because to big companies and fast food chains like McDonalds and Chick-fil-A[7] are making this health conscious decision, consumers will now be more alert and aware of what they buy and in return demand antibiotic-free meats. This could lead to a domino affect of supply and demand where other farmers will have to start following in the antibiotic free trend.

In the case of human medicinal antibiotic use, up to half the antibiotic prescriptions in the US are unnecessary. [8] For instance, only about 10 percent of individuals will obtain bacterial *Streptococcus pyogenes* yet about 60 percent of patients with sore throats are given the category B antibiotics amoxicillin, penicillin, cephalexin or erythromycin[9]. The number one component to the development of antimicrobial resistance is overuse in humans. In 2013, CDC's Director Michael Frieden, M.D, said, "The most acute problem is in hospitals. And the most resistant organisms in hospitals are emerging in those settings, because of poor antimicrobial stewardship among humans" [10] It seems that antimicrobial resistance in the hospital increases and is hard to riden use to the constant use of medication and sanitization and even improper infection control that will allow an environment for the resistant bacteria to thrive.

The CDC and the FDA have each made antibiotics a vital part of their missions. They work alongside health care providers and encourage proper antibiotic use for conditions that only antibiotics can treat. For example doctors are being motivated not to give antibiotics for the common colds or coughs. Past evidence has shown that antibiotics are not an effective treatment to these, so avoidance of antibiotics is ideal.

But let us be clear, limiting use of antibiotics won't cure or solve resistant bacteria. The lack of evidence due to farmers not allowing access to their facilities for research and the expense of the research are lacking to make a viable connection between farm animals and humans. Right now there is only speculations and assumption. We believe limiting antibiotics will help lessen the amount of resistance bacteria however the resistant bacteria already exist. We can try to produce less of the resistant bacteria through less use of the antibiotics but we still need to tackle and create better drugs. The bacteria had evolved and adapted to the treatments and now we must adapt and evolve new methods and treatments to this new threat that seems to be staying.

As far as the biggest referred-to resistant bacteria methicillin-resistant *Staphylococcus aureus* (MRSA) the CDC describes that serious MRSA infections are exposed during healthcare while the rest are acquired through contact with an infected person. As the CDC's web site states, "Anyone can get MRSA through direct contact with an infected wound or by sharing personal items, such as towels or razors, that have touched infected skin. MRSA infection risk can be increased when a person is in activities or places that involve crowding, skin-to-skin contact, and shared equipment or supplies. This might include athletes, daycare and school students, military personnel in barracks, and those who recently received inpatient medical care," [11]. The CDC does not categorize MRSA as a food-borne pathogen. Therefore we cannot say that MRSA in the affected animals translated to MRSA that infected humans through ingestion or consumption. As before, more studies are needed before any substantial links are made.

For now we can make preventative efforts. Bacteria on meat and poultry are destroyed through proper cooking. That means that safe handling practices in the kitchen, like hand washing(outside the kitchen as well), separating raw and ready-to-eat foods and thoroughly cooking all foods, are our best prevention thus far. Also being selective about when and what kind of antibiotics we put into our bodies would help. Requesting a narrow spectrum antibiotic over a broad spectrum antibiotic will lessen the possibility of killing off the good bacterias we need and only target the that are pathogenic. Antibiotic used anywhere created resistance bacteria, now its time to create new treatments to wipe out the superbug and limit inappropriate and abusive intake of antibiotics.

[1]Hiza HAB, Bente L, Fungwe T. Nutrient Content of the U.S. Food Supply, 1909–2005. Home Economics Research Report. 2008;58.

[2]Institute of Medicine; National Research Council; Panel on Animal Health, Food Safety and Public Health; Committee on Drug Use in Food Animals. Washington: National Academy Press; 1999. The use of drugs in food animals: benefits and risks.

[3]<http://www.pbs.org/wgbh/pages/frontline/trouble-with-antibiotics/>

[4]John Gever (23 March 2012). "FDA Told to Move on Antibiotic Use in Livestock". *MedPage Today*. Retrieved 24 March 2012.

[5]http://perduefarms.com/News_Room/Statements_and_Comments/details.asp?id=545&title=Antibiotics%20Position%20Statement

[6]<http://www.tysonfoods.com/Media/Position-Statements/Antibiotic-Use.aspx>

[7]http://www.health.com/health/article/0,,20411588_2,00.html

[8] D. A. Broniatowski, E. Y. Klein, V. F. Reyna. Germs Are Germs, and Why Not Take a Risk? Patients' Expectations for Prescribing Antibiotics in an Inner-City Emergency Department. *Medical Decision Making*, 2014; DOI: [10.1177/0272989X14553472](https://doi.org/10.1177/0272989X14553472)

[9]<http://www.webmd.com/oral-health/antibiotics-for-strep-throat>.

[10]http://www.cdc.gov/media/releases/2013/t0916_health-threats.html.

[11]10 Centers for Disease Control and Prevention Web site, accessed February 24, 2014, at <http://www.cdc.gov/HAI/organisms/mrsa-infection.html>.