Antimicrobial Resistance of Mastitis Pathogens
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Mastitis has been a disease of cattle for probably as long as mankind has milked cows. Over the last forty plus years, antibacterial drugs have been used to treat the disease. In more recent times concerns have been raised that the use of antimicrobials has caused resistance in bacteria isolated from treated animals, other animals in the population, and from food derived from animals for human consumption. Dr. Ron Erskine, DVM from Michigan State University, reviewed the scientific literature on the issue of drug resistance among mastitis pathogens, and presented his report at the 2006 NMC Annual Meeting.

His report focused on four key issues relating to drug resistance in mastitis pathogens: 1) is there scientific data that demonstrates an increase in the resistance of mastitis pathogens to antimicrobials; 2) is there any evidence that drug resistance among mastitis pathogens is an immediate concern for human public health; 3) is bacterial resistance impacting therapeutic outcomes for mastitis therapy; and 4) what additional studies or evidence are needed to resolve these issues? A synopsis of Dr. Erskine's comments on these four issues is presented below.

Concerning the first issue regarding an increase in resistance of mastitis pathogens, various researchers have studied this issue recently over a period of 4 to 7 years, and found that under consistent laboratory techniques there was no change in antimicrobial susceptibility patterns. Thus, from these studies and older reports in the literature, the prevalent conclusion is that scientific evidence does not support a widespread emerging resistance among mastitis pathogens to antimicrobial drugs.

Regarding the issue of concern for human health, there are concerns about the contamination of hands of milkers and the consumption of raw milk by a small segment of the population. Most of the reported studies on microbial resistance have focused on specific strains of *Staphylococcus aureus* that have shown a genetic resistance to erythromycin in poultry but not from bovine or milk sources. Dr. Erskine stated that the available scientific evidence suggests that the presence of the resistant *Staph. aureus* strains originating from the use of lactating or dry cow therapy is unlikely. This should especially be the case if therapeutic regimes continue to utilize mainstream or labeled drugs. Veterinarians and producers should not administer newer-generation drugs that are not labeled for the treatment of mastitis in cattle.

On the issue of bacterial resistance to drugs impacting the outcome of therapeutic treatment, Dr. Erskine stated that historically the success of therapy has been based on clinical cure to normal milk rather than bacteriologic cure. Unfortunately, it is difficult to compare the success of therapy today with that from many years ago because the standards of cure have changed, and the awareness of how drugs work in the body has improved. Since the correlation of susceptibility testing to clinical outcome has not been
established, and since it is not possible to compare the cure rates presently with historical reports, we can not determine the answer to this issue.

On the last point of needed additional studies and evidence, Dr. Erskine reported that he believes studies are needed 1) that are tightly controlled regarding the conditions and history of the samples, 2) that evaluate the pharmacokinetics of the antimicrobials, and 3) that determine what concentration of drug is needed to kill the bacteria without allowing the selection of resistant bacteria. Comparison of studies from different time periods should not be done.

Dr. Erskine concludes that at this time there is no evidence that antimicrobial resistance by mastitis pathogens is a crisis issue. He suggests that veterinarians and producers should use antibacterial drugs prudently, and should select judiciously which cows to treat in order to achieve reasonable rates of success with minimal risk of contributing to the public health concern of antimicrobial resistance.