

Supplementary Table 1. Impediments to reducing antibiotic use in Canada, and “stewardship issues” needing addressing in the next 5 years.

Different animal species groups	Impediment to reducing antibiotic use	Most important stewardship issues in next 5 years	Single most important issue(s)
Aquaculture	Only 4 products are approved for use in fish, all require a prescription, most antimicrobials are used in feed.	National monitoring program to assess drug use and resistance; Better understanding of the practices that lead to resistance; Basic guidelines on antimicrobial use in aquaculture.	Synchronization and transparency of antimicrobial drug use and resistance monitoring across all federal and provincial agencies such that permits comparisons; Availability of cost effective alternatives to antimicrobials; Herd health management approach to veterinary medicine still in its infancy; Lack of knowledge (growers and veterinarians) on effect of repeated antimicrobial use.
Beef cattle	Antimicrobial resistance is not of high importance to beef producers, the old antibiotics work well.	Lack of conclusive evidence demonstrating that use leads to resistance in human pathogens from beef cattle use; Lack of scientific knowledge; Infection control for some diseases is very difficult; Need a baseline of information on practice use of antimicrobials; Disparity between provinces on policy and procedure; Economic considerations; Relative lack of education tools and guidelines for producers and veterinarians.	National antimicrobial drug use and resistance monitoring program for beef; Closing of the OUI and API use loopholes; Antimicrobials should be prescription only; Development of Risk Category III products and alternative for agriculture; Better communication with human health professionals and the public; Leadership and champions within the industry are needed.
Companion	Veterinary practitioners and horse	Measuring antimicrobial use and its	Education in the area of antimicrobial

animals, and equine	owners or clients e.g. performance horse demands; Data on use of antimicrobials and on resistance; OUI and API importation and use loopholes; Internet drug purchasing.	impact on resistance; Accountability relative to use; Certification; Identification of sentinel practices to monitor; Funding for future programs.	use and its impact on resistance; Use of electronic medical records to capture data; Infection control training.
Dairy cow	Uncontrolled antimicrobial use through the OUI and API importation and use loopholes along with purchase and use of OTC antimicrobials; Veterinarians should not profit from the sale of antimicrobials; Lack of a sense of urgency; Veterinarians and producers likely will not attend antimicrobial resistance meetings; Drug choices can be impacted by pharmaceutical rebates/trips.	Success of the National Dairy Quality Assurance Program – requires veterinary prescription for extra label drug use, non-DIN products require a prescription; Education on the proper use of antimicrobials in practice; Sustainable and full funding for CgFARAD.	Uncontrolled antimicrobial use through the OUI and API importation and use loopholes along with purchase and use of OTC antimicrobials; Education about stewardship.
Poultry	Education and outreach at all levels; Focus on production practices (e.g. husbandry, vaccination, nutrition) to prevent disease and reduce antimicrobial use; Establish a baseline for antimicrobial use levels – how much, what and why being used; Need consensus on how to measure use of antimicrobials; Sharing of data should be easy because of the structure of the industry; Targeted antimicrobial use	Measure antimicrobial use; Expand the science around resistance; Address regulatory reform issues for approval of novel antimicrobials and complimentary medicines particularly in the area of non-feed additives; Develop a stewardship culture among all industry players; Assess issues in light of use, profit and performance; Close the OUI and API importation and use loopholes; Support sustained funding for CIPARS and	Close the OUI and API importation and use loopholes; Support sustained funding for CIPARS and CgFARAD; Measurement of use and resistance.

	base on local susceptibility data.	CgFARAD.	
Small ruminants	Only 4 antimicrobials are approved for use in sheep, with 95% of antimicrobial use in sheep being extra-label and producer drive; There are no approved products for goats; all use is extra-label.	Increased enrolment in On-Farm Food Safety Programs; Development of Prudent Use/Clinical Practice Guidelines; Need to get products (pharmaceuticals and biologicals) with small ruminant label claims.	Improved access to information for veterinarians and producers to a level similar to that of other major species relative to important diseases; Availability of licensed products for minor species; Get access to vaccines for prevention of important diseases – interest in a MUMS approach for vaccines; Resources for developing proper infrastructure support for sheep and goat farms.
Swine	Quantification of antimicrobial use in Canada - by class of drugs, indications, dose and withdrawals; Economic incentives to sell antimicrobials plus OUI.	Communications between veterinarians and animal husbandry personnel; Producer education regarding antimicrobial use and alternatives; Lack of leadership/ownership to move antimicrobial resistance issues forward; Identification of antimicrobial resistance abusers and the ability to take corrective actions; Lack of a clear message to the agricultural community.	Public Health Agency of Canada, the Canadian Animal Health Institute and the Canadian Swine Health Board to provide joint leadership and accountability in the area of antimicrobial resistance.
Veal and the young dairy calf	Management of antimicrobial use and resistance e.g. Dutch farmers are put in isolation when hospitalized; Disease management challenges; No pressures to show treatment at the farm level; Focus on traceability of residue violations; Housing structures and the	Use and resistance monitoring; Regulatory issues involving distribution of antimicrobials e.g. prescription only, extra label drug use of category 1 products, strengthened provincial regulation.	Improved awareness of producers and veterinarians; Incentives around implementation of On-Farm Food Safety Programs; Harmonized national traceability programs; Prudent Use Guidelines; Regulatory is the single most important issue.

	fact that animals are commingled.		
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