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CPRC Update

TACKLING ANTIBIOTIC RESISTANCE

Antibiotic resistance is a very important issue with implications for both agriculture and human health. It is an issue that is receiving a lot of attention from media and the scientific community. Prophylactic use of antimicrobials (used to prevent rather than treat an infection) has been of particular concern, especially when the drugs used are of the same or related class as those used in human medicine. Scientific evidence clearly shows that exposing bacteria to antimicrobials selects for resistance. However, what is not entirely clear is how agricultural use relates to the development of bacterial resistance, especially to antimicrobials used in human medicine. What are the contributions to resistance of bacterial communities in animal hosts vs. human hosts? This is a complex question on which many scientific opinions remain divided.

Several studies suggest that agricultural use of antimicrobials has a direct bearing on the development of resistance to antimicrobials used in human medicine. On the other hand, recently published results from a large epidemiological study in Scotland (Mather et al. 2011, Proceedings of the Royal Society: Biological Sciences), which involved scientists from the University of Guelph and the Public Health Agency of Canada, suggest the risk of passing resistance from animals to humans may be lower than previously thought. The authors suggest that current policy restricting agricultural use of certain antimicrobials may therefore be overly simplistic. Nevertheless, antimicrobial resistance is an issue that the poultry industry takes very seriously. The National Poultry Organizations, through the Canadian Poultry Research Council (CPRC), continue to make significant financial contributions to research in this area.

How prevalent is resistance?

An important aspect of understanding antimicrobial resistance is to determine how much is out there and how resistance rates are affected by production practices. Dr. Michele Guerin, an epidemiologist at the University of Guelph, is leading a surveillance study comparing rates of bacterial resistance in conventionally-raised broiler chickens and those raised without antimicrobials.

How do antimicrobials affect poultry?

A major emphasis of CPRC's Avian Gut Microbiology research program is to better understand how antimicrobials affect the microbial populations in the avian gut, and in turn, how these changes affect the bird. These changes can have profound impacts on avian immune function, for example. One aspect of the strategy to reduce the need for antimicrobials is to make use of, and enhance, the bird's own defenses. As indicated in last month's CPRC update, research designed to do just that is ongoing.

What are the alternatives?

Another emphasis is to develop alternatives to antimicrobials in the event that currently used products become less effective, or their continued use is deemed detrimental. An arsenal-type approach of dealing with infections using a variety of methods makes it less likely that bacteria can develop resistance. A number of alternative control strategies are being developed with CPRC support. For example, Dr. Christine Szymanski at the University of Alberta is developing technology based on bacteriophage and engineered antibodies that can target specific bacteria. Dr. Bogdan Slominski at the University of Manitoba is looking at the pre- and pro-biotic effects of products from enzymes used to breakdown certain feed constituents, as well as the potential of Distillers Dried Grains with Solubles (DDGS) to promote poultry health in the absence of antimicrobials. Drs. Éva Nagy, John Prescott

(University of Guelph), Byeonghwa Jeon (Atlantic Veterinary College, PEI) and Martine Boulianne (University of Montreal) are all working on various vaccine technologies that could offset or replace antimicrobial use. Dr. Joshua Gong, Agriculture and Agri-Food Canada, is hoping to exploit the antimicrobial properties of essential oils and spices for use in infection control strategies.

In short, CPRC continues to direct considerable resources into research relating to antibiotic resistance. Details on the outcomes of this research will be provided in future updates. These, and other studies around the world, are contributing to the overall effort to better understand bacterial resistance to antimicrobials and develop rational strategies that promote the prudent use of antimicrobials in the poultry industry.

For more details on any CPRC activities, please contact The Canadian Poultry Research Council, 350 Sparks Street, Suite 1007, Ottawa, Ontario K1R 7S8, phone: (613) 566-5916, fax: (613) 241-5999, email: info@cp-rc.ca, or visit us at www.cp-rc.ca.

The membership of the CPRC consists of Chicken Farmers of Canada, Canadian Hatching Egg Producers, Turkey Farmers of Canada, Egg Farmers of Canada and the Canadian Poultry and Egg Processors' Council. CPRC's mission is to address its members' needs through dynamic leadership in the creation and implementation of programs for poultry research in Canada, which may also include societal concerns.