Constructing antimicrobials that destroy bacteria

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ARS molecular biologist David Donovan has developed a new method to create antimicrobials that can kill disease-causing pathogens as an alternative to antibiotic use in livestock. Because much of the cost of a cow is the feed and labor needed to maintain her, fewer but higher yielding cows mean lower priced milk. Dairy herd improvement ultimately benefits consumers. That's why it's just as important to keep complete and accurate records as it is to keep the cows contented. The National Cooperative Dairy Herd Improvement Program has been tracking Bossy's milk yields since 1905. Over the years, this program has made enormous contributions to dairy cattle breeding. ARS scientists receive the lactation records of all herds enrolled in the program and use the figures to rank the bulls that sire the nation's dairy cows and to rank the cows themselves. The results of years and years of scientific dairying? Milk production has been trending upward for more than 25 years in the United States-from about 117,000 million pounds in 1970 to more than 150,000 million pounds in 1994-even though the number of milk cows has been reduced. Credit: Keith Weller.

(Phys.org) -- U.S. Department of Agriculture (USDA) scientists have developed a new method to create antimicrobials that kill disease-causing pathogens. These antimicrobials can be used as an alternative to antibiotics.

Growing concerns about antibiotic resistance to certain strains of bacteria and increasing restrictions on the use of antibiotics in animals has accelerated the need to find alternatives. Scientists with the Agricultural Research Service (ARS), the chief intramural scientific agency of USDA, are working to provide new strategies for enhancing production and improving overall animal health. This research supports the USDA priority of promoting international food security.

The patented technology for designing pathogen-targeted antimicrobials is the work of molecular biologist David Donovan at the ARS Henry A. Wallace Beltsville Agricultural Research Center (BARC) in Beltsville, Md. Donovan works in the center's Animal Biosciences and Biotechnology Laboratory.

Viruses that infect bacteria, called bacteriophages (phages), produce enzymes that can be used to kill pathogens. These novel enzymes have been shown to be effective in killing pathogens like streptococci and methicillin-resistant Staphylococcus aureus, also known as MRSA.

Collaborating with industry, university and federal scientists, Donovan demonstrated that these particular enzymes have molecular domains that can be isolated and will act independently of their protein surroundings. They kill bacteria by eating or chewing up the walls of cells.

The enzymes can be manipulated to create an antimicrobial that targets and kills only specific pathogens. This greatly reduces the probability that non-targeted bacteria will develop resistance.

Read more about this research in the May/June 2012 issue of Agricultural Research magazine.

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