

Antibiotic Resistance – Will this change the way I farm?

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A recent public webinar series hosted by the 'AMR – One Health Consortium' at the University of Calgary focused on the latest understanding affecting antimicrobial resistance (AMR). Dr. Herman Barkema (Professor Epidemiology of Infectious Diseases through the Faculty of Veterinary Medicine and Cumming School of Medicine) was a key moderator and has shared research findings previously with BC dairy audiences. "We need to make sure that the agriculture community sees what the size is of this problem in livestock," says Barkema of AMR.

"We need a sense of urgency" he insists, "because it is urgent."

Antimicrobial resistance, or bacteria being resistant to antibiotics, is often mentioned as a major concern in human and animal health as well as in sustainable food production. Humans or animals with infections caused by resistant bacteria can experience a dramatic increase in illness severity, death risk, and treatment costs. In dairy cattle specifically, this means a decrease in milk production, or a longer milk withdrawal time due to increasing treatment length, leading to increasing costs associated with common bacterial infections.

Resistance to antibiotics continues to increase worldwide, while not many new antibiotics have been developed. This will dramatically reduce available treatment options in the coming years. Economically, antibiotic resistance represents a threat to dairy industry sustainability and farm productivity.

Common producer concerns regarding bacterial resistance include the development of mandatory antibiotic use restrictions, or their ability to successfully treat common bacterial disease in the future, like mastitis or bacterial pneumonia. As the treatment and prevention of mastitis account for the vast majority of antibiotic use on farms, methods like selective dry cow therapy or selectively treating clinical mastitis have been proposed as a way to reduce on-farm antibiotic use. But are they necessary? Does reducing antibiotic use in food production make a difference? To summarise – yes.

Research has demonstrated that the reduction of antibiotic use in animal production systems leads to a reduction in the levels of resistant bacteria in that production system, as well as the producers and their employees. Therefore, not only can reducing dairy antibiotic use decrease resistant bacteria in the animals, but also reductions in resistant bacteria can be seen in those people working with animals, like producers and their families.

Could resistant bacteria be on my farm?

Yes, in Canada (including British Columbia), resistant bacteria are present in dairy cattle. Resistant bacteria have been found in the udder, intestine, and in environmental manure samples. A newly initiated surveillance system has been established in Canada to understand what the situation is in Canadian dairy specifically, with 150 dairy farms participating across British Columbia, Alberta, Ontario, Québec, and Nova Scotia. The Canadian Dairy Network for Antimicrobial Stewardship and Resistance (CaDNetASR), a Dairy Farmers of Canada and Agriculture and Agri-Food Canada Dairy Cluster 3 project, aims to understand the current status of antibiotic resistance in Canadian dairy farms and inform producers of the results. Tools like this can be used to understand how antibiotic use has impacted the bacteria to date, and why certain antibiotics may be becoming less effective.

What is 'One Health'?

'One Health' is an approach that recognizes human, animal, and environmental health are connected. This approach is important when trying to cure diseases that transfer between species, much like COVID-19 or flu viruses, as well as addressing issues of environmental impact on health, through water, pollution, and natural disasters. This approach emphasizes the importance of specialists in different areas working together, from academics and disease experts, industry partners, as well as producers and relevant community members. By using a One Health approach, all aspects contributing to health are considered, leading to improved long-term success.

Resistance of bacteria to antibiotics is a major One Health issue as bacteria can transfer between species and environments, and bacteria can acquire material from other bacteria that make them resistant. This could lead to relatively harmless bacteria coming in contact with another more dangerous type of bacteria and essentially handing over the genetic blueprints to resist one or more of our most commonly used antibiotics, eventually leading to "superbugs," bacteria that cannot be treated with most antibiotics anymore.

Why does antibiotic use in humans impact how I treat my cows?

"Often when I speak to farmers about it, they see this as a human health problem that is imposed on them," Barkema states. However, this is not the case. As producers know, the antibiotics sitting in their barn, and the ones sitting in their own medicine cabinet have the same or similar names (i.e. penicillin, tetracycline, etc.). This is because many antibiotics used in humans, animals, and in the environment (i.e. on crops or in aquaculture) have the same active ingredients. Therefore, if bacteria can transfer between species, they can carry those antibiotic resistant traits with them, causing problems down the line. Specifically, antibiotic use must be reduced across all sectors for substantial progress to be made. Similarly, if a boat has many holes and only one patch, it will still sink.

How will this impact my farm?

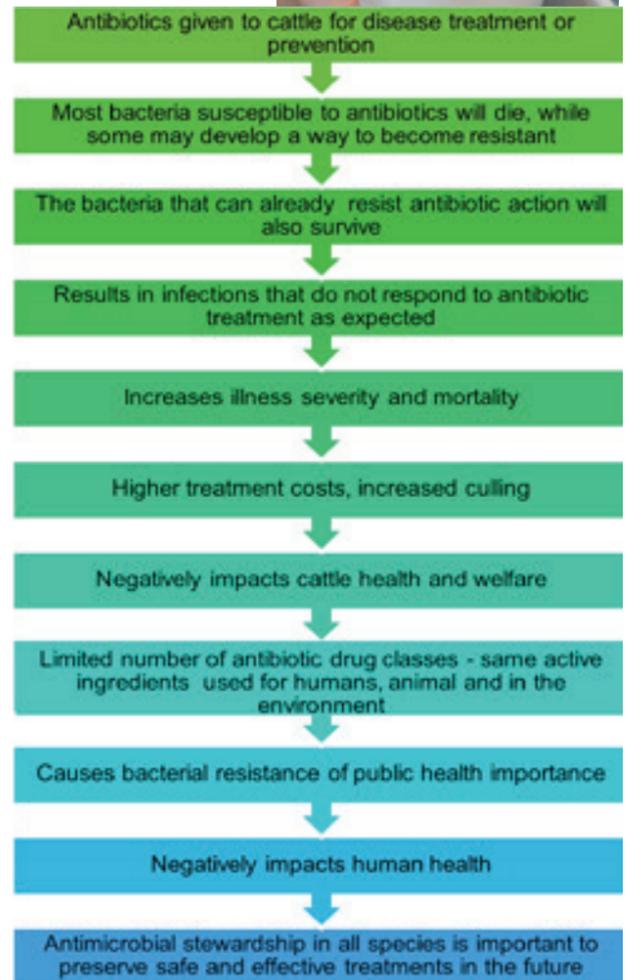
Predictions have been made that suggest in the next lifetime if we do not change our antibiotic practices, routine surgeries (i.e. human knee replacements) may become too dangerous even in the most advanced medical settings due to the risk of untreatable bacterial infections. The direct impacts on Canadian dairy producers are currently unknown. However, it has been projected that by 2050, there will be a global annual decline in livestock production caused by antibiotic resistance of 2.6 – 7.5%.

On dairy farms, available treatment options will become more limited, and preventive antibiotic use will be less common. Disease prevention and biosecurity will be of critical importance, as bacterial disease treatment success decreases. Additional biosecurity efforts may need to be taken to maintain production levels and animal welfare. "Infection prevention and control is the basis for antimicrobial stewardship," says Barkema.

If this is such a problem, what is being done?

Research into best practices that minimize consequences when reducing antibiotic use on dairy farms is increasing in popularity. Within our own research team, we have seen successful selective practices (dry cow therapy and clinical mastitis treatment) effectively enacted in Canada, and British Columbia specifically.

Antibiotic resistant bacteria are increasing worldwide and have been found in BC dairy cattle.



The pathway from agricultural antibiotic use to human health implications.

Antibiotic resistance has become a priority in Canadian research, government, and academic institutions. The University of Calgary is leading a newly developed AMR – One Health Consortium, which focuses on antibiotic use and resistance research, policy, training, outreach, and commercialization. The public webinar series represents one of the Consortium's outreach activities, aimed at improving public knowledge of antibiotic resistance, and host meaningful discussions regarding control efforts.

What can I do to limit bacterial resistance on my farm?

Your veterinarian is the best person to help guide your antibiotic use. Consider not using antibiotics 'just in case' if this is a common practice on your farm. Ask your veterinarian about selective methods and how to limit unnecessary antibiotic use.

Judicious use of antibiotics to protect their effectiveness in human and animal medicine is essential to maintaining the sustainability of the dairy industry and ensuring continued public support for the industry.

You can learn more about the webinars and AMR here: www.research.ucalgary.ca/amr/news-events/events





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