

# Antibiotic holiday needs to be a long one to combat resistance

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(PhysOrg.com) -- Heavy use of antibiotics has created a host of dangerous drug-resistant pathogens that endanger the health of millions of people. However, it has been unclear how quickly a ban on the overuse of an antibiotic would restore its usefulness.

According to a new study by researchers at Yale University and the University of Tromsø in Norway, the "antibiotic holiday" would have to extend over 40 years to be effective.

“Bacterial populations have evolved resistance to most [antibiotics](#) we have,” said Jeffrey Townsend, assistant professor in the Department of Ecology and Evolutionary Biology and co-lead author of the paper, published online Jan. 8 in the *Journal of Antimicrobial Chemotherapy*.

“Since we have failed to develop new antibiotics, many people have proposed that we just need to pause our usage of the ones for which resistance has reached a high frequency. Unfortunately, that alone does not appear to be a viable solution.”

The use of antibiotic avoparcin in farm animals was banned in Europe beginning in 1995 when tests revealed that 75 percent of the bacterium *enterococci faecium* were resistant to the antibiotic. The antibiotic is a close cousin of vancomycin and teicoplanin, considered drugs of last resort in treating infections. Health officials feared that vancomycin-resistant strains of bacteria might spread to human patients.

The idea behind creating an “antibiotic holiday” is that the bacterium pays a high evolutionary cost to maintain a resistance trait so the dangerous strain of pathogen would eventually disappear in the absence of the antibiotic.

Analyzing the data from Denmark, the researchers found that frequency of the resistant strain of bacteria in farm animals did plummet in the first three years following the ban. However, the resistant strains persisted through 2008 at levels near 2 percent, enough to ensure that a drug-resistant strain would quickly reemerge if the antibiotic were to be reintroduced.

Townsend said a statistical analysis showed it could be as long as 45 years before the frequency of the resistant strain was reduced enough to safely reintroduce the antibiotic. He said that while such antibiotic holidays are still a good idea, their limitations should be recognized.

“Given the decreasing rate of discovery of novel antimicrobial agents, it appears that antibiotic holidays alone have little chance of refurbishing our supply of antimicrobial agents,” Townsend said. “Our only options may be the permanent application of more restricted usage, preventing

the evolution of [resistance](#) in the first place.”

Provided by Yale University

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