January 2018

AMU STRATEGY

A PRESCRIPTION *for change*

+

AMR
WHAT'S THE ISSUE

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A ROLE IN THE STRATEGY

BIOFILMS

THE INTERNATIONAL EXPERIENCE

BROILER
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VACCINES

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Chicken Farmers of Canada
Les Producteurs de poulet du Canada

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ON THE COVER

White Hen
Credit:Stepanyda
Stock photo
ID:525642489

LETTER FROM BENOIT

Benoît Fontaine
Chair, CFC

Dear fellow chicken farmers,

The issue of antimicrobial resistance and use (AMR and AMU) in the Canadian chicken industry has been top of mind for farmers, consumers and governments over the last several years. All partners in our industry have been working on ways to manage antimicrobial use in order to ensure that antibiotics remain a part of the toolkit for both humans and animals.

We took our first step in 2014, with the ban on the preventative use of Category I antibiotics, but it is clear that we cannot stop there. We need to be diligent in our mission to further reduce antibiotic use. This means that we have to take additional steps. It is certainly no easy task, and will require the collaboration of every link in our value chain.

Chicken Farmers of Canada recently announced our antimicrobial use strategy, which eliminates the preventive use of Category II antimicrobials by the end of 2018, and sets a goal to eliminate the preventive use of Category III antibiotics by the end of 2020.

This decision builds on the objective of eliminating the preventative use of antibiotics of human importance, guided by a comprehensive strategy that involves reduction, surveillance, stewardship, and research. Chicken Farmers of Canada is implementing this strategy to answer the public health threat of AMR, to maintain consumer confidence, and to provide our customers a sustainable means of meeting government and consumer expectations – while protecting animal health.

We have created this magazine to help communicate the elements of the AMU strategy, the updates we have been making, and the opportunities for farms to pursue. This is our opportunity to act, be proactive, and take measures to take ourselves out of the antibiotic equation before the ability to use antimicrobials is taken away from us.

Every farm needs to evaluate its management practices; there is no silver bullet solution, and every farm is different. The changes we are making are being phased in over time to give us the opportunity to find out what works on our own farms to maintain the health and welfare of our birds.

We have been leaders in antimicrobial stewardship, and this strategy demonstrates that we are committed to providing continued confidence to consumers, customers, and to governments.

Sincerely,

Benoît Fontaine
Chair, Chicken Farmers of Canada

> “WE HAVE BEEN LEADERS IN ANTIMICROBIAL STEWARDSHIP, AND THIS STRATEGY DEMONSTRATES THAT WE ARE COMMITTED TO PROVIDING CONTINUED CONFIDENCE TO CONSUMERS, CUSTOMERS, AND TO GOVERNMENTS.”

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Chicken Farmers of Canada's **Responsible Antimicrobial Use Strategy**

Chicken Farmers of Canada (CFC) has actively engaged with stakeholders and has implemented a series of initiatives to demonstrate responsible antimicrobial use (AMU) in the Canadian chicken sector.

CFC's *Responsible Antimicrobial Use (AMU)* Strategy, launched in 2012, was developed in conjunction with the Canadian Hatchery Federation, Canadian Hatching Egg Producers, Canadian Poultry and Egg Processors Council, the Animal Nutrition Association of Canada, and the Canadian Association of Poultry Veterinarians.

Key Focus on Medically Important Antimicrobials

Antimicrobials are, and will remain, essential tools to protect the health and welfare of birds and to ensure a safe food supply. CFC supports the responsible use of antimicrobials that have been approved by the Veterinary Drugs Directorate of Health Canada.

The objective of CFC's strategy is to demonstrate proactive management of antimicrobial use and to eliminate the preventative use of antimicrobials of human importance, in order to preserve effective treatment options.

Following the successful elimination of Category I antibiotics for preventative use in Canadian chicken production in May 2014, CFC established a phased approach to eliminating the preventative use of the remaining antimicrobials of human importance.

Step 1: Elimination of the preventative use of Category I antibiotics (those most critical to human health) in May 2014

Step 2: Elimination of the preventative use of Category II antibiotics by the end of 2018

Step 3: Goal to eliminate the preventative use of Category III antibiotics by the end of 2020, contingent on a re-assessment of the objective at the end of 2019

This strategy continues to allow for the use of antimicrobials to treat and control diseases, and for the use of ionophores and chemical coccidiostats.

Maintaining the use of antibiotics for treatment is a critical cornerstone to CFC's strategy to maintain animal welfare and food safety. While there are markets for "raised without the use of antibiotics" products, CFC does not believe this approach is sustainable for the entire industry. Antibiotics will continue to be essential for use in agriculture to maintain animal welfare, which is why CFC's strategy focusses specifically on the reduction of preventative use, rather than full elimination.

Canadian chicken farmer – Yvon Cyr, in his barn in New Brunswick.

The rationale for implementing CFC's strategy includes:

To maintain consumer confidence

To ensure the access to antibiotics for therapeutic purposes to treat disease

To answer the public health threat of antimicrobial resistance and the concerns of antimicrobial use in agriculture

To provide our customers a sustainable means of meeting government and consumer expectations, while protecting animal health

This strategy, covering all chicken raised in Canada, works in collaboration with the **Pan-Canadian Framework on Antimicrobial Resistance and Antimicrobial Use** and provides a sustainable means of meeting consumer expectations while protecting animal health.

This direction is consistent with recent announcements from foodservice companies that have established policies to eliminate the use of antimicrobials of importance to humans while maintaining the ability to treat for disease, rather than "Raised without the use of antibiotics" policies.

Responsible Antimicrobial Use Strategy

CFC's strategy is a clear demonstration of commitment to the issue of antimicrobial resistance and use, and provides continued confidence to customers,

consumers and government about the sustainability of the Canadian chicken sector.

For example, the effectiveness and success of the elimination of the preventative use of Category I antibiotics has been documented by **the Public Health Agency of Canada.**

The key guiding elements of CFC's *Responsible AMU Strategy* include surveillance, stewardship, and research.

Surveillance

- Since 2013, CFC has collaborated with the Public Health Agency of Canada on surveillance at the farm level for both antibiotic use and resistance – this is in addition to surveillance at retail and processing plants.
- CFC has also been conducting antimicrobial use surveillance by collecting use information during audits of the *Raised by a Canadian Farmer* On-Farm Food Safety Program.
- These surveillance programs have allowed stakeholders to better understand antimicrobial use trends and to monitor the impacts of the reduction strategy.

Stewardship

- To reduce the competitive disadvantage compared to other countries, CFC has worked with the federal government to increase the availability of feed additives and to allow for their proper labelling.
- Working with value chain members, reviews of quality management practices are being conducted throughout the supply chain.
- Communicating the issue of antimicrobial resistance and the importance of the *Responsible AMU Strategy* to all stakeholders.
- Health Canada is implementing new initiatives to improve the oversight of antimicrobial use – these include regulations and policy changes on own-use importation, active pharmaceutical ingredients, the removal of growth promotion claims, and a requirement for veterinary oversight of all medically important antimicrobials.

Research and Innovation

- CFC has placed an emphasis on research, with over half of its research funding dedicated to vaccine development, gut health, and alternative products.
- A priority has been placed on antimicrobial use and resistance for projects being submitted to Agriculture and Agri-Food *Canada's Canadian Agricultural Partnership Research Cluster* – a research program starting in 2018.

Talking to Consumers

Antimicrobial use in agriculture will continue to be important to manage disease, animal welfare and food safety. Therefore, it is important for open communication with consumers about the importance of these products.

CFC has developed several tools to help consumers understand antimicrobial use. For example, check out examples of **brochures**, a **series of videos,** and the **letstalkchicken.ca** website explaining antimicrobial use in the chicken sector.

An important core message for consumers is not to confuse the issue of antimicrobial resistance with that of antimicrobial residues. As always, consumers can be assured that Canadian chicken is free of antibiotic residues. Canada has strict regulations with respect to antibiotic use and withdrawal times to ensure that chicken reaching the marketplace does not contain residues, which is monitored by the Canadian Food Inspection Agency. **AMU**

LINKS

For more information and videos, check out **www.chicken.ca** and **www.letstalkchicken.ca**.

Go to **the Public Health Agency of Canada** to see the PHAC report at www.canada.ca

Raised by a Canadian Farmer

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SUSTAINABILITY EXCELLENCE / EXCELLENCE EN DÉVELOPPEMENT DURABLE

Chicken farmers are proud to raise the Canadian chicken you trust!

Canadians want fresh, high-quality Canadian chicken and our farmers are proud to raise it to some of the highest standards for food safety, animal care, and sustainability.

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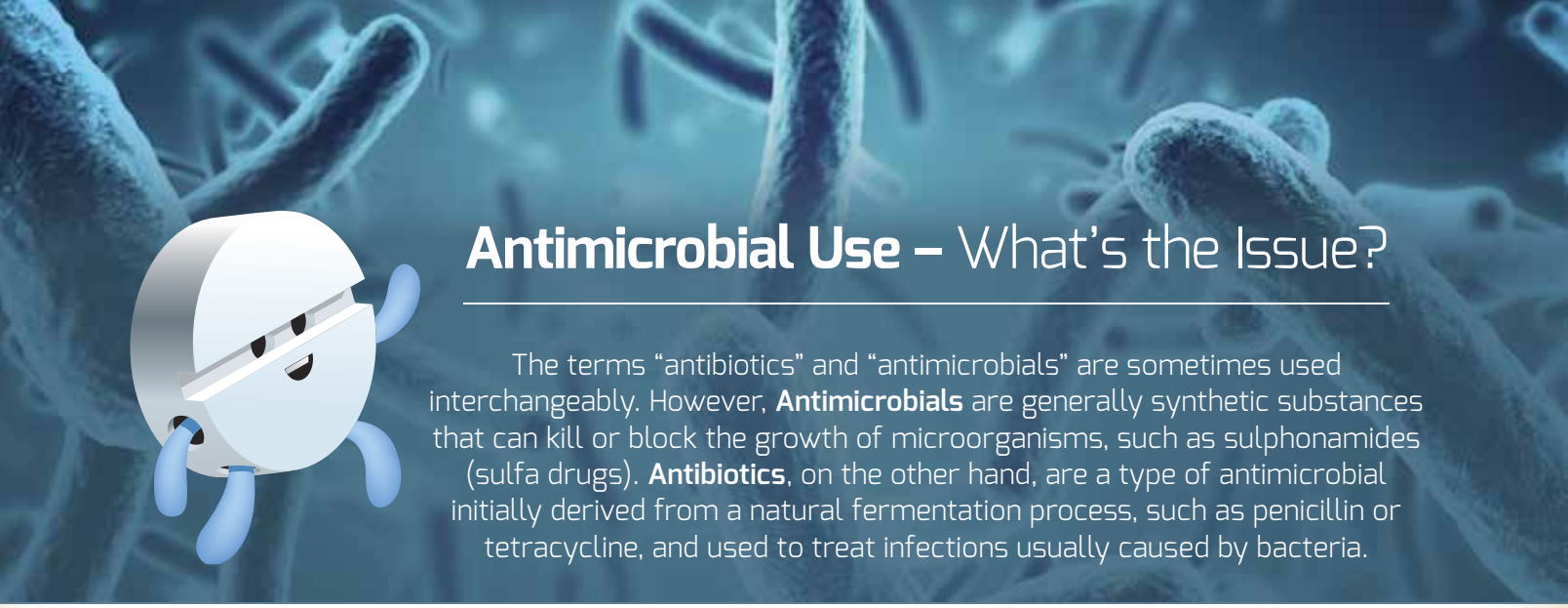


Antimicrobial Use – What's the Issue?

The terms "antibiotics" and "antimicrobials" are sometimes used interchangeably. However, **Antimicrobials** are generally synthetic substances that can kill or block the growth of microorganisms, such as sulphonamides (sulfa drugs). **Antibiotics**, on the other hand, are a type of antimicrobial initially derived from a natural fermentation process, such as penicillin or tetracycline, and used to treat infections usually caused by bacteria.

Residues are not the Issue

While industry needs to remain vigilant about preventing antibiotic residues, antibiotic residue is not the present-day concern associated with antimicrobial use.

Antibiotic residues refer to the presence of the antibiotics themselves in the final meat product. The Canadian Food Inspection Agency monitors for residue levels and chicken has maintained an excellent track record.

The Issue is Resistance

Antimicrobial resistance is a naturally occurring phenomenon where bacteria evolve various mechanisms that reduce or eliminate the effectiveness of antibiotics.

Some bacteria are naturally resistant, such as certain types of bacteria being unaffected by penicillin. Other bacteria develop resistance by genetic mutations that allow them to survive in the face of environmental pressures, such as the presence of antibiotics, or by receiving resistance genes transferred from other bacteria.

Cross-resistance can also develop because of the similarities among different antimicrobials. For example, tylosin and erythromycin are two different antibiotics used in animals (erythromycin is also used in people). Development of resistance to tylosin in previously susceptible bacteria can also confer resistance to erythromycin in the same bacteria.

Antimicrobial use is a major driver for the development of antimicrobial resistance. Bacteria adapt and become resistant when they are exposed to antimicrobials used by humans and in agriculture - thus the pressure to reduce antimicrobial use.

Antimicrobial resistance – its development and how it is shared amongst bacteria – is a complex process, but one that can have significant negative impacts on human and animal health.

The diagram from the (U.S.) Centers for Disease Control and prevention (CDC), outlines how resistance can develop and spread among the community.

Resistance is a Threat to Public Health and to Agriculture

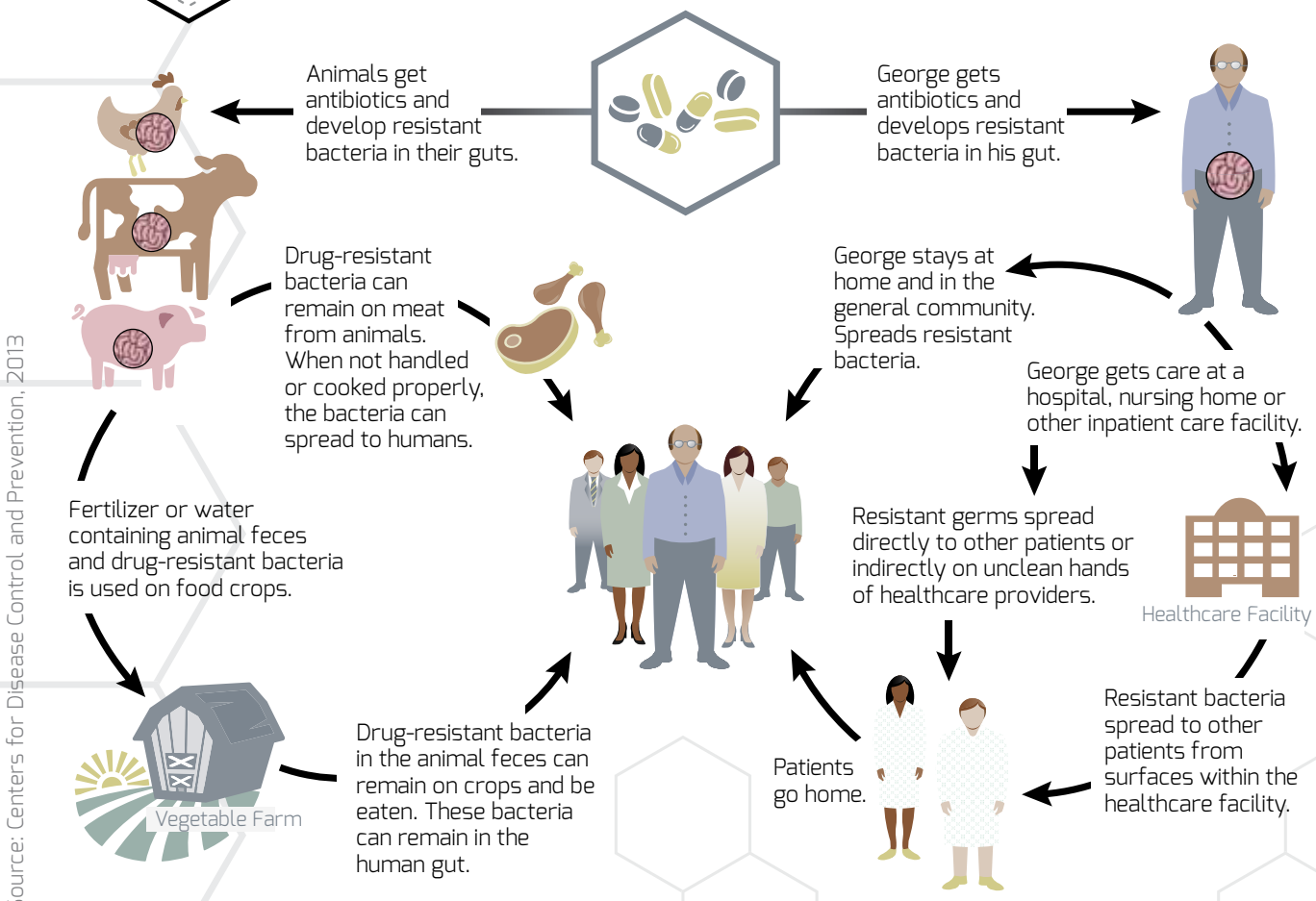
The World Health Organization (WHO) has stated that antimicrobial resistance is a serious threat to global public health that threatens the effective prevention and treatment of infections caused by bacteria and other micro-organisms. Without effective antimicrobials, infections will become untreatable and illnesses will become longer and more severe.

This threat is amplified by the fact that very few new antibiotics have been discovered in recent decades – which enforces the need to preserve the effectiveness of current antibiotics.

The threat to public health has been well documented, both in Canada and internationally:

- The CDC has estimated that antimicrobial resistance is responsible for 23,000 deaths/year and more than 2,000,000 illnesses in the U.S.
- The United Kingdom has projected that worldwide deaths due to antimicrobial resistance will reach 50 million by 2050 if no action is taken, at a cumulative cost to global economic output of $100 trillion US.

Examples of How Antibiotic Resistance Spreads



Source: Centers for Disease Control and Prevention, 2013

Simply using antibiotics creates resistance. These drugs should only be used to treat infections.

- The Organisation for Economic Co-operation and Development estimates that up to 50% of human infections in G7 countries may be resistant to routinely used antibiotics and notes that patients with resistant infections have two to three times higher mortality and risks of complications.
- The Public Health Agency of Canada has stated that antimicrobial resistance significantly impedes our ability to fight infectious diseases, leading to more and increased hospitalizations resulting in increased health care costs and costs to society in the form of increased disability claims and loss of productivity.
- **The Pan-Canadian Framework for tackling antimicrobial resistance and use** calls for urgent action to counter the potentially devastating effects of the emergence and spread of AMR.

ANTIMICROBIAL USE IS A MAJOR DRIVER FOR THE DEVELOPMENT OF ANTIMICROBIAL RESISTANCE. BACTERIA ADAPT AND BECOME RESISTANT WHEN THEY ARE EXPOSED TO ANTIMICROBIALS USED BY HUMANS AND IN AGRICULTURE - THUS THE PRESSURE TO REDUCE ANTIMICROBIAL USE.

THE PUBLIC HEALTH AGENCY OF CANADA INDICATES THAT THERE IS INCREASING EVIDENCE THAT THE USE OF ANTIMICROBIAL AGENTS IN VETERINARY MEDICINE AND LIVESTOCK PRODUCTION IS AN IMPORTANT CONTRIBUTING FACTOR TO THE EMERGENCE AND PERSISTENCE OF BACTERIAL RESISTANCE IN HUMANS.

The threat to agriculture is similar – increased resistance will prevent the use of antibiotics for treatment of disease, while threatening both the welfare of animals and the food supply.

Does Antibiotic Use at the Farm Contribute to This Problem?

All antibiotic use can impact and help develop resistance, whether in humans or in agriculture.

The Public Health Agency of Canada indicates that there is increasing evidence that the use of antimicrobial agents in veterinary medicine and livestock production is an important contributing factor to the emergence and persistence of bacterial resistance in humans.

When antibiotics are used in agriculture, there is an opportunity for bacteria to develop resistance. As shown in the figure, improper handling and cooking of poultry products can result in people becoming ill from bacteria that may be present on poultry meat (e.g. *Salmonella*). If those bacteria are antibiotic-resistant, then treatment of the resulting illness can become much more difficult.

Research appears to also show that the risk for farm workers and families may be more elevated than the general public, due to their closer association with live animals. Research is indicating that farm workers and families have higher antimicrobial resistance patterns than the general population.

The International Effort to Maintain the Effectiveness of Antibiotics

In 2015, the World Health Organization issued a Global Action Plan on AMR developed with both the World Organization for Animal Health and the Food and Agriculture Organization, which has resulted in a number of initiatives to reduce use around the world.

For example, in April 2016, G7 Agricultural Ministers made a declaration that all members were encouraged to ensure the prudent use of antibiotics, to phase out antibiotics for growth promotion and to preserve the use of antibiotics only for therapeutic reasons. This was followed in September 2016 by the United Nations General Assembly adopting a political declaration aimed at combating the global threat posed by antimicrobial resistance.

In Canada, in 2015, the Canadian government released an Action Plan on Antimicrobial Resistance and Use and followed this with the development and call for action in the **Pan-Canadian Framework for tackling antimicrobial resistance and use.** This framework focusses on surveillance, infection prevention and control, stewardship and research and innovation.

CFC's *Responsible AMU Strategy* dovetails with the Pan-Canadian framework for tackling antimicrobial resistance and use. CFC's commitment to this strategy is demonstrated by the reduction efforts of antimicrobials of human importance. **AMU**

LINKS

Pan-Canadian Framework for Tackling Antimicrobial Resistance and Use.

www.canada.ca/en/health-canada/services/publications/drugs-health-products/tackling-antimicrobial-resistance-use-pan-canadian-framework-action.html

WHEEL OF CHICKEN

Understanding your Choices

Ever wonder what all those chicken labels mean?

Do you know the difference between free-range and free-run?

Take a look and understand your choices when it comes to buying chicken!

When you're at the grocery store, make sure you ask for chicken with the Raised by a Canadian Farmer brand – this ensures you get fresh, safe, high quality Canadian chicken that you and your family will love!

GRAIN-FED

Since all chicken in Canada is given a feed that consists of over 85% grain, this term is typically just used for marketing. Chicken labeled as "grain-fed" is stating the obvious, though some brands will mention special types of grain.

HORMONE/ STEROID-FREE

Though it is rare, some marketers still classify their chicken as "hormone-free." This is little more than a marketing tactic, since the use of hormones and steroids in raising poultry have been banned since the 1960s in Canada.

FREE-RUN

Free-run is different than free-range in that chickens do not necessarily need to be raised outside but they are required to be able to move around freely within the barn. All chickens raised for meat in Canada are considered free-run.

FREE-RANGE

Free-range birds must have access to the outdoors. However, since there is no legal definition of free-range in Canada, this can vary from farm to farm.

VEGETARIAN GRAIN-FED

Vegetarian grain-fed means that the feed contains only vegetable protein such as soy, which can alter the flavour and colour of the meat. While chickens are omnivores, chickens can be raised on vegetarian feed, as long as an appropriate protein level is achieved.

HALAL

With respect to food, Islamic laws are very specific and Muslims seek to eat foods defined as "Halal," which is defined by Muslims as "that which is allowed" by God, or "Allah," the Law-Giver. Muslims are taught that the animals must be well-rested and handled in a way that minimizes suffering.

KOSHER

Kosher refers to the content and production requirements, not to any specific cuisine. In Hebrew, kosher means "fit" or "proper," indicating the food products meet the dietary requirements of Jewish law. These laws are known as the laws of kashruth and deal with what foods may be eaten together and how those foods are to be prepared.

RAISED WITHOUT ANTIBIOTICS

Raised without antibiotics on the label means that the chicken was not treated in any way with antibiotics.

ORGANIC

Chicken sold as organic is raised to a specific standard laid out by the Canadian General Standards Board, in addition to the standards set by an organic certification board. Organic chicken must be raised with a certified organic feed that contains no animal by-products or antibiotics, and any supplements, such as vitamins, must be approved by a certification body.

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chicken.ca | poulet.ca
chickenfarmers.ca | producteursdepoulet.ca

Antimicrobial Use in Chicken Production

The Role of Antimicrobials in Animal Production

Appropriate antimicrobial use in animals is essential in the management of health which, in turn, influences animal welfare and food safety. Good animal welfare, a wholesome food supply, and sustainable production depend upon healthy animals, and antimicrobials are important tools in the quest to keep our poultry healthy.

Currently, antimicrobials are used in animal agriculture to prevent, treat, and control certain diseases and to improve production. However, antimicrobials for "growth promotion" and "feed efficiency" improvement are no longer considered "responsible use". Consequently, Health Canada has initiated action to have such label claims removed by the end of 2018.

In chicken production, the two main diseases for which antimicrobials are used preventatively are Necrotic Enteritis *(Clostridium perfringens)* and Coccidiosis *(Eimeria spp.)*. Antimicrobials such as virginiamycin and bacitracin are used to prevent Necrotic Enteritis while the ionophores, which are technically antimicrobials, but are not used to treat or prevent bacterial infections, are used to prevent coccidiosis, a parasitic disease.

Many antimicrobials are used to treat bacterial infections in poultry. Necrotic enteritis is commonly treated with penicillin but can also be treated with some forms of bacitracin or tetracyclines. Coccidiosis, on the other hand, can be treated with certain sulphonamides or with a specific sulfa-like drug called amprolium. Infections caused by other bacteria, such as *E. coli*, are also treated with a number of different kinds of antimicrobials.

The definitions for prevention and therapy are as follows:

Disease Prevention (prophylaxis): Involves the administration of an antimicrobial drug to animals, none of which are exhibiting clinical signs of disease.

Disease Treatment: The use of antimicrobials in response to the identification of a known clinical or subclinical disease, including the mass medication of flocks of birds in which a subset of birds are identified with signs of clinical or subclinical disease for which antimicrobial treatment would be indicated.

Antimicrobials Used in Human Medicine and Animal Agriculture

Some antimicrobials used in animal agriculture are the same as or are similar to those used in human medicine.

Health Canada ranks antimicrobials by their importance to human medicine and the availability of alternatives. There are four categories of importance, with antimicrobials categorized based on the level of effectiveness in treating human infections. Those products classified in Category I, II and III are used in human medicine, whereas those products classified in Category IV have no shared human equivalent.

The classification of antimicrobials can change periodically and does not always reflect the availability of a specific human product. For example, virginiamycin is used exclusively in animal agriculture, yet is categorized as "High Importance" to humans. While virginiamycin is not used in human medicine, an analog, known as "Synercid" is used in people under certain circumstances, thus the Category II designation.

Some of our trading partners classify certain antimicrobials differently than we do in Canada. For example, bacitracin is categorized as Category III in Canada, whereas in the U.S. it is categorized as not important for human medicine.

Chemical coccidiostats are also used in feed but are not antimicrobials; therefore, they do not fall into any of the categories listed above. These products include nicarbazin (Nicarb), diclazuril (Clinacox), decoquinate (Deccox), clopidol (Coyden), halofuginone (Stenerol) and robenidine (Robenz).

Category	Category Criteria	Antimicrobial Family	Examples of Product Names
I - Very High Importance	Essential for serious human infections and limited or no alternatives available	Cephalosporins	Ceftiofur (Excenel)
		Fluoroquinolones	Baytril
II - High Importance	Essential for treating serious human infections and few alternatives available	Aminoglycosides	Gentamicin
		Lincosamides	Lincomycin, Linco-Spectin
		Macrolides	Tylan
		Penicillins	Pot-Pen, Penicillin G procaine
		Streptogramins	Stafac, Virginiamycin
		Diaminopyrimidines	Uniprim
III - Medium Importance	Important for treating human infections and alternatives generally available	Bacitracins	Albac, BMD
		Sulphonamides	Sodium sulfamethazine, Sulphaquinoxaline
		Tetracyclines	Aureomycin, Oxy, Neo-Tetramed
IV - Low Importance	Not used for humans	Flavophospholipids	Flavomycin
		Ionophores	Avatec, Aviax, Bio-Cox, Coban, Coxistac, Cygro, Maxiban, Monensin, Monteban, Rumensin, Salinomycin, Sacox
Uncategorized		Orthosomycin	Avilamycin

WITH PRESSURE ON REDUCING USE IN BOTH HUMAN AND ANIMAL MEDICINE, CFC HAS TAKEN ACTIONS TO ENSURE THAT THESE TOOLS ARE AVAILABLE FOR DISEASE TREATMENT WITH THE OBJECTIVE OF MAINTAINING THEIR EFFECTIVENESS FOR GENERATIONS TO COME.

There are many terms being used to define production practices relative to antimicrobial use and this list continues to grow.

Such practices range from those with strict requirements, such as Raised Without the use of Antibiotics (RWA) production, where antimicrobial use is not allowed, to much less restrictive procedures, such as no "non-therapeutic" use.

Raised Without the use of Antibiotics: This is the Canadian term used to define product raised without the use of antimicrobials listed in Categories I, II, III or IV.

Antimicrobials of Human Importance: This term refers to the antibiotics listed in Categories I, II and III.

Antibiotic Free (ABF): This is a term used in the U.S. that references the equivalent of Canadian RWA production. Unfortunately, this is a misnomer as all chicken is antibiotic free, in that it does not have antibiotic residues.

Never Ever: This is a marketing claim developed by the U.S. Department of Agriculture that includes the requirement that antimicrobials were not administered.

Non-therapeutic use: This term refers to antimicrobial use for production purposes or for disease prevention purposes.

Surveillance Information

The Canadian chicken sector has worked collaboratively with the Public Health Agency of Canada since 2013 to perform surveillance at the farm level for both antibiotic use and resistance. Chicken farmers have granted the federal government access to their farms so that we can better understand the issues of resistance and use.

The Public Health Agency of Canada publishes annual reports and special bulletins that provide insight into antimicrobial use and trends across the country. While there is a growing number of RWA flocks and flocks raised without the use of antimicrobials of human importance, the majority of flocks receive antimicrobials during the grow-out, and the majority of these are used in a preventive fashion.

These surveillance initiatives have also provided a number of good stories about the responsible use of antimicrobials in the chicken sector. For example:

- The majority of antimicrobials used in poultry production are not used in human medicine and the proportions of antimicrobials used are different between humans and broiler chickens.
- The Public Health Agency of Canada has reported that industry's elimination of the preventive use of Category I antimicrobials has been effective, both in frequency of use and a decreasing trend in *Salmonella* and *E. coli* resistance levels.

Moving Forward

Antimicrobials are useful tools that help to maintain health in people and poultry alike. With pressure on reducing use in both human and animal medicine, CFC has taken actions to ensure that these tools are available for disease treatment with the objective of maintaining their effectiveness for generations to come. **AMU**

CHICKEN FARMERS OF CANADA'S *Sustainability Report*

RAISING THE LOCAL, CANADIAN CHICKEN CONSUMERS TRUST.

To view the full report go to www.chickenfarmers.ca/what-we-do/sustainability/

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Marketing & Antimicrobial Use

The public health risk of antimicrobial resistance has fueled a significant amount of effort from public and private entities. Retail and restaurant companies across the globe have been active on the file as well – both by participating in the global effort to reduce use and by taking advantage of a market opportunity.

As a result, North America has seen numerous announcements from companies declaring their antimicrobial use policies. With each announcement, competitors have felt pressure to provide similar statements. This pressure has also been fueled by special interest groups, government policies, and a drive to demonstrate corporate social responsibility.

PROCESSORS, RETAILERS AND RESTAURANTS ARE FEELING SUBSTANTIAL PRESSURE TO BE ABLE TO IDENTIFY THEIR ANTIMICROBIAL USE POLICIES AND TO PROVE TO CONSUMERS THEIR SOCIAL RESPONSIBILITY.

In Canada, and the U.S., the only opportunity to differentiate product based on antimicrobial use is to use the label "Raised without the use of antibiotics" (RWA).

As a result, companies that are looking to reduce use, to provide consumers with options, or to take advantage of market opportunities, have limited options.

The RWA claim does not allow any antimicrobial use, even when the birds are sick. Therefore, any birds that need an antimicrobial treatment must be diverted away from the RWA supply stream. This presents animal welfare and operational challenges to ensure sufficient product for the market.

Since birds are living organisms and will always be susceptible to disease, there will always be a need to treat them with antimicrobials, when required. To not treat sick flocks presents welfare, food safety, and food quality challenges. For this reason, CFC does not believe that RWA is a sustainable model for the majority of chicken production in Canada.

Processors, retailers and restaurants are feeling substantial pressure to be able to identify their antimicrobial use policies and to prove to consumers their social responsibility.

This reality emphasizes the importance of the CFC reduction strategy. CFC's strategy provides processors, restaurants, and retailers a firm commitment to a reduction strategy for antimicrobials of human importance in the Canadian chicken industry. This strategy is a solid and sustainable means of meeting customer and consumer expectations regarding antimicrobial resistance and use, while at the same time maintaining the ability to treat for disease and to maintain the health and welfare of the birds in our care.

A Timeline of AMU Announcements

Here are examples from Canada and the U.S. since 2014 on announcements related to antimicrobial use in chicken.

Announcements in 2014

- Chick-Fil-A announces that all products will be RWA in 5 years.
- The Canadian poultry industry bans the preventative use of Category I antimicrobials.
- Perdue stops using antimicrobials in their hatcheries.
- Tyson reports it will no longer use antimicrobials in their hatcheries.
- A&W announces that all of its chicken products will be RWA.

Announcements in 2015

- Reports indicate that sales in the U.S. of RWA chicken increased (in value of sales) by 25% over the last year, and represented 11% of total sales.
- McDonald's U.S. bans the use of medically-important antimicrobials.
- Costco announces that it is working to eliminate the use of antimicrobials of human importance.
- Tyson announces that all chicken be raised without the use of antimicrobials of human importance by September 2017.
- Pilgrim's Pride announces plans to increase their RWA production from its current 5% to 25% by 2019.
- Subway announces its products will be RWA by the end of 2018.

Announcements in 2016

- Perdue announces all of its further processed chicken products will be RWA.
- Gold'n Plump announces its chicken will be RWA by 2019.
- Wendy's announces their plan to move to products raised without the use of antimicrobials of human importance by 2017.

Announcements in 2017

- Tim Horton's and Burger King announce a move to chicken raised without critically important antimicrobials to human medicine by 2017 in the U.S. and 2018 in Canada.
- Pizza Pizza announces all of their chicken products will be sourced as RWA.
- Pizza Nova announces all of their chicken products will be sourced as RWA.
- Starbucks announces they will be sourcing chicken RWA as of 2020.
- Metro Inc. releases a new Responsible Procurement Framework which encourages meat suppliers to refrain from using antimicrobials of human importance in a preventive manner.
- Tyson announces that all of its consumer-branded products will be RWA by June 2017. **AMU**

Let's Talk CHICKEN
letstalkchicken.ca

Chicken Farmers Deliver on Animal Care!

All Canadian chicken farmers follow a national *Raised by a Canadian Farmer* Animal Care Program. It is a concrete, accountable means of demonstrating the pride and commitment of farmers in raising the quality chicken Canadians can trust.

- The program offers a national set of standards based on the Code of Practice to ensure consistency from coast to coast.
- The program includes annual farm audits and third party audits, ensuring accountability from every farm.
- The program is mandatory, ensuring participating and compliance from all farmers.
- The whole industry is informed and involved.
- The program has strict enforcement measures to offer additional assurance.
- The program is supported by stakeholders, from gate to plate.
- The program is continuously improving and evolving as we learn.

The "Raised by a Canadian Chicken Farmer" Brand is proud to be part of this program.

ANIMAL CARE PROGRAM
PROGRAMME DE SOINS AUX ANIMAUX
Raised by a CANADIAN FARMER | Élevé par un PRODUCTEUR CANADIEN

GETTING INVOLVED
in the Reduction Strategy

All farmers need to become engaged in the discussion and communicate with other suppliers within the industry.

Farmers should be speaking with their veterinarians, feed suppliers, and chick suppliers about the opportunities to reduce and eliminate the preventive use of antibiotics of human importance, the factors to consider, and the alternative strategies that can be used.

Shifting from a preventative use model to a therapeutic use approach will present a new set of challenges and the successful implementation of this strategy will require the active participation of all poultry value-chain stakeholders working together. In particular, producers and veterinarians will need to work closely together in order to monitor, diagnose, and treat on an as-needed basis.

While there is no single solution, the industry doesn't have to re-invent the wheel. Industry partners have lessons learned on reduction strategies that can be leveraged on your farm.

"THIS IS NO DIFFERENT FROM WHAT VETERINARIANS WOULD HAVE DONE BEFORE THE IMPLEMENTATION OF THIS STRATEGY TO DEAL WITH SICK FLOCKS. IF A FLOCK HAD SOME KIND OF BACTERIAL DISEASE WE WOULD HAVE ENCOURAGED PRODUCERS TO TREAT THAT FLOCK FOR ANIMAL WELFARE REASONS. NOW THE NECROTIC ENTERITIS PREVENTATIVES WILL BE TAKEN OUT OF USE BUT MEDICATING FOR DISEASE REMAINS THE SAME"

– DR. KATHLEEN LONG, DVM MAPLE LEAF

A focus on welfare

An identified risk of reduced preventive use is the increased potential for flocks to contract and develop necrotic enteritis, especially once Category III preventative uses are phased out in 2020.

Without a doubt, there is a balancing act between antimicrobial reduction and animal welfare. After all, one of the main reasons that antimicrobials are being used is to maintain animal health and welfare.

Animal welfare is a main reason why farmers will need to closely monitor their flocks and be in constant communication with their veterinarians and suppliers to ensure that different strategies are investigated and that birds receive antimicrobial treatment when required.

CFC's reduction strategy is based on the ability to continue using antimicrobials for treatment to control disease.

Management Practices

When implementing a reduced use strategy, management practices from the primary breeders all the way through the value chain to the end of grow-out become critically important.

While there is no "silver bullet" to replace preventative antimicrobials, veterinarians agree that achieving successful outcomes when it comes to implementing this new strategy will require a multi-faceted approach.

The next set of articles focus on key management practices at the farm that need to be considered.

- The Importance of brooding
- A focus on water quality and biofilms
- Feed additives and their potentials
- Managing gut health
- Vaccines and the options that exist

The importance of feed quality, vaccine use, brooding techniques, flock monitoring, cocci control, and barn management are described in further detail in the following articles. These articles touch on issues which you may have already heard about, but these are the key elements to achieving success.

"THERE AREN'T ANY MAGICAL REPLACEMENTS FOR ANTIMICROBIALS, IT'S A MULTI-COMPONENT APPROACH WHICH STARTS WITH EXCELLENT FARM MANAGEMENT AND MANAGING DISEASE RISK FACTORS"

– DR. TOM INGLIS, DVM

While opportunities for improvements will vary by farm, the first week after hatch is the most critical period in the life of a broiler chicken. Consider the following:

- Place supplemental feed and water for chicks to consume immediately when they arrive on farm
- Cull unthrifty, ill, or injured chicks as soon as they are identified as these chicks can act as reservoirs of bacterial and viral infections
- Benchmark feed intake at 24 and 36 hours
- Test cloacal temperatures to fine tune temperature adjustments in the first 4 days of life
- Stimulate chicks by encouraging them to get up and eat/drink in the first 7 days – this may require additional barn tours.
- Benchmark weight gain daily, as a drop in gain will identify stress experienced by the chick
- Detect disease or abnormalities early on – if something is perceived to be abnormal, consult your veterinarian or supplier immediately
- Investigate possible vaccination programs with your veterinarian
- Assess the opportunity to use feed additives (e.g. probiotics, acids, etc.) with your veterinarian and feed supplier
- Review your management practices to optimize environmental conditions and management/ biosecurity practices on the farm to limit the disease pressures on your flock **AMU**

CANADA'S CHICKEN FARMERS

Proud to Raise the Chicken Canadians Trust

#IHEARTCHICKENFARMERS

FACTS ABOUT CANADIAN CHICKEN

Over **90%** of Canada's chicken farms are family owned and operated.

The use of hormones and steriods in chicken production has been illegal since the **1960s.**

Chickens raised for meat are all free to roam, with **unlimited** access to food and water.

There is a **mandatory**, audited Animal Care Program that is administered across all Canadian chicken farms.

In Canada, barns are cleaned out after **every** single flock and fresh bedding is laid out prior to the arrival of new chicks.

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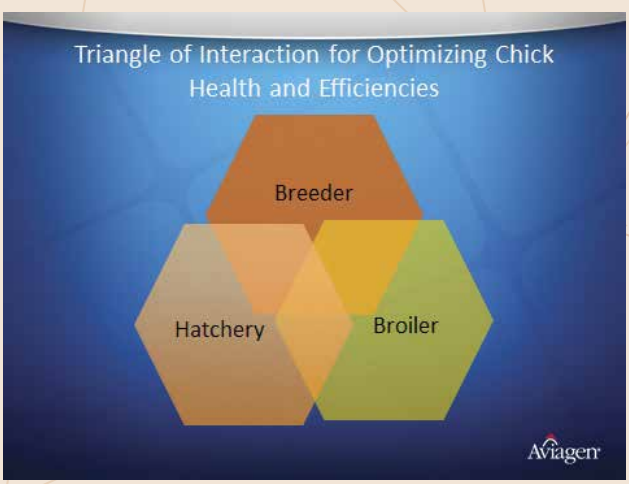
Broiler Brooding Management and the Triangle of Interaction:

Working Together to Reduce Antimicrobial use Early On

The removal of the preventive use antibiotics from poultry production is approaching quickly. The end of 2018 marks the elimination of the preventative use of Category II antimicrobials while a goal of eliminating the preventative use of Category III antimicrobials has been set for 2020. Currently, action is under way to meet these deadlines including work on education, research, surveillance and stewardship, key elements guiding the AMU reduction strategy.

Direction from science-based research as well as data collection and analysis through surveillance are undoubtedly critical components of implementing the AMU reduction strategy successfully. However, it is through the immediate application of management portfolios and dialogue between stakeholder groups, that the industry can continue providing a quality product to the consumer and instill trust throughout the value chain.

Goals are scored on the soccer field by a triangle of athletic interaction between players as they move up the soccer pitch. This same interaction is needed in the poultry industry as it strives for greater chick quality and grow-out excellence. The triangle of interaction, or simply influence, is between the breeder industry, the hatchery, and the broiler grow-out. Strong communication and cooperation between members of the triangle of interaction is imperative in the pursuit of quality and excellence.



THE TRIANGLE OF INTERACTION, OR SIMPLY INFLUENCE, IS BETWEEN THE BREEDER INDUSTRY, THE HATCHERY, AND THE BROILER GROW-OUT.

Excellent grow-out is achieved through attention to detail in management, especially during the critical first 7 days. During the first 7 days, it is the producer's role to provide the essentials (e.g. environmental conditions, adequate feed/water, etc...) for the chick to begin a life without the use of preventive antibiotics.

Farm preparation and biosecurity

The biosecurity of all broiler farms should be a primary focus, but it is especially important for flocks grown without the use of preventative antibiotics. The spread of disease can be controlled by:

- All-in, all-out production – minimizing the span of broiler ages across the farm
- Limiting traffic – preventing diseases from entering the farm via human traffic, animals or fomites (equipment)

Potential bird health issues can be identified through:

- daily observations
- accurate record keeping
- systematic disease and production monitoring
- cleaning and disinfection of the barn
- appropriate downtime between flocks

Cleaning and Disinfecting the Barn

Close attention should be paid to cleaning the barn and its floors, using effective detergents with hot water to remove any organic matter. All surfaces and equipment should be cleaned and undergo a final disinfection. Additionally, a good practice to test the efficacy of the cleaning and disinfection is bacterial monitoring.

Water System Cleaning

- Remove biofilms, with approved products
- Chlorinate and sanitize the water
- Test and control water pH, to help control bacterial growth
- Flush drinking lines weekly from placement through to depletion to ensure that water does not become stale. Flushing also removes any buildup of biofilms and air pockets from the water lines

DURING THE FIRST 7 DAYS, IT IS THE PRODUCER'S ROLE TO PROVIDE THE ESSENTIALS FOR THE CHICK TO BEGIN A LIFE WITHOUT THE USE OF PREVENTIVE ANTIBIOTICS.

Litter and Barn Environment Management

Consider litter such as straw or shavings from a clean source. Use your judgement as to the potential risk of bacterial, viral or mold spread.

- Spread approved litter material to a depth of 5 – 10 centimeters
- Heat the barn to an air temperature of 32 – 34 degrees C for at least 36 hours prior to chick placement
- Litter temperature is preferred between 28 – 32 degrees C
- Relative humidity should be 55 – 70 %
- Temperature and humidity should be monitored daily to ensure a uniform environment

Brooding and Management

The goal of brooding management is to provide a comfort zone which will promote early access to feed and water in order to:

- promote early development
- achieve target body weights
- achieve optimal uniformity with enhanced welfare traits
- promote gut integrity and yolk utilization
- enhance immune competence in fighting infection and other challenges ahead

Mapping out the goal in optimal brooding depends on the daily activities that are in place from placement to when the chicks can thermo-regulate (control their body temperature) and tolerate fluctuations in environmental and management conditions. Until then, the grower becomes the "mother hen" in support and care.

The manager cannot manage what is not measured. Success in brooding focuses on crucial metrics that help evaluate success for production efficiency and, above all, health. As mentioned previously, chicks cannot thermo-regulate at placement; hence, management must address barn environment parameters in the brooding chamber.

Temperature:

Temperature sensors positioned throughout the barn may give an overview of brooding environmental temperatures but not of the chick itself. It is therefore critical that the manager monitor vent temperatures in an effort to ensure body temperatures between 39 and 40.5 degrees C. Any fluctuations from this norm must be addressed at delivery and in the brooding chamber. Body temperatures can be influenced during trucking or in the barn by heat source, drafts, ventilation, floor temperatures, and so on.

Feeding and Drinking:

Providing the chicks with the correct environment and establishing a suitable comfort zone for the chicks will encourage them to actively seek water and feed. This begins the early development of good feeding and drinking behavior. Early and active access to feed and water optimizes gut, organ and skeletal development, which supports body weight gain throughout the brooding period and into the growing and finishing phases.

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Figure 1: Assessing crop fill of chicks with a full, rounded crop (left) and an empty crop (right).

Table 1: Crop fill assessment guidelines.

Time of Crop Fill After Placement	Target Crop Fill (% of Chicks with Full Crops)
2 hours	75
4 hours	80
8 hours	>80
12 hours	>85
24 hours	>95
48 hours	100

** Aviagen 2017

An important measure that must be used to assess early feeding activity is the percentage of the flock that has full crops. Simply stated, the percentage of crop fill demonstrates the ability of the chick to acquire food and water. The goal is simple - to have 95 plus percent of the flock with full crops fill at 24 hours of age. If this goal is not met, then all brooding practices should be reviewed, improved and then subsequent flocks examined to measure the effect of changes. Body weights, gut integrity, and immune competence are all a reflection of the ability of the chick to acquire food and water, and crop fill is a metric of that ability that **MUST BE PRACTICED.**

Summary

Quality results from the interaction between parent and broiler stock management, parental health and nutrition and incubation management. A good quality chick, if managed correctly, provides a strong foundation for future broiler performance. It is everyone's responsibility to communicate and interact in all aspects of management in provision of a quality chick and the grow out of that chick. There is no room for error as performance is a 24 hour 7 day a week job. Metrics and attention to the FLAWS (Food, Lighting, Air, Water, and Space) will become the rule for quality chick management in a future without preventative antibiotics. To do it right, data, decision, direction, dialogue and discipline will be needed. Let the journey begin. **AMU**

LINKS

For more information, tips and tricks, check out Dr. Scott Gillingham's video on Broiler Brooding Best Management Practices for Early Chick Performance put together with Chicken Farmers of Ontario. **www.youtube.com/watch?v=o4irr5vEyBI&list=PLHPYbco4Mv64xvk6W5-mtoEjhSy5PqdR_&index=7**

For more information, go to **www.iChicken.ca**

Scott Gillingham, DVM, D. ACPV

Canadian Regional Business Consultant,
Aviagen North America

Managing Gut Health at the Farm – Alternatives to antimicrobials and antimicrobial-reduction production

What is gut health, and why is it important for chickens?

The gastrointestinal tract (the gut) of chickens is an ecosystem in which microbes and the intestinal environment should be in balance. The intestinal environment consists of the feed and water entering the system. Shortly after entering the system, the feed and water are digested and absorbed via a mixture of components, such as enzymes, different pH levels, and pass through barriers, including mucus.

Bacteria that can be beneficial or opportunistic (i.e., they will become bad if the environment allows for it) are microbes that are a part of the intestinal ecosystem. A balanced microflora (composed of good, opportunistic, and bad microbes) is needed for good gut health. Setting the stage for this balance soon after hatch, and maintaining it throughout the life of the bird, is key to ensuring conditions in the bird that will maximize the flock's performance. Additionally, the barn's litter microbiota is also very important to help maximize this balance throughout the flock's grow-out period.

Supporting intestinal integrity and environment

The gastrointestinal tract has many purposes, including: physical barrier; immune function for protection against disease; and breakdown, digestion and absorption of feed and water that can be translated into production parameters. The gastrointestinal tract is made up of the mouth, esophagus, crop, proventriculus, gizzard, and intestinal tract, the latter of which is made up of the small intestine, large intestine, ceca, and cloaca. Each area of the gastrointestinal tract has its own "ecosystem," making it dynamic and complex.

Initially, feed and water enter through the mouth, where saliva starts the breakdown of the feed and water. Then feed and water pass down the esophagus to the crop, a storage area where some chemical digestion continues. From the crop, the feed and water move to the proventriculus, where the majority of chemical digestion occurs (i.e., breakdown of feed with acid and some enzymes). Mechanical digestion (i.e., physical breakdown of feed) occurs in the gizzard before moving into the intestine. The feed and water then pass through the small intestine, ceca and large intestine. Once past the large intestine and ceca, the feed and water become manure and exit through the cloaca. The cloaca can also act to sample or "test" microbes from the litter, which can also help to build up the immune system.

The small intestine is the main area where most of the feed is digested and absorbed. To efficiently absorb feed, there must be a large surface area in the intestinal tract. This surface area is formed by big and small folds that form the villi. Increased villi numbers and villi height help to increase the surface area for nutrient absorption. The small intestine develops rapidly compared to the body weight of the bird, from 17 days of incubation to about 10 days post-placement. During this critical time, the bird's ability to efficiently digest and absorb nutrients, in addition to mounting strong disease defenses, is developed. As a result, getting the bird off to the right start with nutrition and management is critical to gut health management. Additionally, maintaining the surface area of the villi and the barrier function of the intestinal tract continues to be important throughout the chicken's life, especially in antimicrobial-reduced production.

The large intestine and ceca are the main areas in which water is absorbed, in addition to other functions. There are a large number and a diverse population of microbes along the entire gastrointestinal tract. However, the ceca contain some of the most numerous and diverse bacteria.

Supporting a balanced microflora

The microflora is a delicate part of the barrier function of the intestinal tract. Many organisms make up the microflora, but the primary component is the bacterial population. Trillions of bacterial organisms with hundreds of different types of bacteria make up the

bacterial microflora within the poultry intestine. A healthy microflora is generally diverse, with many different bacteria present.

The stability of the microflora is a balancing act between the beneficial and opportunistic microflora. Opportunistic bacteria can be disease-causing under certain alterations to the intestinal environment. The changes that favour opportunistic bacteria often happen under stressful situations. Stressors (e.g., change in temperature, immune suppression, lack of biosecurity, feed changes, poor-quality feedstuffs) or invading bad organisms can upset the balance, allowing the microflora to become unbalanced and cause a problem. When opportunistic, or even pathogenic, bacteria take over the microflora, the balance changes from a diverse bacterial population to a uniform population made of the "bad" bacteria.

Generally, the gastrointestinal tract of the newly hatched chick is relatively sterile, but organisms, including bacteria, quickly gain access. These bacteria come from eggshell contamination, which can sometimes come from the breeder, contaminated equipment or clothing, pests, or from elsewhere. Within a few hours of hatching, the intestinal tract is colonized by different bacterial groups.

THE CHANGES THAT FAVOUR OPPORTUNISTIC BACTERIA OFTEN HAPPEN UNDER STRESSFUL SITUATIONS.

As the bird ages, the intestinal microflora population should change from an immature, relatively uniform bacterial population, to a mature, relatively diverse bacterial population, reaching a stable balance within two to three weeks in the small intestine or up to six weeks in the ceca. Supporting the early establishment of a mature and beneficial microflora community will encourage the development of a balanced microflora. Ultimately, this balanced microflora will allow the villi to flourish, absorption to be maximized and the presence of pathogenic bacteria within the gastrointestinal tract to be minimized.

To further complicate the microflora, on the farm both the chicken and the barn have their own microbial populations that are closely related. The poultry barn, especially the litter, has its own microflora that is highly influenced by the chicken gut microflora, and vice versa. The poultry barn microflora can change over time with the changes made to the gut microflora. It may take several flock cycles to positively change the populations and profile of the poultry barn microflora. Conversely, it takes a far shorter time to change the barn microflora to an opportunistic or problematic one.

Many key factors can impact the delicate balance of the intestinal system and negatively impact broiler performance, and they are reflected in an additional cost of production. Some of these factors relate to biosecurity, management, feed, and water.

Common challenges impacting gut health in the broiler barn

There can be many challenges facing the success of the flock. One of the largest challenges is disease that can either be clinical, resulting in mortality and observable sickness, or subclinical, resulting in reduced performance, and unobservable sickness. Both the clinical and subclinical birds can act as a pool of bad organisms that can spread throughout the flock and the barn, which can have a negative impact on flock and intestinal health.

Common intestinal challenges, or challenges that can be intensified by intestinal problems, include coccidiosis, necrotic enteritis, collibacillosis, and dysbacteriosis.

Coccidiosis is a disease complex caused by the parasite *Eimeria*. There are many species of *Eimeria*, and different groups of species will infect different animals (e.g., chicken *Eimeria* are different than turkey *Eimeria*). While a single species of *Eimeria* can cause coccidiosis, in the field, generally many different species are present and infecting a single bird or flock, making coccidiosis a "disease complex."

Necrotic enteritis (NE) is a disease condition that is caused by the bacteria *Clostridium perfringens* (CP). In the poultry intestine, there are many beneficial Clostridiae bacteria species; however, with certain predisposing factors, CP can invade the intestinal tract either as a bad bacterium or as an opportunistic bacterium. CP thrives in oxygen deprived conditions that can result from intestinal damage and also produces toxins that kills surrounding tissue, further enhancing the oxygen-free environment. Since CP cannot produce several kinds of amino acids, the building blocks of protein, this bacterium "loves" any environment that provides

free protein. A coccidiosis infection, especially mid-gut cocci (*E. maxima*) damages the intestinal lining in such a way that proteins leak from inside the gut barrier to outside, where the bacteria are. Additionally, during a coccidiosis infection, increased mucus is produced that is rich in protein, which favours CP growth.

There are many other predisposing factors to NE, but another example is a diet that is rich in non-digestible fractions, complex proteins and components that slow the movement of the feed in the gut. This group of factors can help to increase the amount of nutrients available to the bacteria while decreasing the amount of nutrients available to the bird. As CP takes over the gut, becoming NE, the microflora becomes unbalanced and relatively singular in the type of bacteria found.

"Colibacillosis" is the general term for any kind of local or systemic infection caused at least in part by avian pathogenic *E. coli* (EC). There are many kinds of EC, some of which do not cause problems, throughout the bird. Some pathogenic EC will cause problems outside of the intestinal tract, while others will cause issues within the intestinal tract. Typical infections with EC are opportunistic in nature and the result of an initial insult, such as environmental stressors and/or compromised immune function.

"Dysbacteriosis" is a broad term used to describe the presence of an abnormal microbiota in the mid-gut region that can lead to many other problems, such as reduced intestinal barrier function and poor nutrient digestibility. Some of the factors that may lead to dysbacteriosis can include both infectious and non-infectious stressors. Unfortunately, this is a controversial term, with not much known about, specifically, what causes the issue or how to properly characterize the problem.

How can you manage gut health on the farm?

Managing the gut health of the chicken can seem like a challenging task. However, a detailed and holistic approach to barn and bird management, from before the flock arrives to after the flock leaves, can help to encourage and maintain the flock's intestinal health.

Over the years, poultry personnel have been using some form of the acronym FLAWS as an approach to observing barn management. This acronym is a reminder to assess feed, light, litter, air, water, (bio) security, sanitation, space and staff. A disruption to any of these points could present certain stressors to the flock that could, either directly or indirectly, impact the microfloral balance in the intestine as well as the barn. The combination of preventative management with effective biosecurity and consistent health measurements will help to keep the microflora balanced while ensuring maximum performance. In essence, this strategy may help to keep the bad bacterial load to a minimum, the opportunistic bacteria in check and maintain a balanced microflora.

A part of preventative management is to form a gut health management program. This program should get the chicks off to the right start and ensure the birds are getting the most from their feed while building immunity. The "seed, feed, weed" program, as pioneered by Dr. Steve Collett (Doctor of Veterinary Medicine, University of Georgia), is a critical part of this program:

- **Seed** the gut with good bacteria and promote beneficial bacteria growth: To get the flock off to the right start and enhance gut development while supporting early growth, you must think about best brooding practices as well as promoting beneficial bacteria in the gut. In addition, you should promote beneficial bacteria in the gut, which can be done by different technologies to maintain optimum water pH (approximately 5–6.5 in the water) and water quality as well as support the beneficial gut microbial population. This step could include solutions such as organic acids and probiotics (i.e., a viable and defined culture of microorganisms that when ingested have a beneficial effect).
- **Feed** the beneficial bacteria in the gut and support the good bacteria: The second step includes thinking about maintaining the proper intestinal environment and maximize feed utilization. To achieve this step, you should utilize technologies that promote a

balanced intestinal environment that can support beneficial bacteria and ensure the nutrients meant for the bird are absorbed early in the intestinal tract rather than being accessible to opportunistic bacteria. This step could include the implementation of enzymes, organic acids or prebiotics (i.e., a non-digestible food ingredient that beneficially affects the animal by selectively stimulating the growth and/or activity of one or a limited number of bacteria).

- **Weed** out unfavourable microorganisms and support the immune defense: The last concept is to build the bird and flock immunity by developing their natural immunity and defenses and preventing opportunistic or bad bacteria colonization. The application of this step should help prepare the animal for health challenges. The technologies used in this step could include vaccines, organic minerals, organic acids, mannan-rich fractions (type 1 fimbriae blockers), essential oils, saponins and more.

When using an alternative approach to a prevention production strategy on-farm with an antimicrobial-reduction program, it is important to have a combination program, as there is no silver bullet for a successful program. As more alternative technologies come to the market, it is important to think about key selection criteria in addition to being aware of the background information and researching the technology. The key selection criteria to think of are:

1. What is the consumer acceptance?
2. What is the safety?
3. If in the feed, is there pellet stability and stability with other ingredients?
4. What is the mode of action?
5. Is the technology consistent?

General good practice management tips for good gut and barn health

Just like in the past, observing the FLAWS should be used as a reminder to check feed, light, litter, air, water, (bio) security, sanitation, space and staff and is a detailed approach to best management practices during brooding as well as the duration of the flock. Some critical areas to concentrate on are:

- Biosecurity.
- The downtime between flocks and what you are doing during this downtime.
- Pre-placement preparation before the chicks come to the farm.
- Having a strong coccidiosis prevention management strategy.
- Brooding management for around the first two weeks the birds are in the barn.
- Litter management from the pre-placement to the end of the flock.
- Water management, including quality, sanitation and access.
- Feed management, including quality and access.
- Stocking density.
- Environmental management of temperature, relative humidity, ventilation and lighting.
- Monitoring the birds during the flock through transition times during the flock, feed and water consumption, and performance of the flock.
- Have a flock health management program with your veterinarian.
- Walking the barns to assess equipment and the flock.
- Picking up the mortality, and cull birds as early as possible.
- Communication and coordination between all those involved in helping with the success of your farm. **AMU**

Kayla Price, Ph.D.
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Alltech Canada

The Importance of Waterline Cleaning, Disinfection, and Regular Sanitation Programs on Chicken Health

Water is one of the key ingredients for life on our planet. This fact holds true in poultry production and we know that maintaining optimal water quality is a key step in optimizing poultry production and producing quality products. A broiler chicken will drink 1.8 times as much water as it will eat feed. By volume alone, water is one of the most important inputs into your barn.

If water quality is so important, how do we measure it?

Water quality refers to a number of characteristics of the water your birds are drinking including:

- Microbiological content (bacterial counts)
- Mineral content and chemical characteristics (minerals and pH)

Microbiological Content

Microbiological content determines whether water is clean. All birds are sensitive to bacterial contamination of the water - especially baby chicks. The effects of contaminated water can be as slight as reduced weight gains and mild enteritis or as severe as infections and mortality. To determine if there is a water contamination problem we suggest that samples are taken from the barn and water source for testing.

We know that the *Raised by a Canadian Farmer* On-Farm Food Safety program requires the input water (water from the well or water source) to be potable (no bacterial growth), but water from samples taken in the barn will invariably have a few bacteria present, if nothing else from the sampling method. Barn water samples should be taken at the point of the water line furthest away from the source. The sample must be collected in a special, sterile container that has white powder (buffer and dechlorination) in the bottom to protect the bacteria being tested.

The way we measure bacterial contamination in water is to put a certain volume of sample water (usually 1 milliliter) onto a media filled plate for bacteria, incubate the plate, and count the number of bacterial colonies which grow. We call the number of colonies that grow, colony forming units or CFUs. For human water standards, the bacterial count considered acceptable is 0 CFU/ml for *E.coli* and fecal bacteria, which are also known as coliforms. We should try to achieve this standard for poultry water as well, but must recognize that when we take samples in barns we will occasionally get dust from the barn or line which can contaminate the sample with fecal bacteria.

Another type of bacteria which is important to test for in your water samples is Pseudomonas. *Pseudomonas aeruginosa* is a bacteria which grows well in wet environments and can act as a pathogen for poultry. Very young birds are most susceptible to Pseudomonas and the infections can kill birds and result in lameness throughout the flock's life. Results for Pseudomonas contamination should be 0 CFU/ml.

Remember

- Water used in misting system should be properly sanitized and tested at least once a year.
- Water used to humidify barns or egg storage rooms should be properly sanitized and tested at least every 6 months.

» Special attention should be directed to all open water sources (rivers, lakes, and dugouts) as they are a high risk for transferring pathogens from wild animals and birds to your flocks!

Mineral content and chemical characteristics

The mineral content of water can have an impact on bird health and barn conditions. Water which has a high content of certain minerals (for example sodium, iron, magnesium, sulfates, and sulfites) can result in reduced performance, contribute to the incidence of certain diseases and trigger gut health problems.

Depending on your water source, the mineral content of your water can vary, with the season and over time. Mineral testing should be done at least on an annual basis. Water filtration and treatment can be used to lower undesirable mineral levels and can pay dividends in bird performance and health. When you are designing your sanitation program it is also important to know the acid content of your water.

Acid content is measured by pH. A low pH indicates a high acid content and a high pH indicates a low acid content. There are differing opinions on the effect of water pH on gut health and bird performance but it is widely known that pH has a direct effect on the efficacy of chlorine as a sanitizer in addition to the solubility of minerals. Minerals can also become an important component of biofilm formation and a layer of calcium or iron can protect the bacterial biofilm underneath so removing minerals and scale is an important part of a waterline sanitation program.

Sanitation is the ongoing, day-to-day program for killing microorganisms in water delivered to birds while they are in the barn. There are a number of ways to sanitize drinking water for poultry but chlorination is the most common, cost effective, and easy method. The goal of a chlorination program should be to achieve a chlorine level of two to three ppm at the farthest drinker in the system, which can be easily measured with chlorine strips.

Cleaning and disinfecting water lines

The "black grunge" that builds up in waterlines is called a biofilm. Biofilms are complex communities of microorganisms including bacteria, algae, fungi and slime molds. Biofilms often build themselves around and into mineral deposits, which makes them even harder to remove. The biofilm and mineral complexes effectively protects bacteria from sanitizers like chlorine, reduces the efficacy of sanitizers with organic matter and provides a safe environment for harmful bacteria like *E.coli* and Pseudomonas to multiply and contaminate your water.

Aside from their negative effects on water quality, if biofilms are not controlled they eventually block waterlines, reducing water flow to the birds and eventually force the producer to replace the waterlines. These "communities" of microorganisms work together to protect themselves, but they do have one major weakness. Many biofilm organisms have adapted to low oxygen environments and in fact, some cannot survive exposure to oxygen.

Biofilms are:

» communities of microorganisms: bacteria, fungi, algae, and slime molds
» built around or include mineral deposits (commonly: iron, calcium, magnesium)
» different on every farm depending on water characteristics, barn management and ages of equipment
» a source of pathogenic bacteria and act to reduce the effectiveness of your sanitizer

The basics of a standard water line cleaning program are the following three steps:

1. Acidify the water to a pH of four (let stand for 8–24 hours) – this helps to dissolve the mineral complexes in the biofilm and the water line.
2. Add hydrogen peroxide in a final concentration of 0.8–3% (let stand for 12–72 hours) – this step disrupts the organic component of the biofilm.
3. Add a disinfectant (let stand for 24–48 hours) – this step is to kill any remaining bacteria which have been exposed but not killed by the peroxide.


Sampling water lines

Keep in mind…

- During each step, walk the line and trigger the nipples with a broom to ensure that the whole system is exposed to the treatment.
- Between each of these steps, we recommend a high-pressure flush of five minutes or one minute per 100 feet of line.
- Peroxides produce gas when they contact biofilms, so the system must be open to prevent bursting the water line!
- If the system has not been routinely cleaned between flocks, you may need to repeat the three steps and take samples to test the water quality after cleaning.

Remember – when using any chemical follow the instructions on the label. If you are not using a stabilized peroxide, you should not leave it in the line longer than 3 hours. Always check with the waterline manufacturer for recommendations and approved products, which are known to not damage any components of the system.

How do I know if I have a problem, why does this matter to me?

The microbiological content of your water and surfaces birds come into contact with is not always evident (especially to the naked eye). If you don't test, you won't know whether you have biofilms or contamination in your poultry production environment.

One of the great improvements in bird health and performance came with the "all-in, all-out" production system which allow us to clean up the farm and give each new cycle of chickens a "clean start". This principle only works when we effectively remove the pathogens from the previous cycle when we clean the farm. Contact surfaces (ex. water lines and feed pans) are the most important surfaces to focus on and may harbor pathogens (hidden in biofilms) which jeopardize bird health.

Our research program is showing us that these biofilms have bacteria with multidrug-resistant plasmids, which they share with each other, and may be contributing to antimicrobial resistance and affecting the food safety of our poultry products. There is an old saying that "ignorance is bliss and that knowledge is power", and we have certainly seen improvements and better risk management through measuring, understanding, and effectively controlling biofilms.

Tom Inglis, BSc.Ag., DVM, Dipl. ACPV.
Company President
Poultry Health Services Ltd.

Feeding Chickens Without the Preventative Use of Antimicrobials Important to Human Medicine

The approval and use of antimicrobials for poultry is strictly controlled by Health Canada, Veterinary Drugs Directorate and the poultry industry uses these products carefully under these regulations. However, as we move away from the preventative use of antimicrobials that are considered important to human medicine, feeding programs for chickens will make use of a very specific ingredient matrix as well as alternative ingredients designed to support the health and well-being of chickens.

When it comes to growth and production in any type of commercial poultry operations, there are clearly defined expectations and targets set by both the producer and the processor. The role of the nutritionist is to have an in-depth understanding of, and experience with feed ingredients and knowledge of nutrients required for growing chickens economically and efficiently.

To accomplish this without the preventative use of antimicrobials important to human medicine, it has become essential to focus on maintaining good gut health through strategic feed formulation and the use of alternative ingredients. It is the job of the nutritionist to analyze and determine the best combination of ingredients to be used in feeds in order to meet the needs of the bird and maintain good gut health, while at the same time achieving the overall goals and expectations of the producer and the processing plant.

It is very important that poultry nutritionists consider the overall ingredient formulation when setting up a feed program for birds raised without the preventative use of antimicrobials important to human medicine. It is vital that we avoid sudden feed changes or big swings in the ingredient composition of a feed. To avoid feed-induced stress, consistent feed load to load has become an important factor contributing to the success of raising chickens without the preventative use of antimicrobials.

The use of enzymes in feed to complement the bird's own natural production of enzymes is also important to maximize the digestibility of ingredients. By using supplemental enzymes, we enhance the digestibility of ingredients such as corn, wheat, and soybean meal, and mitigate the possibility of undigested nutrients making their way to the hind gut and becoming a food source for unwanted pathogens like clostridium.

In addition to the overall feed formulation and ingredient selection, there are a few classes of alternative ingredients that can be used to help maintain good gut health. Some examples include, phytogenics/essential oils, betaine, probiotics/direct fed microbials, prebiotics/fermentation products, water acidifiers, organic acids, and short chain fatty acids. Essentially, each of these classes of ingredients has a different mode of action and none of them will be a "silver bullet" in maintaining good gut health. It is essential to take a multifactorial approach and use a combination of these classes of ingredients while shuttling them through your program at different times of the production cycle as we cannot expect to see the same response flock after flock and year after year.

Phytogenics/essential oils are plant derived compounds that have a direct antibacterial effect and potential to positively influence overall gut health and immune function. Ingredients such as: **thymol, thyme oil, eugenol, citrus sinensis oil, capsicum, cinnamaldehyde, curcumin, vanillin, and yucca** are some of the most common ingredients available to be incorporated into broiler feed. The efficacy of phytogenics is dependent on many factors including inclusion level, diet, and management. These types of products can be added to the feed and through the water.

Betaine is a trimethyl derivative of the amino acid glycine. It has been shown to have a few modes of action in the bird but most relevant in the absence of antimicrobials is its ability to function as an

osmoregulant. In this role, the betaine helps to maintain water balance in the gut and therefore prevent flushing, keeping barns dry. It can support intestinal growth and function which then enhances nutrient digestibility. In some circumstances, it also exhibits a protective effect on birds exposed to a coccidiosis challenge.

Probiotics/direct fed microbials are products that utilize cultures of microorganisms to benefit the animal. They are used to ensure the population of beneficial microorganisms living in the gut exceeds the population of pathogenic organisms. Probiotics can display the theory of competitive exclusion which means that two species will compete for the same resources within an environment and one of them will eventually outcompete and displace the other. This way the "good guys" thrive and the "bad guys" do not.

Prebiotics/Fermentation products work to reduce the pathogen load in the gut by binding pathogens which are then excreted instead of allowing them to bind to the gut wall. They also can be a source of food for the good bacteria living in the gut. These are indigestible products that are added to the feed because they carry out a specific function. Some of the most commonly used ingredients in this category include yeast-based products, Fructooligosaccharides (FOS), and Mannanoligosaccharides (MOS).

IN ADDITION TO THE OVERALL FEED FORMULATION AND INGREDIENT SELECTION, THERE ARE A FEW CLASSES OF ALTERNATIVE INGREDIENTS THAT CAN BE USED TO HELP MAINTAIN GOOD GUT HEALTH.

Water acidification is often done with organic acids, inorganic acids, or a mixture of both. A good acidifying agent will comprise a blend of several different acid products. The efficacy can depend on the concentration and type of acid used. Some common water acids used in poultry production include citric acid, lactic acid, fumaric acid, and phosphoric acid. The acidification of water is done with two purposes in mind. The first is to reduce water pH and therefore inhibit bacteria. The second is an indirect inhibition of bacteria as a result of being bactericidal. Creating an acidic environment in the gut also helps improve the activity of enzymes which enhances feed digestibility. Lowering the pH of the water also has an added benefit of improving the efficacy of chlorination as a water sanitizer.

An **organic acid** is an organic compound with acidic properties. Organic acids are added to feed and water because they are known to have an antibacterial action against pathogens like salmonella, escherichia coli and campylobacter. A few examples of organic acids include formic acid, lactic acid, acetic acid and propionic acid. Their antibacterial activity is achieved as a result of the acid's ability to dissociate inside the cell of the microbe. When the organic acid dissociates thus changing the acidity within the microbial cell, the microbe then overcompensates in an attempt to pump out the hydrogen ions and reduce the acidity. Consequently, the microbial cell uses all of its energy to get rid of the excess hydrogen, which then leads to its own death.

Short chain fatty acids (SCFA) also referred to as volatile fatty acids, have been used in poultry feeds to reduce and control salmonella. A commonly used SCFA in poultry feeds is butyric acid. Research has concluded that butyric acid can stimulate growth of the villi which line the intestinal tract thereby supporting efficient absorption of nutrients in the bird while also having a role in killing bacteria.

Poultry nutritionists work to formulate a specific ingredient package that will provide nutrients to help optimize the performance of the bird, while still being profitable for the producer. As we move away from the preventative use of antimicrobials important to human medicine, we know that specific formulation strategies and ingredient selection will have to be implemented to support good gut health, maintain immune function, and protect the ideal gut environment, while providing a safe, efficacious, and optimal nutrition package. It becomes important to strategize and shuttle the alternative ingredients to ensure that the birds are provided with the best possible feed programs. More research on the safety and efficacy of alternative ingredients is needed to secure approval of these products for the Canadian poultry industry and over the next few years we can expect more products to come to the market. However, no one additive is going to be the champion in raising chickens without the preventative use of antimicrobials important to human medicine. It is a multifactorial approach relying on ingredient selection and quality, feed formulation, gut health, disease pressure, environment, management, and animal welfare. **AMU**

Lisa Hodgins M.Sc.
Monogastric Nutritionist
New-Life Mills

DON'T REINVENT THE WHEEL

CHICKEN FARMERS DELIVER ON ANIMAL CARE

Canadian consumers want Canadian chicken. But, did you know that the Canadian chicken industry works to some of the highest international standards of animal welfare and food safety?

That's not a phrase thrown around lightly – there are comprehensive, national programs which ensure this.

If you've ever been approached on issues of animal welfare, you'll be familiar with the uncertainty, questions, and concerns that some approaches can raise.

You don't need to re-invent the wheel because Chicken Farmers of Canada has already done the heavy lifting to develop and implement a mandatory Animal Care Program that you can count on and defend.

Ask us – we're here to help.

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Chicken Farmers of Canada
Les Producteurs de poulet du Canada

Animal Care Program
Programme de soins aux animaux
Raised by a Canadian Farmer
Élevé par un producteur canadien

The Role of Vaccination in Reducing Antibiotic Use

All poultry producers and suppliers make their best effort to minimize unnecessary use of antibiotics in commercial poultry production, mainly due to its negative impact on antimicrobial resistance in animals and on humans. Moreover, if antibiotics are used when not warranted, and/or applied at the wrong dosage and for the wrong duration of time, it can potentially cause other antibiotics in the same category to be less effective.

In this article, the main goal is to discuss important broiler chicken diseases and how proper diagnosis and application of vaccines can reduce the frequency and quantity of antibiotics used at your farm. We will discuss a few examples related to immunosuppressive diseases and viral infections that can leave birds more susceptible to secondary bacterial infections.

Colibacillosis

A common bacterial infection affecting broiler flocks is Colibacillosis that is caused by Pathogenic *E.coli* (**so called "Avian Pathogenic** *E.coli*-**APEC")** bacteria. Although, *E.coli* is part of normal birds' gut flora, under certain circumstances, the pathogenic strains can replicate and eventually result in high mortality, skeletal problems, poor performance, high condemnation, and overall economic losses. While proper antibiotic treatment prescribed by your veterinarian is an acceptable intervention when dealing with acute *E.coli* infection in broilers, bear in mind that Colibacillosis may also be triggered by other predisposing factors, such as Infectious Bursal Disease (IBD), reovirus infection, respiratory diseases, such as Infectious Bronchitis (IB), poor gut health and/or poor environmental conditions, such as high ammonia and excessive dust.

There are two main scenarios related to Colibacillosis:

1. The Primary Infection, where highly-pathogenic strains of *E.coli* (APEC) potentially populate the farm environment and can cause disease on consecutive placements with no other concurrent diseases. For those flocks going through an acute *E.coli* disease episode, your veterinarian, with the help of a diagnostic laboratory, can select the best antibiotic to control mortalities and clinical signs. However, the appropriate intervention for future flocks is to consider complete cleaning and disinfection and to vaccinate flocks with *E.coli* vaccine for at least two to three consecutive flocks.

2. The Secondary Infection, where *E.coli* is causing high mortality, but there is an underlying primary cause that results in higher susceptibility to *E.coli* infection. You and your veterinarian need to determine the presence of other predisposing factors, such as IBD, IB and/or gut health issues. While vaccination with *E.coli* vaccine can help, it is not sufficient and you should address the Primary Infections to control overall Colibacillosis at your farm. Antibiotic treatment under this scenario may have variable outcomes and may not address your primary diseases, especially the viral ones.

MOST OF OUR BROILER BREEDER FLOCKS IN CANADA ARE HYPER-IMMUNIZED AGAINST IBD. HENCE, THERE IS USUALLY A GOOD LEVEL OF MATERNAL ANTIBODIES IN BROILERS DURING THE FIRST FEW WEEKS OF LIFE.

Infectious Bursal Disease

This is an important immunosuppressive disease that can affect broilers, mainly during the first four weeks of life and result in various degrees of damage to bursal tissue. The bursal tissue is the main immune tissue in birds, especially in broilers with short life cycles. In Canada, we only have IBD infections that are caused by variant strains of IBD in commercial flocks. If your flock is infected around 15 days of age and younger, the magnitude of immunosuppression is significant and permanent. Affected flocks are uneven, experience higher level of mortality due to secondary bacterial infections, experience poor growth and potentially higher condemnations, due to illnesses like cellulitis. On the other hand, IBD infections that occur after 18–20 days of age are usually less costly, but if coupled with other concurrent diseases such as IB or virulent reovirus infection, can potentially result in significant losses. If IBD is suspected or confirmed at your farm, even with no apparent economic losses, it shouldn't be ignored. The infection can build up over consecutive flocks and eventually results in more costly complications.

Most of our broiler breeder flocks in Canada are hyper-immunized against IBD (via multiple live and killed vaccinations). Hence, there is usually good level of maternal antibodies in broilers during the first few weeks of life. However, since each broiler placement may be from different breeder sources, the level of maternal antibodies varies and some percentage of broilers within a flock can be more susceptible to IBD infection than the rest of the flock during the first two to three weeks of life.

For broilers, there are basically three types of commercially available IBD vaccines in the market. These are:

a) IBD-vector vaccines – These vaccines are applied In-Ovo at the hatchery. The IBD vector vaccines are good choice of vaccine when you have low to moderate IBD infection that affects broilers at later ages. Since they are given In-Ovo, the administration is ideal and also convenient for broiler producers. The cost of this vaccination for producers is relatively higher than other types of IBD vaccines.

b) Intermediate plus live IBD vaccines (Antigen-antibody complex) – This type of vaccine is also administered In-Ovo at the hatchery. This vaccine is ideal when you are dealing with moderate to high persistent field IBD variants at the farm. Under persistent IBD challenge, It is recommended to use this vaccine over two to three cycles of placements. The goal is to allow the vaccine strain to eventually replace the IBD wild virus through competitive exclusion and reduction of shedding of the wild virus. The cost of this vaccine is relatively lower than vector vaccines.

c) There are other **live IBD vaccines** that are either applied at the hatchery (spray) or at the farm via drinking water or spray. These vaccines are mild to moderate IBD vaccines. These vaccines have a lower cost per bird compared to vector and immune-complex vaccines. However, since they are applied via mass administration (water or spray), their outcome depends on proper vaccination techniques. The age of birds being vaccinated with this group of vaccines is an important factor for success. If vaccines are administered very early, strains can be neutralized by maternal antibodies and reduce its efficacy. Consult with your veterinarian to choose the best type of IBD vaccines and proper age of vaccination in your broiler flocks.

Infectious Bronchitis

This viral disease is currently affecting broilers in Ontario and to a lesser extent in Quebec mainly due to DMV-1639 serotype. When birds are affected, damage caused by the virus to the upper respiratory tract (trachea) can act as a major predisposing factor for subsequent Colibacillosis. Another aspect of IB infection occurs closer to processing, and can cause higher airsaculitis condemnations due to

secondary bacterial infection. Even though there is currently commercially available vaccine in Canada that fully protects against this IB serotype, some veterinarians are using Mass type vaccine at the hatchery followed by Mass/Conn vaccines at 12–14 days of age with some success. The idea is that even if these vaccines are not perfect for current field IB viruses, they may be able to compete and lessen the negative impacts of field virus.

In addition to proper vaccination against IB, application of *E.coli* vaccine, where Colibacillosis has historically been observed, can assist in lowering the losses caused by secondary bacterial infection.

Coccidiosis

Currently, in conventional broiler flocks, ionophores and non-ionophore coccidiostats are mainly applied in feed and effectively prevent clinical coccidiosis. This has been widely applied by industry with satisfactory outcomes.

However, in raised without antibiotics flocks (RWA), where ionophores cannot be used, vaccination against coccidiosis either by itself, or in the form of bio shuttle strategy are viable options to prevent coccidiosis. The bio shuttle strategy refers to the application of coccidiosis vaccine at the hatchery, followed by a leaky non-ionophore coccidiostat, usually in grower feed. The idea is that non-ionophore coccidiostats can prevent clinical or subclinical *E. Maxima* infection in those chickens that didn't receive the vaccine adequately and hence, are more prone to exposure to high volume of oocysts in the litter. Another available tool in RWA flocks to control coccidiosis is to use non-ionophore coccidiostats in feed. This has had a very good success rate.

It is well accepted that one of the most important predisposing factors for Necrotic Enteritis (NE) is subclinical coccidiosis (especially *E. Maxima*), and therefore, control of coccidiosis plays an important role in prevention. Currently, coccidiosis control and application of in-feed antibiotics is the most common approach in prevention of clinical NE. This is mainly due the absence of an effective vaccine that can prevent this condition in broilers. However, there are a number of researchers who are focusing on this front and hopefully, in the near future, we will have an acceptable NE vaccine that can be used at the commercial level.

The take-home message is that maintaining gut health is crucial in RWA flocks, because, in the absence of in-feed antibiotics, any damage to gut mucosa can open the door to variety of pathogenic bacteria such as APEC or virulent *Enterococcus cecorum* strains that are normal gut flora to enter the bloodstream and result in localised and/or systemic infection.

In conclusion, this article attempts to reflect the important role of vaccines in preventing certain common diseases that can affect broiler flocks. By controlling certain viral diseases via vaccination, you can reduce antimicrobial usage at the farm level for treatment of bacterial diseases that appear as secondary infections. **AMU**

Babak Sanei

Manager of Veterinary Services
Poultry vaccines and Medicated Feed Additives

Zoetis Inc.

IMPORTANT NOTICE:

HEALTH CANADA IS CHANGING HOW YOU WILL BE ABLE TO ACCESS ANTIMICROBIALS

By the end of 2018, Health Canada will require a veterinary prescription to purchase any product, including feed, with antimicrobials of human importance.

The list of antimicrobials includes:

- Apramycin
- Bacitracin
- Lincomycin
- Neomycin
- Penicillin
- Spectinomycin
- Sulphonamides
- Tetracycline/ Chlortetracycline/ Oxy-tetracycline
- Tylosin
- Virginiamycin
- Or their salts or derivatives

Ionophores and coccidiostats will not be affected.

These antimicrobials will no longer be sold over the counter or at livestock medicine outlets.

BE PREPARED.

SPEAK WITH YOUR VETERINARIAN AND FEED MILL TO ENSURE A SMOOTH TRANSITION.

For further information, see Health Canada's website at **bit.ly/AMR_CDN**

Learning from the International Antimicrobial Reduction Experience

In 2016, world leaders gathered at the United Nations (UN) High-Level Meeting on Antimicrobial Resistance (AMR) and re-committed to the Global Action Plan on Antimicrobial Resistance, put forward in 2015 by the World Health Organization (WHO), the Food and Agriculture Organization of the United Nations (FAO), and the World Organization for Animal Health (OIE).

"Antimicrobial resistance threatens the achievement of the Sustainable Development Goals and requires a global response…No one country, sector or organization can address this issue alone."

- H.E. Peter Thomson, President of the 71st session of the UN General Assembly

Canada is not alone in tackling antimicrobial resistance and neither is its poultry industry. Antimicrobial use (AMU) strategies, comparable to CFC's, have seen great success in reducing total antimicrobial use in poultry production. For example since 2009, the Netherlands has observed a 70% decrease in poultry antimicrobial use and, similarly, the UK has reported a reduction of 71% since 2012.

There are lessons to learn from these countries as Canada implements its own chicken AMU strategy. While regional production difference may exist, even within Canada, there are enough similarities to glean important information from each country's experience in order to help navigate some of the same challenges and opportunities.

Netherlands

Netherlands antimicrobial strategy:
In 2008, the Dutch "reduction and responsible use of antibiotics in livestock" policy was enacted as a public-private partnership. It was facilitated and supervised by the government; however, major livestock sector stakeholders and the Royal Netherland Veterinary Association took responsibility for implementing the policy.

Three antimicrobial reduction targets were set

1. By 2011, reduce livestock antimicrobial use by 20%, as compared to usage in 2009
2. By 2013, reduce livestock antimicrobial use by 50%, as compared to usage in 2009
3. By 2015, reduce livestock antimicrobial use by 70%, as compared to usage in 2009

Began promoting transparency and benchmarking of antimicrobial use per herd/flock and veterinarian in 2011.

Improve livestock health by:

1. Introducing mandatory animal health plans
2. Having one contracted vet per herd/flock
3. Having mandatory periodical veterinary herd/flock inspections.

THE IMPLEMENTATION OF THE POLICY WAS SUCCESSFUL AT REDUCING TOTAL LIVESTOCK ANTIMICROBIAL USE, AND REDUCTION TARGETS WERE EVEN MET AHEAD OF SCHEDULE.

The implementation of the policy was successful at reducing total livestock antimicrobial use, and reduction targets were even met ahead of schedule. By 2014, the sales of veterinary antimicrobials had dropped by 58% (i.e. from 495 tonnes of active substance in 2009 to 207 tonnes in 2014). Since 2013 almost no critically important antibiotics have been used in the major livestock sectors.

How did this affect profits? It has been reported that there were no measurable negative economic or production impacts to the industry or producers from the implementation of the Dutch antimicrobial reduction strategy. In fact, broiler production increased by 9% from 2009 to 2014 and a study examining 21 broiler farms from 2009-2011 showed that farms with more than a 50% reduction in antimicrobial use did not perform any better or worse than farms that did not reduce their antimicrobial use.

To read the full economic report along with farmer testimonials across Dutch livestock sectors go to: **www.government.nl/binaries/government/documents/reports/2016/01/27/good-practices-use-of-antibiotics/dutch-veterinary-good-practices.pdf**

FOR EXAMPLE SINCE 2009, THE NETHERLANDS HAS OBSERVED A 70% DECREASE IN POULTRY ANTIMICROBIAL USE AND, SIMILARLY, THE UK HAS REPORTED A REDUCTION OF 71% SINCE 2012.

According to Dr. Paul Cornelissen, a poultry vet who serves almost 20% of the Netherlands meat poultry, management practices such as cleaning the barn between flocks, adhering to biosecurity protocols, and making sure to achieve ideal barn conditions during the first 36 hours of the brooding period contributed to the poultry industry's successful transition. Dr. Cornelissen also stresses the importance of chick quality, being conscience of breeder flock genetics, and chick immunity levels when reducing antimicrobial use.

In the Netherlands, antimicrobial reduction even led to some unexpected positive outcomes. According to Cornelissen, before the Dutch AMU strategy was

implemented, over 60% of antimicrobial use in poultry was to control the digestibility and gut health of birds. Once antimicrobial usage was reduced, higher feed quality was fed which coincidently decreased the occurrence of footpad lesions.

Besides changes in management practices Dr. Cornelissen credits achieving the phased antimicrobial reduction targets to all parts of poultry value chain working together towards a common goal.

United Kingdom (UK)

The UK antimicrobial use strategy:
In 2011 the British Poultry Council (BPC) released the Antibiotic Stewardship Scheme which focused on responsible use of antimicrobials and reducing the use of antimicrobials categorized as being of "most highly critical importance" to human health by the Word Health Organization (WHO). Under the guidelines of the Scheme, antimicrobials of "most highly critical importance" to human health can only be used therapeutically, not preventatively, and require a veterinarian's prescription.

The 2012 iteration of the Antibiotic Stewardship Scheme introduced a voluntary ban on the use of third and fourth generation cephalosporins and a commitment was made to reduce the use of fluoroquinolone antimicrobials. Fast-forward to 2016 when a ban on the use of colistin was added to the Scheme.

The BPC stresses that the Scheme is more focused on sustainable usage than reduction and relies on the successful implementation of the three R's, Replace, Reduce and Refine, by its producers as well as the entire value chain.

Furthermore, the three R's are supported by the principles of animal husbandry, hygiene and stockmanship. The values of stockmanship according to the BPC are knowledge of animal husbandry, skills in animal husbandry and personal qualities such as empathy, dedication and patience.

Strong stockmanship and management are pillars of the Scheme and reduction would not be possible with them. The BPC attributes successful implementation of the Scheme to its "committed and professional workforce".

Replace: Use antimicrobial alternatives if possible.

Reduce: Using risk assessment, reduce the amount of birds that receive treatment.

Refine: Always look to improve treatment strategies by consulting collected data.

The results of the implementation of this Scheme have been a 71% total reduction in the use of antimicrobials by weight from 2012 to 2016 and an 11% increase in poultry production during the same period.

To read the 2016 version of The BPC Antibiotic Stewardship Scheme and view Scheme implementation results from 2012-2016 visit **www.nfuonline.com/assets/61352**

The United States

The U.S. antimicrobial use strategy:
The United States Food and Drug Administration (FDA):

1. Banned the use of fluoroquinolones (i.e. Baytril®) in poultry in 2005.
2. Banned the extra-label use of cephalosporins (i.e. Excenel®) in poultry in 2012.
3. Released Guidance Document 209 "The Judicious Use of Medically Important Antimicrobial Drugs in Food-Producing Animals" in 2012.

Document 209 contains "nonbinding recommendations" to reduce antimicrobial use in food-producing animals. The document outlines two guiding principles:

» Limit the use of medically important antimicrobial drugs to necessary uses, in order to assure the health of food-producing animals.

The FDA considers treatment, control, or prevention of disease and illness as necessary or "judicious" uses of antimicrobials. Therefore, this principle suggests eliminating the use of antimicrobials for growth promotion purposes only.

» Employ veterinary oversight when using medically important antimicrobial drugs in food-producing animals.

The American Association of Avian Pathology (AAAP)-American Veterinary Medical Association (AVMA) Guidelines for Judicious Therapeutic Use of Antimicrobials in Poultry is a guide to assist veterinary medical practitioners in using antimicrobials judiciously. Among its recommendations are management practices that can help prevent the incidence and spread of poultry infections.

The AAAP-AVMA recommend maintaining optimum poultry environmental conditions in order to reduce the incidence and spread of infection by continuously managing and adjusting:

- Temperature
- Humidity
- Ventilation
- Feed
- Water

The guidelines additionally encourage upholding on-farm biosecurity protocols as a means of disease preventions and recommend the use of immunization when appropriate.

To read the FDA's full guidance document on "The Judicious Use of Medically Important Antimicrobial Drugs in Food-Producing Animals" visit **www.fda.gov/downloads/AnimalVeterinary/GuidanceComplianceEnforcement/GuidanceforIndustry/UCM216936.pdf**

To read the AAAP-AVMA's Guidelines for Judicious Therapeutic Use of Antimicrobials in Poultry visit **www.avma.org/KB/Policies/Pages/AAAP-Guidelines-to-Judicious-Therapeutic-Use-of-Antimicrobials-in-Poultry.aspx** **AMU**

Research & Innovation – Leading the way to finding solutions

Research is an integral part of CFC's comprehensive antimicrobial use (AMU) strategy. For years, CFC has had a strong research program to help the industry work towards sustainably reducing AMU in chicken production by bridging knowledge gaps and by guiding the development of best management practices, new products, and protocols.

Going forward, this research, and the commercialization of its results will become increasingly important. To this end, CFC is contributing a minimum of $500,000 to the new Agriculture and Agri-Food Science Cluster program, which is in addition to significant contributions from other sector members and companies. The primary focus of CFC's research contributions will be on projects to successfully meet the AMU reduction objectives.

CFC contributes to research through the Canadian Poultry Research Council (CPRC). A key deliverable on the AMU reduction initiative, CPRC created an "Avian Gut Microbiology" research program with the aim of examining the impact of gut microflora on the nutrition, feed conversion, pathogen carriage, and health of poultry in the context of antimicrobial reduction and elimination. This program was established to support industry and producers as they respond to growing pressures to reduce antimicrobial use in food production.

Listed below are examples of projects, both completed and some in progress, that will help inform industry decision making as the CFC AMU strategy is implemented. These include examining antimicrobial use and feed alternatives, vaccine development, biosecurity, and chick quality.

Antimicrobial Use and Feed Alternatives Projects:

The impact of reducing mycotoxins in poultry feed on the natural defense against disease (2012).
Natacha Hogan, University of Saskatchewan

Enzyme/yeast-based prebiotic for poultry nutrition (2013).
Bogdan Slominski, University of Manitoba

Evaluation of butyrate glycerides for developing an alternative to dietary antibiotics in poultry (2013).
Joshua Gong, Agiculture and Agri-Food Canada

Delivery of immunostimulatory oligodeoxynucleotides containing CpG motifs to broiler chickens as an alternative to antibiotics (2014).
Susantha Gomis, University of Saskatchewan

Induction of adaptive immunity against respiratory viruses using ovo delivered innate immune stimulants (2014).
Mohamed Faizal Abdul-Careem, University of Calgary

Effects of organic acids on reducing intestinal pathogens in broiler chicken during an on-farm trial (2015).
Martine Boulianne, University of Montreal

Microbiome manipulations of the chicken GI tract as a route to maintain poultry health (2015).
John Parkinson, University of Toronto

Alternatives to antibiotics: a novel symbiotic technology to mitigate enteric inflammatory disease (2016).
Douglas Inglis, Agriculture and Agri-Food Canada

Gut health control in antibiotic-reduced broiler chicken flocks (2016).
Martine Boulianne, University of Montreal

Nutritional regulation of genes associated with avian B cell receptors involved in innate and adaptive immunity (2016).
Juan Carlos Rodriguez-Lecompte, University of Prince Edward Island

Broiler breeder national survey on foodborne pathogen prevalence, antimicrobial resistance and antimicrobial use (2016).
Martine Boulianne, University of Montreal

Vaccine Development Projects:

Assessment of *Clostridium perfringens* pili in vaccine development for controlling necrotic enteritis in chickens (2013).
Joshua Gong, Agriculture and Agri-Food Canada

Understanding and controlling necrotic enteritis in broiler chickens (2013).
John Prescott, University of Guelph

A novel necrotic enteritis vaccine strategy: type IV pilus of *Clostridium perfringens* (2015).
Martine Boulianne, University of Montreal

An inexpensive plant-derived multicomponent vaccine for poultry coccidiosis and necrotic enteritis (2016).
Joenel Alcantra, University of Calgary

Control of *Campylobacter jejuni* in chickens by vaccination (2010).
Shayan Sharif, University of Guelph

Biosecurity Projects:

Assessment and mitigation of contamination risks: critical knowledge to reduce disease and increase biosecurity compliance (2013).
Jean-Pierre Vaillancourt, University of Montreal

Assessment of an air purification system for enhanced biosecurity on poultry operations (2015).
Bill Van Heyst, University of Guelph

Effect of barn sanitation on performance, microbiological and processing traits of commercial broilers (2016).
Doug Korver, University of Alberta

Chick Quality Projects:

Effect of incubator temperature profiles and parent flock age in two broiler strains on embryonic overheating during incubation (2012).
Dr. Doug Korver, University of Alberta

Investigations into yolk sac infection and its non-antibiotics based control in broilers (2013).
Mohammed Arshud Dar, Vaccine and Infectious Disease Organization

The effect of in ovo delivery of nutrients and feed additives on the development of the chicken immune system (2014).
Shayan Sharif, University of Guelph

Lighting during incubation in combination with sanitation of hatching eggs with antimicrobial proteins (2015).
Bruce Rathgeber, Dalhousie University

For more information about the CPRC, the research projects mentioned in this article or to learn more about other research being conducted please visit **http://cp-rc.ca/.** **AMU**

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