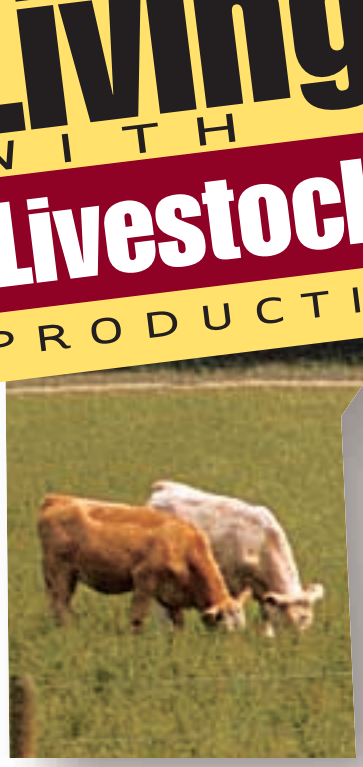
Understanding Anti-Microbial Resistance

Living WITH Livestock PRODUCTION



FALL 2001 FACT SHEET #7

Introduction

Anti-microbial resistance (AMR) is the ability of micro-organisms to resist being killed by an anti-microbial agent. Over time, micro-organisms (bacteria, yeast, parasites) change so that they can protect themselves from the desired effect of the drug or medicine.

Harmful bacteria that do not respond to antibiotic treatments have evolved in recent years, and are now common place in hospitals and in the community. This has reduced the treatment options for infections due to such bacteria. Other concerns are increased health care costs, as well as increased risk of illness or death due to disease.

Approximately half of antimicrobials (drugs used to treat infections from bacteria, yeast, parasites) used worldwide are used in human medicine; the remainder is used in livestock production. Much of the resistance problem we face today is the result of misuse of antibiotics in humans. There is also increasing evidence that the use of antibiotics in livestock production may contribute to AMR. Agriculture must address and deal with this. The human health field must also address its role in antibiotic over-usage and abuse.

The Issue:

There are two main areas of concern regarding antimicrobial resistance.

1. The development of antimicrobial resistant strains of food-borne bacteria that can cause illness in susceptible groups of people. Examples include Salmonella typhimurium DT 104, E.coli 0157 and Campylobacter jejuni. These bacteria can be passed from animals to humans through:

-direct handling of farm animals or their manure,

-through the consumption of undercooked meat or eggs, or unpasteurized milk.

-handling pets, or

-ingestion of unwashed fruits or vegetables.

People infected with these organisms may develop illnesses that do not respond to conventional antibiotic therapy.

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2. The transfer of resistance from animal bacteria that do not cause disease in humans, to human bacteria. These bacteria then cause illnesses in people that do not respond to conventional antibiotic therapy.

Antibiotic Use in Livestock:

Antibiotics are used in animal agriculture in three ways:

1. Therapeutic, or treatment uses are at doses to treat specific disease conditions.
2. Prophylactic, or preventative, uses are when animals are treated because they are known to be at risk or when such usage reduces disease or death during production.
3. Growth promotant uses are when antimicrobials are used in feed rations at low doses to promote growth.

The prophylactic and growth promotant uses of antimicrobials at low levels are believed to be the major contributor to drug resistance development; however, scientific proof is still lacking.

Is There Another Way to Raise Animals? Current Recommendations:

As early as 1962, concerned groups began to recommend that antibiotics be used for the treatment of animals and humans and not for growth promotion. Countries such as Sweden and Denmark have banned the use of antibiotics for growth promotion. They have been able to maintain efficient poultry, beef and pork production without the use of prophylactic antimicrobials. However, the therapeutic use of antimicrobials has increased.

After review of the situation in North America regarding antimicrobial use in swine and poultry production, the consensus was that large-scale poultry and pig production is not practical without antimicrobials available for therapeutic and prophylactic use. However, there are many examples of large-scale pig and poultry producers that have developed management systems that allow production with minimal use of antimicrobials.

Public, medical and veterinary concerns have suggested the following to address the problem:

- more appropriate use of antimicrobials,
- improved management to reduce the need for antimicrobials,
- national antibiotic surveillance programs to define the magnitude and scope of the problem,
- implementation of on-farm food safety programs, and
- increasing research in antimicrobial resistance issues.

An overriding principle is that animal disease is the leading cause of poor animal welfare. Producers have a responsibility to protect their animals from suffering due to preventable disease conditions.

Balancing antimicrobial use with the potential adverse effects on human health while still ensuring safe, efficient, and sustainable food production is the goal for modern day livestock producers.

Strategy for the Future:

Efforts regarding the AMR issue should focus on three areas:

1. Prudent use policy for anti-microbials,
2. Need for a comprehensive surveillance program,
3. Prioritising research activities to support policy development.

Regarding the prudent use policy, the Canadian Veterinary Medical Association has taken a leading role in developing guidelines for antimicrobial drug use in animals.

- Antimicrobials should only be used within the confines of a valid veterinary-client-patient relationship.
- The use of antimicrobials to promote growth and feed efficiency should not compromise the therapeutic use of the same antimicrobials in animals and people.
- The prophylactic use of antimicrobials should occur only if needed to reduce the risk of illness or death due to disease.
- Therapeutic use should only occur when there has been a specific disease organism identified as a result of a clinical diagnosis in a herd or flock.
- All users of antimicrobials should be educated in their proper usage, including administration, handling, storage, disposal and record keeping.

Producers are encouraged to implement a whole herd/flock approach to animal health that includes management, housing, nutrition, genetics, and vaccination programs, along with prophylactic and therapeutic antimicrobial usage based on the advice of the herd or flock veterinarian. Such a holistic approach to herd/flock management will reduce the reliance on antimicrobial usage.

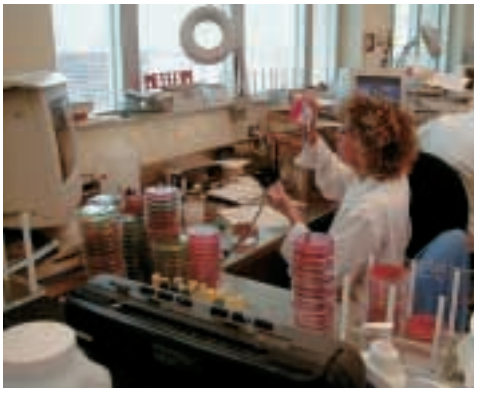
A national surveillance system for antimicrobial resistance is required to define the problem, its magnitude and its scope. Data from such surveillance will help guide the research activities needed to develop alternative policies in this area.

The major livestock commodity groups have instituted on-farm food safety programs. These programs function by identifying potential problems, correcting them and monitoring them. Some programs are voluntary; some are now becoming mandatory. These programs call for producers to join, implement the required activities, and then are validated, generally by a professional such as a veterinarian. The on-farm food safety programs are co-ordinated by a not-for-profit corporation structured under the auspices of the Livestock and Livestock Products Act. As these programs develop and mature, they will be audited and reviewed to ensure ongoing compliance. Refer to another factsheet in this series entitled *Food Safety on the Farm* for more information.

Research in AMR issues is a critical component in addressing many unanswered questions. Among the issues to be addressed are the many factors involved in causing AMR, methods of preventing the development of AMR, and strategies for dealing with organisms that have developed AMR. Research is also needed to develop management strategies for producing livestock with less reliance on antimicrobials.

Summary:

- AMR is a serious issue in both human and animal populations. Its causes are rooted in patterns of antimicrobial use and abuse that is prevalent in both human and veterinary medicine.
- There is no simple solution. Co-operative action by all parties to reduce the prophylactic use of antimicrobials, and to prudently use therapeutic antimicrobials will help to reduce the problem.
- Surveillance programs on food-borne illnesses and AMR will help to define the problem and focus our collective attention on the areas where improvement can be made.
- The goal is to produce a safe, wholesome, high quality food product from livestock while maintaining the health and productivity of these livestock.



Further Information

For further information about livestock production refer to other titles in the series: "Living with Livestock Production" available from Manitoba Agriculture and Food offices.

1. *Health Issues and Livestock Production*
2. *Livestock Odours – Sources, Concerns & Solutions*
3. *Surface Water Issues*
4. *Nitrates in Soil and Water*
5. *Land Application of Manure*
6. *Siting Livestock Production Operations*
7. *Understanding Anti-microbial Resistance*
8. *Food Safety on the Farm*
9. *Livestock Operations and Groundwater Quality*

More detailed information can be found on the Internet at www.gov.mb.ca/agriculture/livestock.

Copies of the Farm Practices Guidelines for Hog Producers in Manitoba (1998 edition), and Farm Practices Guidelines for Poultry Producers in Manitoba (2000 edition) are available from Manitoba Agriculture and Food offices in rural Manitoba and from Agriculture Publications at 8th Floor, 401 York Avenue, Winnipeg, MB R3C 0P8 (Fax: 204-948-2498).*

**The 1995 edition for the other titles of the series are presently available; they are being updated.*