Antimicrobial Stewardship in Food Animals in Canada

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NFAHW COUNCIL

This document was prepared by the National Farmed Animal Health and Welfare Council. The Council was formed in 2010 to advise governments and all other stakeholders in animal agriculture on matters of the health and welfare of farmed animals in Canada. The Council is funded jointly by non-government organizations with an interest in animal agriculture and federal, provincial and territorial governments. Council members are designated by their constituency because of broad expertise in animal health and welfare, public health and an interest in approaching topics and developing advice in the context of One Health.

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1. Executive Summary

Antimicrobial resistance is global problem arising from the use of antimicrobials in both humans and animals. Antimicrobial resistance is well documented as a critical threat to modern medicine. Those involved in animal agriculture where medically important antimicrobials (Health Canada Classifications I, II, III) are used must develop strategies and programs to foster appropriate use of antimicrobials with a goal of retaining the effectiveness of antimicrobials for use in animals and humans.

Antimicrobials are essential in animal agriculture for disease management and preventing animal welfare issues. The need for the use of antimicrobials can be reduced through various infection and disease control strategies at the farm level.

The NFAHW Council, livestock producer organizations, veterinarians, the animal pharmaceutical industry and other stakeholders in animal agriculture have demonstrated leadership by being active on the topic of antimicrobial use and antimicrobial resistance for many years. There are many active initiatives that contribute to finding solutions, provide communication opportunities with producers and veterinarians, reduce risk of disease and foster appropriate use of antimicrobials.

The Federal government demonstrated leadership in 2015 with the development of the Federal Framework on AMR and the Federal Action Plan on AMR. By adding input from animal agriculture, human medicine and others, a pan-Canadian plan will be developed which will demonstrate how Canada will collectively act on the issue of antimicrobial resistance.

It is generally accepted that it will be the cumulative impact of numerous interventions or actions which will have a positive impact antimicrobial resistance. Antibiotic stewardship is multidimensional and needs to include, as one facet, the changes proposed for agriculture in the development of a pan-Canadian plan. There is a role for producers, commodity organizations, veterinarians, veterinary organizations, universities and colleges, the pharmaceutical industry, regulators and others. Coordination of roles and activities and the development of consistent messaging is required.

A description of the current situation and activities with some analysis is followed by a series of recommendations are provided to stakeholders in animal agriculture in Canada to identify how animal agriculture can participate as a full partner in developing a pan-Canadian plan for AMR.

2. Background

Antimicrobial resistance is a global problem that arises from the use of antimicrobials in both humans and animals. The problem of resistance is widely recognized as a critical threat to

modern medicine and has been well documented in professional journals and media. In some cases, there are now no or very limited choices of antimicrobials for treatment. The use of antimicrobials in both humans and animals has come under intense scrutiny.

The NFAHW Council has been active on the topic of antimicrobial use and antimicrobial resistance (AMU/AMR), completing "Antimicrobial Resistance and Antimicrobial Use Initiatives in Humans and Animals in Canada" in 2012 and releasing "Antimicrobial Use and Antimicrobial Resistance: Strategies for Animal Agriculture" in 2014.

The Canadian Veterinary Medical Association, provincial veterinary regulatory bodies, the livestock commodity organizations, the Council of Chief Veterinary Officers, the Ad-Hoc Committee on Antimicrobial Stewardship in Canadian Agriculture and Veterinary Medicine, academia, animal pharmaceutical industry and others have all been active in advancing the need for action on antimicrobial resistance over the past several decades.

In animal agriculture, animals are not always treated as individuals but rather as flocks, herds or groups at the same risk within the flock or herd. Feed and water are important routes of administration for many situations. Other routes of administration may be used in single animal treatments. The presence of disease in the flock/herd reduces productivity and may increase animal welfare issues. At key points of the production cycle, such as when new groups are formed or animals are moved, and when there is a history of infectious disease following the change, antimicrobials may be used preventatively to reduce disease and to ensure continued productivity. Preventing disease is an important animal welfare and productivity consideration.

2.1 Federal Framework and Action Plan

In Canada, as part of a global initiative to address AMR, the Public Health Agency of Canada is leading Canada's work on antimicrobial resistance. In October 2014, "***Antimicrobial Resistance and Use in Canada: A Federal Framework for Action***" was released followed in March 2015 by the "***Federal Action Plan on Antimicrobial Resistance and Use in Canada: Building on the Federal Framework for Action on Antimicrobial Resistance and Use in Canada***" which focus on three interconnected pillars – Surveillance, Stewardship and Innovation – and provide a framework for stakeholders in human and animal medicine to develop strategies to address AMR as part of a pan-Canadian national action plan.

The NFAHW Council identified the Stewardship pillar of the Federal Framework as an area that the Council was well placed to position animal agriculture in a proactive position in addressing the AMR. The Council recognizes that the Surveillance and Innovation pillars will also be important to progress on the Stewardship pillar activities but recognizes activities underway in those areas by others that will connect with the Council's work.

2.2 The need for change

The need and the pressure for change in practices in the use of antimicrobials in animal agriculture is growing.

- Antimicrobial resistance is a critical and complex global threat that agriculture and veterinary medicine need to address as part of the solution to the overall problem.
- Internationally, there is a commitment by the leadership of the G7 countries, including Canada, to address the problem of antibiotic resistance as a matter of urgency, and more globally by on-going commitments to the issue by the World Health Organization and the World Organization for Animal Health (OIE).
- Health Canada plans to introduce changes to the Own Use Importation and Active Pharmaceutical Ingredients which will control their entry into and use in Canada.
- Health Canada is also planning to remove label claims for antimicrobials for growth promotion and to require veterinary oversight for both feed and water medication use in food animals.
- Trade - The European trade agreement and the need for equivalency with changing agricultural antibiotic use practices in the United States adds to the need for change.
- Social License – AMR is important to society, to maintain its social license, animal agriculture must participate in addressing the issue of AMR.

2.3 Effectiveness of antimicrobials for humans and animals is critical

Modern medicine for both humans and animals is based on the availability of effective antimicrobials. The continuing efficacy of antimicrobials is important for animal agriculture, both in disease control in livestock production and related animal welfare considerations.

There is growing concern about resistance of bacteria to antimicrobials and the impact of such resistance to human and animal health, particularly those antimicrobials that are especially important in human medicine.

Based on their importance to human medicine, Health Canada classifies antimicrobials into four categories. Categories I, II, and III are medically important and were the focus of Council's discussion.

In 2013, a Canadian Animal Health Institute study showed that 78.4% of the total weight of medically-important antimicrobials in Canada were used in production animals.i This does not include products imported for Own Use (OUIs) or as APIs for further compounding. Although these figures may be deceptively high because of the greater mass of animals than humans in Canada, there may be a potential for reduction in the use of medically important antimicrobials in animal agriculture. In human and veterinary medicine, it is increasingly recognized that

antimicrobials should only be used where their benefits are clear and substantial in treating the infection.

3. The Canadian situation

Animal agriculture provides safe food for Canadians as well as exporting animals and animal products around the globe. Animal agriculture creates employment in rural communities and supports the retail and service sector. Throughout its history, Canadian animal agriculture has demonstrated that it progressively adapts and changes practices with changing knowledge and technology. Canadian animal agriculture responds actively to societal imperatives.

Canada has a strong network of veterinary practitioners with a profound knowledge of animal agriculture. Many have completed specialty certification or specialized programming in their areas of practice.

The landscape for antimicrobial use in food animals in Canada has continued to change since the September, 2014 Council report titled ***"Antimicrobial Use and Antimicrobial Resistance: Strategies for Animal Agriculture"***. This change is being driven particularly by proposals and on-going developments in the United States relating to food animal use of antibiotics by the Food and Drug Administration's Center for Veterinary Medicine. Related policy changes were announced in April 2014 by Health Canada's Veterinary Drug Directorate (HC) and the Canadian Animal Health Institute (CAHI). These changes predated several international initiatives to address the problem of antibiotic resistance as a matter of urgency[ii], and more globally by on-going commitments to the issue by groups such as the G7, the World Health Organization[iii,iv] and the World Organization for Animal Health (OIE)[v].

In its report, the NFAHW Council stated that:

- The consideration of AMU and AMR is an urgent issue,
- All stakeholders in Canada's animal agriculture have a responsibility for the prudent use of antimicrobials when they are required, respecting issues of both animal and human concern.
- Canada should recognize the universality of responsibility for management of the problems resulting from the use, both domestically and internationally, of antimicrobials in humans, animal agriculture, companion animals and other uses.

The NFAHW Council is pleased that the recommendations in "***Antimicrobial Use and Antimicrobial Resistance: Strategies for Animal Agriculture***" (Appendix Table 1) are being acted on, including:

- that stakeholders in Canada's animal agriculture support the HC and CAHI initiative and
- that a lead federal champion(s), such as the Public Health Agency of Canada (PHAC) and/or Agriculture and Agri-Food Canada (AAFC), establish a committee that coordinates initiatives relating to use of antimicrobials in animal and human medicine.

3.1 Health Canada and the Canadian Animal Health Institute announcement – 2014

Health Canada's Veterinary Drug Directorate and the Canadian Animal Health Institute (April 2014), announced changes to Category I, II and III antimicrobials administered in feed or water to farm animals, whereby production (growth promotional) claims for these drugs are to be removed and with the requirement that other use in feed or water be prescription only and require "veterinary oversight". These changes are anticipated to be implemented in December 2017. By these actions, Canada will more closely align with international standards[vi] for antimicrobial use in food animals. Besides removing production use claims of Category I, II and III antimicrobials in agriculture, the changes will mean that all Canadian veterinarians will for the first time have responsibility for all antibiotic use in the feed and water of food animals (veterinarians in Quebec currently have this responsibility). HC and CFIA will implement the requirement to increase veterinary oversight of medically-important antibiotics in livestock feed and in water.

3.2 Federal Leadership

3.2.1 The Federal Framework for Action, October 2014

In October 2014, the Government of Canada announced a Federal Framework for Action to address the issue of antibiotic resistance and use[vii]. PHAC is leading actions by federal departments and agencies. The key areas of focus in the framework are:

Surveillance – "*Detecting and monitoring trends and threats in order to inform strategies to reduce the risks and impacts of antimicrobial resistance*",

Stewardship – *"Conserving the effectiveness of existing treatments through infection prevention and control guidelines, education and awareness, regulations, and oversight"*, and

Innovation – "*Creating new solutions to counteract loss in antimicrobial effectiveness through research and development"*.

3.2.2 The Federal Action Plan, March 2015

In March 2015, the Federal government announced an action plan[viii], with narrow timelines, for addressing antimicrobial resistance and use in Canada. PHAC, supported by HC, CIHR and AAFC, will work with federal, provincial and territorial partners, as well as human health, animal health, agri-food and industry partners to develop a pan-Canadian framework to address antimicrobial resistance. Action items (Appendix Table 2) include a commitment to:

- Develop an antimicrobial use surveillance process that will document antibiotic use in food animals;
- Enhance all AMR/AMU surveillance through the creation of Canadian Antimicrobial Resistance Surveillance System (CARSS);
- Increase veterinary oversight for veterinary antibiotics in food animals;

- Education;
- Strengthen the control over importation of Active Pharmaceutical Ingredients (APIs) (2017); and,
- Work with federal, provincial and territorial partners and stakeholders to refine the regulatory framework.

3.3.3 The Auditor General of Canada's Report, April 2015

In April 2015, the Auditor General of Canada issued an analysis of whether the PHAC had fulfilled its key responsibilities to mitigate the public health risks posed by antibiotic resistance[ix]. The Auditor General was critical of Canada's failure to develop a national strategy, including how the health and agri-food sectors will work together, and of HC's failure to address the API and Own Use issues and of allowing antibiotics important in human medicine to be sold for use in food animals without prescription. The API and Own Use provisions have been subject of repeated and long-standing criticism from many quarters[x,xi]. The Auditor General noted that HC has the administrative authority to do this. The report also noted that development of a pan-Canadian strategy would allow HC the opportunity to strengthen veterinary oversight and ensure a more consistent approach across the country. PHAC and HC were given the opportunity to review and add comments to the report before its release in April 2015. The Federal Action Plan (Appendix Table 2) addresses the issues raised by the Auditor General. Timelines are very tight.

Recommendation 1. Recognizing the critical importance of national and global action to ensure there is continued effectiveness of antimicrobials for use in humans and animals, the NFAHW Council recommends that all stakeholders in animal agriculture support the Federal Framework for Action and the Federal Action Plan for antimicrobial resistance.

Recommendation 2. Recognizing the importance of national coordination of this complex issue, the NFAHW Council recommends that all stakeholders in animal agriculture support and participate in the development of a pan-Canadian strategy to manage antimicrobial resistance.

4. Principles on which stewardship recommendations were based

Four principles were identified to guide Council's discussion in developing recommendations on the stewardship of antimicrobials in animal agriculture.

- The overall goal is decreased antimicrobial resistance in humans and animals, and to preserve the effectiveness of antimicrobials for both human and animal use.
- The Council can provide leadership and direction to Canadian agriculture, veterinary medicine and others involved in this complex and multistakeholder issue.
- The discussion is focused on animal agriculture rather than on broader aspects of veterinary medicine and is limited to medically important antimicrobials.
- That antimicrobials are essential for treating bacterial infections in animals, and that prophylactic or preventative use of antimicrobials may be effective in reducing disease prevalence and the overall use of antimicrobials. Animal welfare issues may arise with unmanaged disease.

5. What is Antimicrobial Stewardship?

Antimicrobial stewardship is an **active, dynamic process of continuous improvement.** It involves coordinated interventions designed to promote, improve, monitor, and evaluate the judicious use of antimicrobials so as to preserve their future effectiveness and promote and protect human and animal health. Antimicrobial stewardship involves a "5R" approach of responsibility, reduction, refinement, replacement and review.[xii]

The concept and practice of antimicrobial stewardship continues to evolve in human and veterinary medicine. It is generally accepted that it will be the cumulative impact of numerous interventions or actions which will have a positive impact antimicrobial resistance.

Antimicrobial stewardship is multidimensional and needs to include, as one facet, the changes proposed for agriculture.

It is in the control of producers, veterinarians and other stakeholders to commit to stewardship of antimicrobial use in animal agriculture to manage antimicrobial resistance.
Figure 1 shows some of the multidimensional ways of improving stewardship in agriculture. The regulatory changes proposed in the Federal Action Plan for how antimicrobials are used in food animals are just one component of improving stewardship. Documenting antimicrobial resistance and antimicrobial use is another since this will provide the data against which the effect of changes can be measured or emerging problems can be identified. However, perhaps the biggest and most difficult element, which is encountered daily in medicine and veterinary medicine, is a change in the culture that has developed around the expectation that effective antimicrobials are and will always be available.

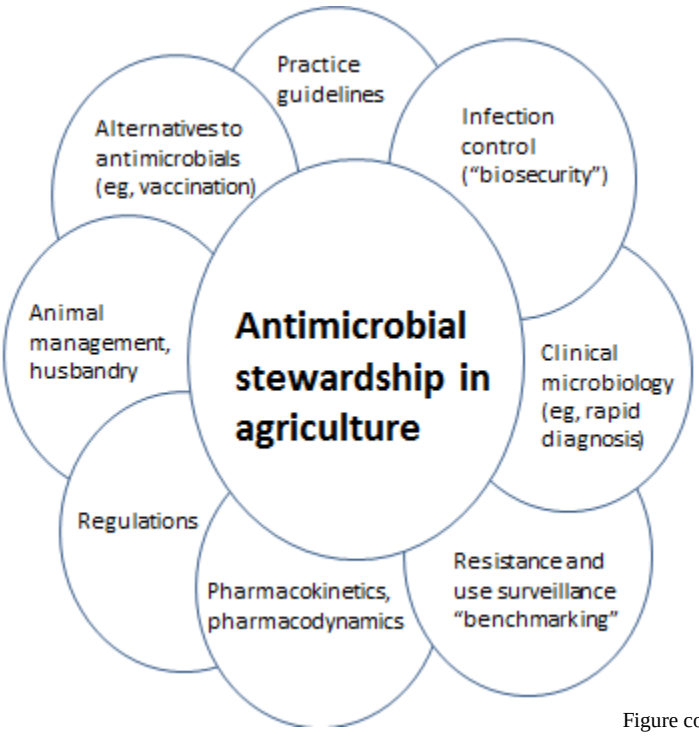

Figure courtesy of Dr. John Prescott

Figure 1

5.1 How will successful Stewardship in farm animal production be identified?

- Farm animal production is widely trusted and respected as a partner in the national AMR initiatives that supports efforts to control AMR impacting human health.
- A culture committed to antimicrobial stewardship in farm animal production has been not only developed but also embraced within the sustainable livestock commodity production programs and within farm animal veterinary medicine.
- Antimicrobial stewardship practices have contributed to maintaining positive animal health and animal welfare outcomes.

5.2 What measures can be used to demonstrate progress and success?

- The level of use of medically important antimicrobials is known through surveillance programs which measure use on a population basis by internationally agreed standards (including OUI and API usage if these continue to be permitted).
- Reduced or managed antimicrobial resistance in bacteria from farm animals, and separately from humans, for medically important antimicrobials monitored through a robust system of surveillance.

- A robust system of “benchmarking” of antimicrobial use at the national, provincial, commodity, farm and veterinarian level is established. This system supports management interventions where use is assessed as problematic.
- Assessment of the effectiveness of programs to educate and train producers, veterinarians and others on appropriate antimicrobial use – e.g. number of programs, number of participants, uptake, changed practices.
- Assessment of the relationship of animal agriculture with other partners involved in the broader pan-Canadian and international AMR initiative.
- Assessment of the acceptance of consumers of the measures taken.

6. Stewardship Challenges

6.1 Leadership

Many including the Auditor-General have identified the lack of a national strategy to address antimicrobial stewardship. The Federal Framework and Federal Action Plan are a first step in addressing this but will require the engagement of all federal, provincial and territorial partners and other stakeholders in the development and implementation of a pan-Canadian strategy to address antimicrobial resistance. The Council believes it can play a leadership role in mobilizing the broad group of stakeholders who need to be involved if animal agriculture is to play its part in addressing AMR.

The still largely uncoordinated effort is illustrated by Figure 2 that shows the large number of groups engaged with AMR Stewardship in animal agriculture. These include the Canadian Council of Chief Veterinary Officers (CCVO) and the Canadian Council of Veterinary Registrars (CCVR), the Canadian Veterinary Medical Association (CVMA) and the National Farmed Animal Health and Welfare Council (Council).

One perspective on leadership is that it is a shared responsibility, so that the involvement of different actors as shown in the Figure is a positive and not a negative feature. Council would however go further and state that leadership in antimicrobial stewardship should be broadened, through education and engagement, down to the level of the individual producer and veterinarian.

Nevertheless, the issue of leadership and of coordination among the many groups addressing stewardship in animal agriculture remains critical, as does the relation of these activities with ongoing stewardship in human medicine. Countries that have implemented comprehensive national strategies, including targeting of problematic resistant pathogens, have been most successful in controlling resistance[xiii].

Figure courtesy of Dr. John Prescott

Figure 2

Recommendation 3. The NFAHW Council recommends that within the context of a pan-Canadian strategy for AMR that it assume a national leadership role to bring stakeholders together to coordinate:

- ***their respective leadership roles;***
- ***communication and education activities; and***
- ***the development of an effective partnership with those involved in human initiatives on antimicrobial resistance.***

6.2 Regulatory issues

Regulation is one component of stewardship but must be supported and led by awareness, education and training to ensure compliance. Education is crucial to obtaining support for change.

6.2.1 Canadian Regulations

Many of the issues of stewardship in food animals relate to Canada's regulatory framework, where the federal regulations control approval and sale and provincial and territorial regulations control use (by veterinarians, pharmacists, producers). This is a surprisingly complex process that sometimes seems almost as complex as antimicrobial resistance itself.

Harmonization with antimicrobial use regulation in the United States is impacted by some differences in the current regulations. For example, the US Food and Drug Administration (FDA) does not approve extra label drug use of antimicrobials in feed. However FDA, frequently has dosage ranges for products, whereas Health Canada tends to have single dosage points for products while permitting extra label drug use (e.g., increasing the dose) under veterinary prescription. As well FDA has more compatibility claims for products used concurrently. There is a regulatory harmonization process as part of the Regulatory Cooperation Council towards same-time access to new animal drugs in both countries. The growing mutual confidence of HC's Veterinary Drug Directorate and the US FDA's Center for Veterinary Medicine may lead to joint recognition of regulatory decisions made separately in the individual jurisdictions.

In April 2015, Canada's Minister of Health issued a "notice of intent" to introduce proposed amendments to the Food and Drug Regulations to address the personal or own-use importation of veterinary drugs and strengthen the control over the importation of veterinary active pharmaceutical ingredients (APIs). The proposed regulatory amendments are part of the Government of Canada's Federal Action Plan on Antimicrobial Resistance and Use in Canada, which builds on the Federal Framework for Action announced on October 24, 2014. The purpose of these proposed amendments to the Food and Drug Regulations is to protect public health and food safety and to align the Regulations with those of other countries while promoting the prudent use of antimicrobials in food animal production. The proposed amendments will incorporate appropriate oversight of the importation of APIs for veterinary use and the importation of veterinary drugs by individuals for use on their own animals. For effective implementation, these changes need to be synchronized with the removal of the growth promotion claims and veterinary oversight of medically important antimicrobials used in feed & water.

Recommendation 4. The NFAHW Council recommends that Health Canada advance proposed regulatory amendments to establish limitations and controls on the antimicrobials imported under the provisions of Own Use Importation or as Active Pharmaceutical Ingredients.

6.3 Background to veterinary prescribing, authorizing and dispensing in Canada

An important and historic change proposed in the Federal Action Plan is to bring under veterinary prescription or oversight the use of medically-important antimicrobials that currently do not require a veterinary prescription.

By way of background, however, this section summarizes current veterinary prescribing, authorizing and dispensing in Canada. Further discussion relating to the proposed change to veterinary prescription or oversight of all medically-important antibiotics in the food or water of food animals is found in Section 7.2.

Prescribing and dispensing are separate veterinary medical activities. The authority for a veterinarian to undertake each of these activities is established by provincial legislation.

The process of prescribing and dispensing of pharmaceuticals must be transparent. The client has the choice to have a prescription filled or have medicated feed mixed wherever they may legally do so. Any action that would result in a client being forced or persuaded to purchase their pharmaceuticals from a particular location would justify claims of conflict.

Veterinarians are encouraged by the prudent use guidelines of the Canadian Veterinary Medical Association to consider the Health Canada categorization of antimicrobials when prescribing, and consider using an effective antimicrobial in the lowest category of importance to human health and to use approved products according to the label whenever possible.

6.3.1 Extra Label Drug Use (ELDU)

In Canada, veterinarians are able to prescribe extra label drug use. The veterinarian has the responsibility to ensure safety to the animal, efficacy and food safety. Veterinarians must obtain informed consent from the owner when prescribing extra label drug use. Veterinarians must adhere to Health Canada regulations and guidelines on drugs prohibited for use in food producing animals or other situations.

Extra Label Drug Use can result from the lack of approved products in the Canadian marketplace due to the size of the market relative to the costs of approval of the product. In particular, this affects the small ruminant species.

6.3.2 Pharmaceutical promotion

Corporate loyalty programs are offered by pharmaceutical companies. Both veterinarians and pharmaceutical companies play a role in ensuring promotions don't unduly influence treatment choices.

6.3.3 Pharmacists

Pharmacy regulations allow pharmacists to dispense approved drugs for use in human and animal medicine pursuant to a prescription issued by a medical practitioner or veterinarian, respectively. Pharmacists may also compound products, in some cases using Active Pharmaceutical Ingredients (APIs), on prescription by a veterinarian. Pharmacists are not supposed to compound products if approved products are available on the market.
Some pharmacists sell active pharmaceutical ingredients to veterinarians or dispense to producers pursuant to a prescription. At this time, pharmacists are exempt from having a Health Canada approved establishment license (EL) when importing and using an API, as are veterinarians. Proposed new regulation will require veterinarians and pharmacists importing API for use to have an establishment license and meet Good Manufacturing Practices (GMP) - API requirements for commercially available antimicrobial products. Pharmacists will be exempt from having an EL or verifying that API meets Canadian requirements for GMP if importing and using an API for a non-commercially available product, while veterinarians will

not be exempt. Under the new regulation pharmacists would be able to import and use APIs such as colistin that is not commercially available for animal use.

Recommendation 5. The NFAHW Council recommends that the pharmacy regulators be engaged in the stewardship of antimicrobial use in animal agriculture to ensure pharmacists are aware of their legislated responsibilities regarding selling or dispensing antimicrobials for animals.

7. Shared Responsibility for Antimicrobial Stewardship

This section summarizes some existing animal agriculture practices by different animal commodity groups that promote antimicrobial stewardship and on which further stewardship efforts might be built. The section also identifies some ways that antimicrobial use might be reduced as part of enhancing a culture of stewardship.

7.1 Summary of Current Producer Initiatives

7.1.1 Sustainability, Quality Assurance and On Farm Food Safety Programs

The national producer (commodity) organizations have sustainability, quality assurance or On Farm Food Safety programs which include components to ensure the production practices support the objectives of the commodity. These objectives might include appropriate use of antimicrobials, environmental programs, animal welfare programs, etc. These programs are highly effective and important communication tools for reaching producers and for implementation of continuous improvement initiatives. While each commodity group has their own sustainability/quality assurance/on-farm food safety program which differs slightly to adapt to the different types of production, the end result is similar since they are based on the same common principles. There are some differences in implementation between the supply managed (e.g. dairy, poultry) and non-supply managed (e.g. beef, pork) commodities due to the different level of control over producers. There may also be market requirements that require compliance.

It is reasonable to expect these programs would be used to reach producers with initiatives to manage antimicrobial resistance. They are currently being used to promote prudent use of antimicrobials with a focus on reducing the risk of antimicrobial residues by promoting involvement of a herd/flock veterinarian and the responsible use and storage of animal health products. They stress accurate diagnosis, proper drug selection and correct dosage when using antimicrobials. Other key components are recording treatments, records for animal health products, withdrawal times and staff training. Antimicrobial residues in food products from animals are rare, based on testing by CFIA.

The sustainability programs are effective tools for the commodity groups to reach out to their producers to raise awareness and initiate education on new and evolving issues, leading a process of continuous improvement. For example, the poultry commodity organizations used

their On-Farm Food Safety Programs to implement their policy prohibiting the use of Category I drugs for disease prevention.

The sustainability programs contain components of:

- Hazard Assessment Critical Control Point (HACCP) model focusing on the on-farm processes.
- Education/Communication
- Documentation
- Best management practices
- Standard Operating Procedures (SOPs)
- Assessment/Audit

7.1.2 Reducing the need for antimicrobial use in animal production

Production and management practices, genetics and facilities can influence the health of animals and the need for antimicrobial use. Denmark is an example of a country which has very low use of antimicrobials in pork production but has continued to concentrate and grow its production[xiv]. In Canada, the poultry industry does not allow the use of Class I antimicrobials for preventative purposes.

On farm practices are mechanisms for infection prevention and control. Disease reduces production efficiency and so, measures to increase animal health and welfare and reduce the need for antimicrobials are important to producers. Practices such as biosecurity; vaccination; proper nutrition, ventilation, animal comfort, parasite control; evaluation of antimicrobial usage all contribute to infection prevention and control.

Improper disposal of unused, partially used or out dated antimicrobials can result in environmental contamination. Disposal of antimicrobials is governed provincially. In some provinces, there are programs for disposal of medications used on the farm. The Canadian Animal Health Institute in collaboration with CleanFarms coordinates the collection and safe destruction of unwanted animal health products on a rotational basis across Canada.

7.1.2.1 Biosecurity/Biocontainment

Biosecurity will reduce the likelihood of introducing disease to a production facility and biocontainment practices will limit spread within or beyond the production facility. The CFIA Office of Biosecurity in partnership with the national commodity organizations has led the development of commodity specific biosecurity protocols for each livestock sector. The implementation of the plans is led by the national and provincial commodity organizations through their sustainability programs. Producers need to adapt the standards to suit each livestock production unit and implement their use as daily practice.

In recent disease events in Canada such as Avian Influenza, the value of biosecurity has been demonstrated in managing a disease outbreak. Biosecurity is a best practice for animal production facilities.

7.1.2.2 Animal Identification and Traceability

Proper record keeping and unique animal identification is essential for all livestock production units to manage necessary treatments and withdrawal times as well as facilitate the surveillance of animal disease and antimicrobial use.

In disease management, the ability to identify premises and trace animals is important in the containing a disease and may reduce the need for antimicrobial use.

7.1.2.3 Genetic Selection

Good animal breeding practices, monitoring traits and genetic selection is widely used to select and develop livestock that are well adapted to the production systems they will live in. This can significantly reduce the need for treatment by improving resistance to disease, improving soundness and other factors essential to good animal health. The development of genomics should allow for better understanding of the impact of genetics on disease and selection to enhance disease resistance.

7.1.2.4 Nutrition

Adequate nutrition is essential to good health and disease resistance. Appropriate feeding regimes will enhance health and improve immunity to disease while meeting productivity and profitability goals.

7.1.2.5 Animal Housing

Farmed animals in Canada may have partial or complete confinement. Appropriate facilities will provide animal comfort, adequate space, good water and air. Good engineering practices must be implemented to ensure proper flooring, ventilation, heating, space allotment, feeding space and other factors that contribute to good health and disease and injury prevention. There may be implications when shifting production systems to accommodate market needs.

Such things as moving to cage free birds and loose housing for sows may result in increased disease and increased need for antimicrobials.

7.1.2.6 Animal Health Programs

Herd/flock health programs that identify the health management strategies as well as treatment protocols developed to meet the needs of the farm are essential. An established relationship with a herd/flock health veterinarian helps to develop best health management strategies but also ensures that a veterinarian is available to diagnose disease when it occurs and provide direction for treatment if necessary. This treatment may require prescriptions or other documented direction for the use of antimicrobials via injection, drinking water or medicated feed.

Programs include accurate disease diagnosis, documentation and assessment of treatments and development of disease mitigation strategies. An analysis of farm production strategies will help to identify changes in facilities or common practices which may result in avoidance of antimicrobial use.

7.1.2.6.1 Vaccination Programs

Vaccines can be used to develop disease resistance in the animal population to specific viruses, thus indirectly decreasing the incidence of bacterial disease and the need for antimicrobial use. Bacterial vaccines are also widely used.

Vaccination programs are designed to fit the needs of the individual production facility to prevent diseases of concern in their animals/birds. Vaccination protocols include the vaccines required, booster vaccination requirements and timing maximum antibody titres with periods of greatest disease risk.

7.1.2.6.2 Parasite Control Programs

Internal and external parasites can reduce disease resistance. Control of parasites is an essential component of maintaining herd/flock health and reducing the need for use of antimicrobials. Assessment of parasite risk and prevalence relevant to the species of animal in question and the specific production unit situation will inform appropriate treatment decisions.

7.1.2.6.3 Treatments

Treatment of bacterial disease is essential in livestock production. In spite of mitigation measures, disease may occur. If not treated, the welfare of the animals suffers, animals may die and production is lost. Treatment protocols should be in place which require accurate diagnosis and include a cascading approach to the selection of the antimicrobial to minimize the use of medically important antimicrobials.

The use of alternative treatments should be considered when available and when there is valid information on efficacy and safety in food production. The development and assessment of alternative treatments will be stimulated by increased control of the use of antimicrobials.

7.1.2.6.4 Documentation and Evaluation of Antimicrobial Use

Antimicrobial use should be documented in all animal production facilities, including the identification of the animal, the diagnosis and the outcome. Evaluation of this data will help to determine the appropriate use of antimicrobials in the production unit. The "review" aspect of the continuous improvement ("5R") approach to antimicrobial stewardship is important to ensure that antimicrobials are only used where the benefits are clear and substantial.

7.1.2.7 Husbandry (Stockmanship)

Responsible livestock production encompasses the science, art and tradition of husbandry. Education and training of persons responsible for the care of livestock must be comprehensive and include information regarding antimicrobials and their use in animal health and the production of food.

Skilled producers will notice changes in animal health and wellbeing and make appropriate changes thus limiting or avoiding disease and the need for antimicrobial use.

7.1.2.8 Euthanasia

Producers must be able to judge when a humane death is preferable to implementing or continuing treatment (including antimicrobial use) that has little or no chance of success. Appropriate decision making, proper techniques, adequate training and consideration of mental health issues for operators are essential.

Recommendation 6. The NFAHW Council recommends that the livestock commodity organizations enhance communications with producers (for example via their sustainability, quality assurance or on farm food safety programs) on the importance of reducing antimicrobial resistance through prudent and judicious use of antimicrobials.

Recommendation 7. The NFAHW Council recommends that livestock commodity organizations lead the development of an action plan for their commodity producers to engage their veterinarians in the assessment of the use of antimicrobials, the validity of that use, the alternatives that are available and the management practices that might reduce risk.

7.2 Veterinary Initiatives

The intention behind bringing all use of antimicrobials in the feed or water of food animals under veterinary prescription is that there will be improved stewardship of these drugs in agriculture.

This major change in agricultural antimicrobial use practices gives greater responsibility to veterinarians for antimicrobial stewardship, and will involve increased engagement between veterinarians and producers, such that antimicrobials are only used where their benefits are clear and substantial. The changed relationship may be straightforward with producers in those well-organized commodity sectors that require full participation in the sustainability programs discussed earlier. They may be more difficult with small producers who are independent of the large commodity organizations and who lack an established relationship with a veterinarian.

Education of all producers, veterinarians, feed suppliers and other allied service providers about the reason for and importance of these changes will help all to embrace the changes as part of agriculture's contribution to addressing the antimicrobial resistance crisis. This needs to be developed with a pan-Canadian perspective.

Recommendation 8. The NFAHW Council recommends that a continuing education program for current and future producers, veterinarians, feed suppliers and other allied service providers to animal agriculture be developed at a national level and widely disseminated provincially to promote a culture of antimicrobial stewardship in Canadian agriculture and veterinary medicine.

7.2.1 Veterinary Oversight and Prudent Use

The CVMA's Veterinary Pharmaceutical Stewardship Advisory Group (VPSAG) is working collaboratively and very actively with the Canadian Council of Veterinary Registrars (CCVR) to develop a national framework on antimicrobial stewardship specifically to address the meaning of "veterinary oversight" and to harmonize understanding across the provinces and territories. This group will share the "***Veterinary Oversight of Antimicrobial Use: A Pan-Canadian Framework for Professional Standards for Veterinarians***" document with PHAC, HC, and CFIA, as important first steps in a broader development of the Pan-Canadian framework and engagement of veterinarians in these changes.

The Canadian Veterinary Medical Association for many years has provided guidelines for veterinarians on prudent use of antimicrobials both at the general and species level for adoption in veterinary practices.

7.2.2 Veterinary-Client-Patient Relationship (VCPR)

A VCPR is a prerequisite to undertaking the steps necessary to establish medical need and consequently prescribe or dispense. It is not a signed contractual agreement but rather it is a continuing working relationship and interaction between veterinarian, client and specific animal patient(s) based on trust. The VCPR is not in of itself an entitlement to prescribe, authorize or dispense.

For the purposes of this document, a legitimate VCPR is considered to exist if medical records of the veterinary practice contain sufficient evidence of ongoing interaction between the veterinarian, animal owner and specific animal patients to ensure the veterinarian has a knowledge of the animals and the operation.

For a national understanding of the meaning of VCPR, the following definition of VCPR from the CVMA Antimicrobial Prudent Use Guidelines (2008) is considered to be consistent with provincial legislation:

A VCPR exists when all of the following conditions have been met:

1. The veterinarian has assumed the responsibility for making clinical judgments regarding the health of the animal(s) and the need for medical treatment, and the client has agreed to follow the veterinarian's instructions.
2. The veterinarian has sufficient knowledge of the animal(s) to initiate at least a general or preliminary diagnosis of the medical condition of the animal(s). This means that the

veterinarian has recently seen and is personally acquainted with the keeping and care of the animal(s) by virtue of an examination of the animal(s) or by medically appropriate and timely visits to the premises where the animal(s) are kept.

3. The veterinarian is readily available for follow-up evaluation, or has arranged for emergency coverage, in the event of adverse reactions or failure of the treatment regimen.

7.2.3 Ethical Considerations

The requirements to be met by the registered veterinarian in order to appropriately prescribe a drug for use by any route of administration, including being mixed in animal feed or water, minimally include:

1. Establish and meet conditions of a valid Veterinary Client Patient Relationship (VCPR) in regards to the specific animals,
2. Make an evidence-based determination of medical need,
3. Complete appropriate documentation in the medical record,
4. Provide documentation to regulatory authorities if and as required and
5. Provide oversight of use and follow up.

Veterinary pharmaceutical companies often offer purchase incentives to veterinarians through loyalty programs. Ethical standards for veterinarians require that treatment choices are based on prudent use and risk mitigation.

Recommendation 9. The NFAHW Council recommends that veterinary regulators and veterinary associations develop awareness, education and training for veterinarians on the responsibilities of veterinarians in working with clients and treating animal with regard to addressing antimicrobial resistance.

7.3 Regulators

Shared responsibility for the stewardship of antimicrobials in Canada requires a cooperative approach among those involved including Health Canada, provincial governments, veterinary regulators, pharmacy regulators and commodity organizations who are all involved in regulating their stakeholders. An understanding of the regulatory reach of each player is necessary to understand roles.

8. Surveillance

8.1 Antimicrobial Resistance

The Public Health Agency through the Canadian Integrated Program for Antimicrobial Resistance (CIPARS) monitors trends in antimicrobial use and antimicrobial resistance in selected bacterial organisms from human, animal and food sources across Canada. CIPARS has gained international accolades for the quality and robustness of its data.

The Public Health Agency of Canada has committed recently to the development of the Canadian Antimicrobial Resistance Surveillance System (CARSS). CARSS is designed to strengthen coordination and integration of PHAC AMR/AMU activities and information.

International recommendations relating to antimicrobial stewardship in animal agriculture are that detailed AMR data be available. Council recognizes the pioneering work of CIPARS and the continuing need for an effective system for monitoring antimicrobial resistance in Canadian agriculture integrated with human bacterial resistance data.

Recommendation 10. The NFAHW Council recommends that all stakeholders make efforts to build on the success of the Canadian Integrated Program for Antimicrobial Resistance Surveillance (CIPARS), for the purpose of monitoring the effects of the new stewardship approaches and identifying and responding to emerging problems in a timely way.

8.2 Antimicrobial Use

Currently, antimicrobial use is measured by sales statistics from members of CAHI. This data reports antimicrobials distributed by family of antimicrobials by province and by route of administration. Expansion of the program is being considered to provide more detail at a regional and species level.

Missing from these statistics are products entering Canada as Own Use Importations and Active Pharmaceutical Ingredients for use on the farm.

While use of antimicrobials on the farm is documented as part of the sustainability (QA) programs, it is not collated into a national summary. Producers may have antimicrobials available on the farm for common, easily diagnosed problems. Veterinarians will provide protocols and oversight for these treatments if they have a VCPR with the operation.

Veterinarians are required to document in their medical records diagnoses, diagnostic test results, recommended treatments, and sales of products. However, this information is not collated into a national summary.

International recommendations relating to antimicrobial stewardship in animal agriculture are that detailed use data be available. Countries that have successfully reduced the quantities of antibiotics used in food animals, such as Holland, have found that “benchmarking” comparison of antimicrobial use by farms or prescription by veterinarians have been valuable national and farm-level management tools in promoting stewardship. Benchmarking was consistently ranked highly as an important measure for reduction of antibiotic use[xvxvi].

The Canadian Animal Health Surveillance System (CAHSS) is investigating a project proposal to investigate the collection of usage information. Data sources could include sales data and usage data already being recorded but not collated.

A robust system of "benchmarking" of antimicrobial use at the national, provincial, commodity, farm and veterinarian level to provide a basis to support interventions is a critical part of managing the stewardship of antimicrobials in food animals. It would go a long way to ensure that farm animal production is widely trusted and respected as a partner in the national AMR initiatives that supports efforts to control AMR impacting human health.

The Canadian Animal Health Surveillance System is a platform that could be tasked with developing a plan for a surveillance system that would result in data which accurately measured antimicrobial use in animal agriculture. Once a surveillance system is developed from the plan, usage data should be shared with CIPARS and other identified groups for analysis and dissemination to provide a basis for program decisions related to the use of antimicrobials in animal agriculture.

Recommendation 11. The NFAHW Council recommends that the federal government develop with its provincial/territorial partners, and industry and other stakeholders, a robust system of collecting antimicrobial use at the national, provincial, commodity, farm and veterinarian level, for the purpose of "benchmarking" and supporting continuous improvement. The Canadian Animal Health Surveillance System is a platform that could be used to develop a plan for this surveillance. Funding for this initiative should be provided by the Government of Canada as this information is critical to measuring antimicrobial use.

9. Innovation

9.1 Research

It will be necessary for research priorities to include topics which facilitate the production of animals with the minimum use of antimicrobials. The research findings will support educational efforts aimed at veterinarians, producers and other stakeholders and allow refinements to commodity sustainability programs.

Innovative communication and media approaches should be adopted to reach and influence all stakeholders.

Strong leadership may be able to utilize the federal AMR Framework and the pan-Canadian AMR strategy to coordinate research priorities on AMU/AMR across commodities. Currently, research priorities in animal agriculture are defined by commodity organizations and funded through producer organization, government and private funds. The larger national organizations have well developed processes for establishing priorities, attracting proposals and selecting successful projects.

Research priorities might include:

- Continued work to identify best practices in management, housing, production systems and husbandry to reduce the need for antimicrobial use.

- Methods for rapid and accurate identification of disease – use of production parameters, rapid diagnostic tests, etc.
- Identification of alternatives to replace antimicrobial use, such as improved immunization, nutraceuticals and biosecurity practices.
- How to obtain accurate information at the farm and veterinarian level to provide accurate measures of use for comparative purposes.
- Identifying those uses of antimicrobials in farmed animals where the benefits are clear and substantial.
- What the differences in prescribing practices are in Canada compared to other developed countries, and the bases of these differences if they are found to exceed "benchmark" norms.
- Analysis of the experience of other countries such as the Netherlands and Denmark that have successfully reduced antimicrobial use in agriculture.

Recommendation 12. The NFAHW Council recommends that the national commodity organizations include research priorities which address the issue of antimicrobial resistance and optimal use of antimicrobials when establishing research priorities for their sector.

9.2 Regulation

To encourage the development and use of alternate products, Canada will need to develop regulatory enabling processes for low risk animal health products intended for food animals and for feed additives with physiological and health benefits. As part of this, the classification of feed additives and drugs will need to be re-evaluated. Increasing the availability of alternative products to the degree that they are available in other countries will help promote the reduction of antibiotic use and increased stewardship measures.

The US has approved dosage ranges and compatibilities for using more than one antimicrobial in food and water but does not allow extra label drug use. In Canada, where extra label drug use is allowed, specific dosages are approved and where compatibility of antimicrobials is not available, it increases extra label drug use when veterinarians change the dosage or combine products. Harmonization with the US on this issue would help to make the use of antimicrobials in feed and water in the two countries more equitable.

Other areas of harmonization with the US and other international standards are in the categorization of antimicrobials and the definition of medically important antimicrobials.

The Regulatory Cooperation Council process between Health Canada – Veterinary Drug Directorate and the US Center for Veterinary Medicine is a positive step that may lead to joint recognition of regulatory decisions made separately in the individual jurisdictions.

Recommendation 13. The NFAHW Council recommends a harmonized, pan-Canadian, regulatory framework for antimicrobial stewardship in agriculture and veterinary medicine that meets international standards.

Recommendation 14. The NFAHW Council recommends that Health Canada develop regulatory enabling processes for low risk animal health products intended for food animals and for feed additives with physiological and health benefits.

Recommendation 15. The NFAHW Council recommends that Health Canada advance harmonization of regulations with the United States and meet international standards.

10. Moving Forward

The causes of antimicrobial resistance are complex but the consequences affect everyone. Multiple interventions will be needed and will involve everyone in a position to contribute to mitigation. The stewardship of antimicrobial drugs involves many different steps but the step that is most difficult to make is a change in the mind-set or culture that has developed over time. Agriculture and veterinary medicine need to work closely together to embrace and build this cultural shift. We are fortunate that Canada has the capacity to do so.

- **Leadership**
  There is opportunity for all stakeholders in animal agriculture to demonstrate leadership in their sector. The NFAHW Council can play a role in providing a forum for communication among the many activities, sharing successes and coordinating activities. Producers and other stakeholders will have opportunities to provide leadership at international meetings such as the World Organization for Animal Health (OIE), World Health Organization (WHO) and multinational industry meetings.

- **Communication/Extension**
  Communication to build awareness and extension education and training will be key in building the commitment for adopting practices to address antimicrobial resistance. A coordinated planned approach will be required to ensure all stakeholders are receiving and internalizing the same key issues and related messaging on their role in addressing antimicrobial resistance.

  Veterinary regulatory bodies, agriculture and veterinary schools, commodity organizations, veterinary associations and government agencies will all play a role in building awareness, education and training.

  There will be an important role in sharing of success in implementation strategies among the commodity organizations and other stakeholders.

- **Effective partnership**
  To develop a pan-Canadian approach, it will be critical to establish relations with those in human health to allow sharing of actions, progress, lessons learned and best practices.

- **Research and Innovation**
  - Alternatives and Risk Mitigation - Stakeholders should initiate investigation of alternatives and risk mitigation strategies to reduce the need for antimicrobials in animal production. If validated, these should be adopted as standard practice.
  - Reducing need for antimicrobials - Investigation of production systems is required to identify changes that might reduce the need for antimicrobials. (e. g. facilities, avoiding sale barns, minimizing transportation stresses)
  - CgFARAD - Investigation of the ability and capacity of CgFARAD (Canadian global Food Animal Residue Avoidance Database) to expand its role to include advice on avoiding development of antimicrobial resistance beyond its current mandate, which is to make recommendations on withdrawal times for veterinarians using drugs extra label to avoid residues in the food chain.
- **Regulation**
  - Move forward with regulatory change on Active Pharmaceutical Ingredients and Own Use Importation.
  - Assess regulatory needs required to create a change environment.
  - Consideration and potential introduction of label dose ranges and compatibilities in Canada to reduce extra label drug use.

11. Listing of Recommendations

Recommendation 1. Recognizing *the critical importance of national and global action to ensure there is continued effectiveness of antimicrobials for use in humans and animals, the NFAHW Council recommends that all stakeholders in animal agriculture support the Federal Framework for Action and the Federal Action Plan for antimicrobial resistance.*

Recommendation 2. Recognizing the importance of national coordination of this complex issue, the NFAHW Council recommends that all stakeholders in animal agriculture support and participate in the development of a pan-Canadian strategy to manage antimicrobial resistance.
Recommendation 3. The NFAHW Council recommends that within the context of a pan-Canadian strategy for AMR that it assume a national leadership role to bring stakeholders together to coordinate:

- their respective leadership roles;
- communication and education activities and
- the development of an effective partnership with those involved in human initiatives on antimicrobial resistance.

Recommendation 4. The NFAHW Council recommends that Health Canada advance proposed regulatory amendments to establish limitations and controls on the antimicrobials imported under the provisions of Own Use Importation or as Active Pharmaceutical Ingredients.

Recommendation 5. The NFAHW Council recommends that the pharmacy regulators be engaged in the stewardship of antimicrobial use in animal agriculture to ensure pharmacists are aware of their legislated responsibilities regarding selling or dispensing antimicrobials for animals.

Recommendation 6. The NFAHW Council recommends that the livestock commodity organizations enhance communications with producers (for example via their sustainability or quality assurance programs) on the importance of reducing antimicrobial resistance through prudent and judicious use of antimicrobials.

Recommendation 7. The NFAHW Council recommends that livestock commodity organizations lead the development of an action plan for their commodity producers to engage their veterinarians in the assessment of the use of antimicrobials, the validity of that use, the alternatives that are available and the management practices that might reduce risk.

Recommendation 8. The NFAHW Council recommends that a continuing education program for current and future producers, veterinarians, feed suppliers and other allied service providers to animal agriculture be developed at a national level and widely disseminated provincially to

promote a culture of antimicrobial stewardship in Canadian agriculture and veterinary medicine.

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Recommendation 10. The NFAHW Council recommends that all stakeholders make efforts to build on the success of the Canadian Integrated Program for Antimicrobial Resistance Surveillance (CIPARS), for the purpose of monitoring the effects of the new stewardship approaches and identifying and responding to emerging problems in a timely way.

Recommendation 11. The NFAHW Council recommends that the federal government develop with its provincial/territorial partners, and industry and other stakeholders, a robust system of collecting antimicrobial use at the national, provincial, commodity, farm and veterinarian level, for the purpose of "benchmarking" and supporting continuous improvement. The Canadian Animal Health Surveillance System is a platform that could be used to develop a plan for this surveillance. Funding for this initiative should be provided by the Government of Canada as this information is critical to measuring antimicrobial use.

Recommendation 12. The NFAHW Council recommends that the national commodity organizations include research priorities which address the issue of antimicrobial resistance and optimal use of antimicrobials when establishing research priorities for their sector.

Recommendation 13. The NFAHW Council recommends a harmonized, pan-Canadian, regulatory framework for antimicrobial stewardship in agriculture and veterinary medicine that meets international standards.

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Recommendation 15. The NFAHW Council recommends that Health Canada advance harmonization of regulations with the United States and meet international standards.

Appendix

Table 1. Recommendations of the NFAHWC Council's Report "Antimicrobial Use of Antimicrobial Resistance: Strategies for Animal Agriculture" (September, 2014).

Recommendation	
1	That stakeholders in Canada's animal agriculture industry support in principle the collaborative initiative announced April 10, 2014 by Health Canada and Canadian Animal Health Institute to work with other implicated stakeholders to: Remove growth promotion and/or production claims of medically-important antimicrobial drugs; Develop options to strengthen the veterinary oversight of antimicrobial use in food animals.
2	That stakeholders in Canada's animal agriculture industry support the regulatory modernization of Health Canada which was originally announced in May 2012.
3	That the animal agriculture industry stakeholders follow the lead of the poultry sector in supporting the position of Health Canada on the ELDU of Category 1 drugs for preventative use.
4	That a national committee including all the main stakeholders be created under the lead of federal champions such as the Public Health Agency of Canada and Agriculture and Agri-Food Canada. This committee will hold at least one annual meeting designed to encourage cross engagement of all stakeholders and will be responsible to coordinate the actions to be taken toward improvement of the use of antimicrobials, with an objective of achieving synchronization, complementarity and synergy of all the stakeholders initiatives related to the use of antimicrobials in animal and human medicine.
5	That research priorities and funding programs include innovation in alternatives to the use or need for antimicrobials in animal agriculture.
6	That CgFARAD receive committed funding from the federal government, the industry and public stakeholders to support the work of CgFARAD in residue avoidance as part of food safety and explore expansion of its scope to include consultation and recommendation on the use of antimicrobials in consideration of the potential for AMR.
7	That the surveillance of the use of antimicrobials be enhanced by CIPARS to improve quantification of the antimicrobials used in animal agriculture through additional mechanisms with the purpose of adequately assessing use by animal species, to help in implementing initiatives to reduce or to enhance better use. The data collected should be publicly accessible.
8	The creation of a joint human and veterinary lexicon related to all aspects of "antibiosurveillance" to help achieve better public communication.

Table 2. Selected action items related to animal agriculture from the Federal Action Plan (March 2015), with agency responsibility and target completion timelines.

Agency	Activity	Target date
SURVEILLANCE		
PHAC	Work with federal, provincial, and territorial (F/P/T) partners and human health, animal health, agri-food and industry stakeholders to develop a pan-Canadian framework to address AMR. The first phase will be working towards identifying the incremental elements of a pan-Canadian approach for endorsement by P/Ts and stakeholders.	Fall 2015
CFIA, AAFC	Identify AMU surveillance data requirements for the animal agriculture sector in support of the creation of a robust monitoring, tracking, and reporting system for AMU.	Spring 2016
	Work collaboratively with veterinary associations and P/T partners to begin to quantify antimicrobial usage in livestock in other dosage forms (e.g., water and injection) and under prescription.	
	Work with stakeholders to develop options for the collection and storage of AMU data for animal feeds and livestock production linking species, production classes, purpose of administration, and dosage quantities.	
STEWARDSHIP		
HC, CFIA, AAFC	Convene multi-lateral discussions with F/P/T partners, stakeholders and other interested parties to discuss and refine federal proposals for increasing veterinary oversight for veterinary antimicrobials for food animal production.	Spring, Summer 2015
PHAC (HC, CFIA, AAFC)	In response to calls for cross-sectoral engagement of all stakeholders in human health and agri-food sectors (e.g., government, industry, health professionals, veterinarians, licensing bodies), a series of consultations will be undertaken to take stock of existing practices relating to AMU, identify best practices for responsible AMU, and explore how to best leverage existing education opportunities.	Spring 2016
HC, CFIA	Work with drug sponsors to facilitate their submissions for label changes to remove growth promotion claims of medically important antimicrobial drugs and associated references in the Compendium of Medicating Ingredient Brochures.	Fall 2016
HC, CFIA, AAFC	Convene an additional round of multi-lateral discussions with F/P/T partners, stakeholders and other interested parties to further consider and refine federal proposals for strengthening the regulatory framework for veterinary drugs. Objectives of these discussions will be to determine how to establish effective oversight of APIs, as well as to engage stakeholders on measures to promote the prudent use of antimicrobials and to facilitate access to alternatives.	Spring 2015
HC, CFIA	Implement the requirement to increase veterinary oversight of medically-important antimicrobial drugs used in livestock feed and in water. The approach and timing will be aligned with a similar initiative in the US.	Decem-ber 2016
HC	Implement measures to address own use importation of veterinary drugs, and strengthen the control over the importation of veterinary active pharmaceutical ingredients (APIs).	2017

Endnotes

[i] 2013 CAHI data

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[vii]Government of Canada. Antimicrobial Resistance and Use in Canada: A Federal Framework for Action. October, 2014. Available from: http://www.healthycanadians.gc.ca/alt/pdf/drugs-products-medicaments-produits/antibiotic-resistance-antibiotique/antimicrobial-framework-cadre-antimicrobiens-eng.pdf

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[x] Uses of Antimicrobials in Food Animals in Canada: Impact on Resistance and human Health. (2002). Health Canada: Advisory Committee on Animals Uses of Antimicrobials and Impact on Resistance and Human Health. Available from: http://www.hc-sc.gc.ca/dhp-mps/pubs/vet/amr-ram_final_report-rapport_06-27_cp-pc-eng.php

[xi] Prescott JF, Szkotnicki J, McClure JT, Reid-Smith R. Léger DF. Antimicrobial stewardship in Canadian agriculture and veterinary medicine: How is Canada doing and what still needs to be done? Can Vet J 2012;53:402-407

[xii] Adapted from the Ad-Hoc Committee for Antimicrobial Stewardship in Canadian Agriculture and Veterinary Medicine

[xiii] Lancet Infectious Diseases Commission. Antibiotic resistance- the need for global solutions. Lancet Infection 2013. 13:1057-1098.

[xiv] Antimicrobials in Agriculture and the Environment: reducing unnecessary use and waste – available at: http://amr-review.org/sites/default/files/Antimicrobials%20in%20agriculture%20and%20the%20environment%20-%20Reducing%20unnecessary%20use%20and%20waste.pdf

[xv] Speksnijder DC, et al. Reduction of veterinary antimicrobial use in the Netherlands. The Dutch success model. Zoonoses and Public Health. 2014. 62:79-87

[xvi] Speksnijder DC, et al. Attititudes and perceptions of Dutch veterinarians on their role in the reduction of antimicrobial use in fam animals. Prevent Vet Med 2015. 121:365-373.