Does the use of antibiotics in agriculture effect antibiotic resistance within humans?

By Bethany Bennison

Introduction:

Over the last decade, bacteria has been affecting and targeting humans resulting in disease. Bacteria is now becoming more resistant to many of the commonly used antibiotics which are used for the treatment of disease. One of the most common reasons for this is agricultural use. This includes the use of antibiotics in livestock for the purpose of therapeutic and non-therapeutic treatment in animals (compassion in world farming, 2011)

What is antibiotic resistance:

This is when a microorganism such as bacteria has the ability to tolerate or combat the desired effect of the antibiotic. The resistance of antibiotics evolves naturally via natural selection through accidental mutation, this can happen in the space of weeks to month in bacteria (science Daily, 2016).

The Clinical Issue:

Antibiotic resistance has been developing worldwide with disease-causing bacteria being one of the greatest risk to the way we practice medicine today. It is having a massive impact on the health care system, including failed treatments and in the worst case untreatable bacterial infections. Worldwide there is an increase of resistant bacteria, which is threatening the efficiency of antibiotics, antibiotics have transformed medicine and has saved many lives. (compassion in world farming, 2011)

Antibiotics resistance in agricultural use:

The use of antibiotics in animals is being noticed as a contributing factor to the development of antibiotic resistant bacteria, which is disturbing all species. The antibiotic resistance crisis has been associated with the overuse and misuse of antibiotics, this can be associated with the misuse of antibiotics within the care on livestock. It is now recognised that overuse in intensively produced livestock is believed to have played a major role in this global issue. Antibiotics used in farm animals has had an implication in human medicine, this has caused an emergence of multi-resistant bacteria that infect people. (New Zealand Veterinary Association, 2015)

Recommendations:

Within New Zealand the goal is to reduce the use of therapeutic antibiotics on livestock to reduce to reduce disease frequency. This can be achieved through eduction to farmers and the carers of livestock. This eduction should be based around infection risk, animal management and husbandry, infection control, hygiene and biosecurity practices. New Zealand was one of the first countries to make a law against using antibiotics in non-therapeutic ways for example, to encourage growth in livestock. This will have a positive effect on antibiotics in the future.

Conclusion: Overall there is literature stating that the use of antibiotics in an agricultural setting has a negative impact on antibiotic resistant bacteria in the human population. This is due to the overuse and misuse of antibiotics in animal husbandry. The most common reason was due to livestock being given antibiotics for purposes that were for non-therapeutic reasons. Another important factor is that the antibiotics that are being prescribed to humans for common reasons are also being prescribed to animals, therefore when humans consume livestock that has been exposed to the antibiotics they build a tolerance to then before they are needed to fight a common infection.

How using antibiotics within livestock effects antibiotic resistance: Literature review:

In the world both developed and developing countries are using antibiotics as growth supplements in livestock. Within the U.S.A is is believed that 80% of antibiotics that are being prescribed to patients with infections are being used in animals primarily to increase the livestocks growth rate and to prevent infection. These antibiotics that have been given to the livestock are then consumed by humans when they eat livestock. This is a direct transfer of resistant bacteria to humans from animals. Out of the fifty percent of antibiotics given to animals only ten percent are drugs given to treat disease. The sequence involved in agricultural use includes, antibiotic use in food-producing animals. The antibiotic kills or limits the growth of susceptible bacteria, allowing the now antibiotic-resistant to grow. The resistant bacteria is then ingested by humans through food supply, this then results in bacteria causing infections in humans that can leads to negative health consequences (Ventola, 2015). The ongoing transmission of resistant strains of bacteria in livestock is due to the exposure of human-to-resistant organism for agriculture, this is then able to spread through the human population. Bacteria is then able to make different clones of themselves, this is when colonisation is created. Bacteria is also known to be able to transfer their genes between strains of the same species. This transfer of genes is the most important role in antibiotic use in agriculture and has a direct link to the rise of now new resistant genes, this can therefore be moved into pathogens which have already been adapted to the transmission in humans (Chang,2015).

Chang, Q., Wang, W., Regev-Yochay, G., Lipsitch, M., & Hanage, W. P. (2015). Antibiotics in agriculture and the risk to human health: how worried should we be? *Evolutionary Applications*, *8*(3), 240– 247. http://doi.org/10.1111/eva.12185

Compassion in world farming. (2011). Antibiotics in farm animal production. Retrieved from http://www.fao.org/fileadmin/user_upload/animalwelfare/antibiotics_in_animal_farming.pdf

Ilic, D., & Rowe, N. (2013). What is the evidence that poster presentations are effective in promoting knowledge transfer? A state of the art review. Health Information & Libraries Journal, 30(1), 4-12. doi:10.1111/hir.12015

New Zealand Veterinary Association. (2015). Antibiotic resistance: challenges and opportunities report to the New Zealand Veterinary Association. Retrieved from http://c.ymcdn.com/sites/www.nzva.org.nz/resource/resmgr/docs/policies_and_guidelines/PwC_AMR_report_web.pdf

Science Daily. (2016). Antibiotic resistance. Retrieved from https://www.sciencedaily.com/terms/antibiotic_resistance.htm

Ventola, C. L. (2015). Part 1:Causes and Threats. *The Antibiotic Resistance Crisis*, *40*(4), 277-282. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4378521/pdf/ptj4004277.pdf

PECOT Category	Information relating to the question	Explanation
Population	People who have been/are being exposed to using antibiotics.	Human group that has ingested livestock that has been exposed to antibiotic drugs.
Exposure	Humans who have been exposed to resistant bacteria due to ingesting livestock which has been in contact with antibiotics	I will be looking at articles that are in relation to understand how humans have become resistant to antibiotics.
Comparison/ Control	Not Applicable	Not Applicable
Outcome	To identify and understand if antibiotic in agriculture has and effect on antibiotic resistance within humans.	Want to be able to understand if antibiotic resistance due to being ingested by humans has an impact on antibiotic resistance.
Time	Not Applicable	Not Applicable

Schneider (2013)

Written Summary.

Posters are designed to be an effective way of communication, when produced correctly the poster will lure nearby people and alert them to the information that has been given on the poster. With poster presentations the maker is able to catch the eye of everyday people and grab their attention. This could be achieved through the use of colour, image and sizes of font. At first glance posters are able to provide the audience with information that can be viewed by many different individuals at their own pace. The poster is able to provide the viewer with a concise overview of the project/topic. (Ilic & Rowe, 2013) After looking into effective ways to present information that is eye catching I chose to create a poster, this poster would be easy to follow, easy to read and stand out to bypasses. With being able to create an effective and easy to read poster, the viewer will be able to understand the importance of antibiotic resistance.