

School Name: Melrose High School

Area of Science: Biochemistry, Animal Science, Agriscience

Project Title: Half-Lives in Antibiotics

Definition of the Problem:

This year our team has decided to study and replicate the half-lives of antibiotics and their effect on humans and animals. A half-life is how long it takes for half of the antibiotics to die or become invalid. We are wanting to research the half-lives of antibiotics because we want to know how antibiotics spread through the animals systems and how long it takes for the antibiotic to leave the animals systems so that it is safe to consume.

Plan for Solving the Problem and Representing it Computationally:

We are planning on making two different programs. One where we display a couple of different ways of how to distribute the antibiotics into livestock (feeding/injecting) and one where we display how fast the antibiotics break down, over time. Part of why we chose this project is that we live in a rural area and almost everyone runs cattle. But many people over use antibiotics and the pathogens become immune. We want to show how we can fix it to where there is the lowest death rate, with the most efficient use of antibiotics. We want to be able to find the best way to give market animals antibiotics while they still remain safe for the consumers.

Progress to Date:

We have been doing research on the spread and half-life of antibiotics. We have also been communicating with local producers and vets on how antibiotics travel through the animals system and how the antibiotics break down. We have coding that we have developed that represents how cattle move through corrals and interact with each other. We are hoping to use this coding to further develop the best way of distributing antibiotics through the herd. This will be either by mixing it with the feed or by injecting it directly into the infecting animals.

Expected Results and Usefulness:

We expected to obtain results pertaining to the movement of antibiotics through the internal systems of cattle. With this information we plan to find the optimal way of distributing antibiotics through a herd while keeping it at safe levels for consumers and market animals. This would be useful by making it more efficient for producers and consumers.

Team Members: Mackenzie Perkins, Hannah Wofford, Ethan Wright, Rebecca Rush

Sponsoring Teacher: Alan Daugherty

Citations of Research:

Merck Veterinary Manual 4th edition, 1973

Danny Fish, David Rush-Local Producers

Doctor Logan, Doctor Ford-DVM/Local Veterinarians

<https://www.nrdc.org/issues/reduce-antibiotic-misuse-livestock>

http://www.merckvetmanual.com/mvm/urinary_system/infectious_diseases_of_the_urinary_system_in_large_animals/bovine_cystitis_and_pyelonephritis.html?qt=antibiotic%20residue&alt=sh