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2012

CANADIAN INTEGRATED PROGRAM FOR ANTIMICROBIAL RESISTANCE SURVEILLANCE (CIPARS) ANNUAL REPORT

CHAPTER 3
ANTIMICROBIAL USE IN ANIMALS

Canada

TO PROMOTE AND PROTECT THE HEALTH OF CANADIANS THROUGH LEADERSHIP, PARTNERSHIP, INNOVATION AND ACTION IN PUBLIC HEALTH.

—Public Health Agency of Canada

Également disponible en français sous le titre :

Rapport annuel du Programme intégré canadien de surveillance de la résistance aux antimicrobiens (PICRA) de 2012, Chapitre 3 – Utilisation des antimicrobiens chez les animaux

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Publication date: December 2015

Cat.: HP2-4E-PDF

ISSN: 1925-9859

Pub.: 150093

Suggested Citation

Government of Canada. Canadian Integrated Program for Antimicrobial Resistance Surveillance (CIPARS) 2012 Annual Report, Chapter 3 – Antimicrobial Use In Animals. Public Health Agency of Canada, Guelph, Ontario, 2015.

3 ANTIMICROBIAL USE IN ANIMALS

TABLE OF CONTENTS

CONTRIBUTORS 2

PREAMBLE 4

ABOUT CIPARS 4

CIPARS SURVEILLANCE COMPONENTS 5

FARM SURVEILLANCE COMPONENT: GROWER-FINISHER PIGS 6

SURVEILLANCE OF THE QUANTITIES OF ANTIMICROBIALS DISTRIBUTED FOR SALE FOR USE IN ANIMALS 7

HOW TO READ THIS CHAPTER 8

SUMMARY – THE TOP KEY FINDINGS 9

FARM SURVEILLANCE: GROWER-FINISHER PIGS 10

KEY FINDINGS 10

SUMMARY OF ANTIMICROBIAL USE BY ROUTE OF ADMINISTRATION 13

ANTIMICROBIAL USE IN FEED 14

ANTIMICROBIAL USE IN WATER 24

ANTIMICROBIAL USE BY INJECTION 29

SURVEILLANCE OF THE QUANTITIES OF ANTIMICROBIALS DISTRIBUTED FOR SALE FOR USE IN ANIMALS 32

KEY FINDINGS 32

NATIONAL-LEVEL ANTIMICROBIAL DISTRIBUTION DATA 34

PROVINCIAL-LEVEL ANTIMICROBIAL DISTRIBUTION DATA 37

ANTIMICROBIAL DISTRIBUTION DATA AND ANIMAL POPULATION CORRECTION UNIT 41

APPENDIX 45

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MONITORING OF THE QUANTITIES OF ANTIMICROBIALS DISTRIBUTED FOR SALE FOR USE IN ANIMALS

We would like to sincerely thank the Canadian Animal Health Institute (CAHI) and their member companies for voluntarily providing the quantities of antimicrobials distributed for sale for use in animals in Canada

CIPARS would also like to thank the small group of volunteer industry and provincial representatives who have been participating in active discussions on appropriate denominators for quantities of antimicrobials distributed for use in animals.

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- Canadian Meat Council
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PREAMBLE

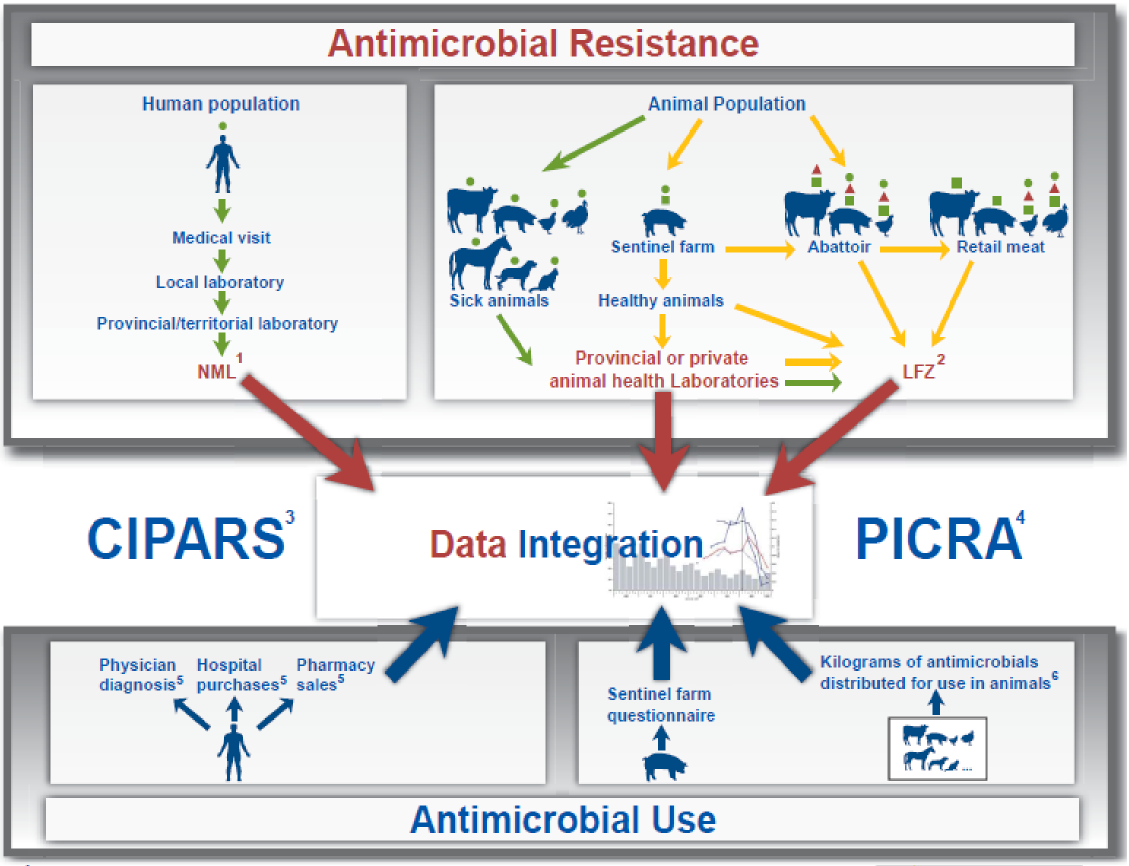
ABOUT CIPARS

The Canadian Integrated Program for Antimicrobial Resistance Surveillance (CIPARS), created in 2002, is a national program dedicated to the collection, integration, analysis, and communication of trends in antimicrobial use (AMU) and resistance (AMR) in selected bacteria from humans, animals, and animal-derived food sources across Canada. This information supports (i) the creation of evidence-based policies for AMU in hospitals, communities, and food-animal production with the aim of prolonging the effectiveness of these drugs and (ii) the identification of appropriate measures to contain the emergence and spread of resistant bacteria among animals, food, and people.

During 2012, CIPARS held discussions on alternative methods of analyzing and presenting the surveillance data to adjust for different data closure dates, and to maximize the integration of existing data. The Annual Report will be released in a Chapter format to improve the timeliness of the data publications. The new Annual Report will consist of 4 chapters: Chapter 1—Design and Methods, Chapter 2—Antimicrobial Resistance, Chapter 3—Antimicrobial Use In Animals, and Chapter 4— Integrated Findings and Discussion. Chapter 1 includes detailed information on the design and methods used by CIPARS to obtain and analyze the AMR and AMU data, including two summary tables describing changes that have been implemented since the beginning of the program. Chapters 2 and 3 present results for AMR and AMU, respectively, with each chapter including a section on the top key findings. Chapter 4 brings together some of the results across surveillance components, over time, across regions, and across host/bacterial species.

CIPARS SURVEILLANCE COMPONENTS

Figure 1. Diagram of CIPARS surveillance components in 2012



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FARM SURVEILLANCE COMPONENT: GROWER-FINISHER PIGS

FARM QUESTIONNAIRE

Antimicrobial use (AMU) information for this chapter were collected from sentinel swine farms through questionnaires administered by the herd veterinarian (or designated staff) to the producer (or designated farm staff). The questionnaires collected antimicrobial use (AMU), herd demographics and animal health information. Antimicrobial use data pertain only to the grower-finisher phase of production although some information was collected on antimicrobial use associated with specific diseases in associated sow herds and nurseries. Please refer to the 2012 Annual Report, Chapter 1—Design and Methods for additional information regarding data collection and analysis.

From 2009 to 2012, a total of 365 questionnaires were received from 124 sentinel swine herds (87 to 95 herds reporting per year), with 48% of sentinel herds (60/124) reporting in each of the 4 years. In 2012, questionnaires were submitted from 87 sentinel herds by 20 veterinarians, contributing 24% (87/365) of the total number of questionnaires to the data presented in this section.

SENTINEL HERD DEMOGRAPHIC INFORMATION

In 2012, questionnaires were received from 18 herds in Alberta (21%, 18/87), 8 in Saskatchewan (9%, 8/87), 12 in Manitoba (14%, 12/87), 28 in Ontario (32%, 28/87) and 20 in Québec (23%, 20/87).

In 2012, 63% of producers (55/87) reported owning their own breeding sows, 46% (40/87) kept sows on-site and 17% (15/87) had sows off-site. One farm did not report their source of pigs, but of those who did, 24% (21/86) of herds reported that they purchased pigs from a single source while 14% (12/86) purchased pigs from multiple sources. The farms that had their own sows and also purchased pigs from a single source/multiple sources were classified as multiple source herds (n = 2).

Fifty-five percent of herds (48/87) reported being all-in-all-out operations and 45% (39/87) indicated operating as continuous flow systems.

In 2012, more than half of grower-finisher herds (56%, 49/87) reported at least another pig farm within 2 kilometers of their farm.

In 2012, 50 of 67 (75%) grower-finisher herds reported providing coveralls and boots for visitors and having a biosecurity sign. In the "Other" category, 3 of 87 (3%) grower-finisher herds reported that they included "Danish entry" among their herd biosecurity protocols.

SURVEILLANCE OF THE QUANTITIES OF ANTIMICROBIALS DISTRIBUTED FOR SALE FOR USE IN ANIMALS

ABOUT THE CANADIAN ANIMAL HEALTH INSTITUTE AND THEIR DATA

As an estimate of the quantities of licensed antimicrobials used in animals, data on active ingredients distributed for sale were aggregated and provided to the Public Health Agency of Canada by the Canadian Animal Health Institute (CAHI). CAHI is the trade association representing the companies that manufacture and distribute drugs for administration to food (including fish), sporting, and companion animals in Canada. The association estimates that its members' sales represent over 90% of all sales of licensed animal pharmaceutical products in Canada[5]. The CAHI data provide a measure of antimicrobials distributed for sale for use in all animal species, including those not covered by CIPARS farm-level surveillance.

The CAHI data do not include antimicrobials imported under the personal-use provision of the federal Food and Drugs Act Regulations (own use import - OUI), nor do they include imported active pharmaceutical ingredients (API), which are drugs imported in non-dosage form and used by a licensed pharmacist or veterinarian. The latest information from CAHI is that the lost opportunity value due to OUI and API was estimated to be 13% of total of all animal health product sales of its members. Health Canada's Veterinary Drugs Directorate is currently reviewing these importation processes as part of their regulatory modernization discussions to enable appropriate oversight. The CAHI data also do not include prescriptions filled by pharmacists using human labeled drugs for companion animals. Hence, distribution data should always be considered with other sources of information (such as farm-level surveillance and antimicrobial resistance findings) for any decision-making. Strong caution should be applied when making inferences from the CAHI data to any use in a particular animal species. CIPARS continues to work to improve this measure and other appropriate measures, to best reflect animal antimicrobial use in the Canadian context.

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[5] http://cahi-icsa.ca/about/

ADJUSTMENTS FOR ANIMAL POPULATION NUMBERS AND WEIGHTS

As stated in the United Kingdom's surveillance report on antimicrobials sold for use in animals[6], the population is an important denominator, as the greater the number of animals, the greater the potential need for antimicrobial therapy. A standard weight was used for each production class to determine the biomass of the animal population; the population correction unit (PCU). However, a static standard weight may not reflect an industry shift in production affecting the average weights of animals treated, related to weather, trade, or other reasons.

Please refer to the 2012 CIPARS Annual Report, Chapter 1—Design and Methods for a more in-depth description of these data and information regarding how the adjustment for populations and weights (i.e., PCU) was calculated.

Distribution data in broad categories, whether adjusted for populations and weights or not, cannot account for the individual potencies of the antimicrobials administered to different species; this has implications for interpretations in trends over time. For example, a decrease in the kilograms of antimicrobials distributed (with or without adjustment by population) reported for a given year could potentially reflect a switch to using a more potent drug, as opposed to reflecting a decrease in the actual exposure of animals to antimicrobials.

STRATIFICATION OF THE DATA

Stratification of the data by province was provided for 2011 and 2012. Stratification of the data by companion animal/production animal was provided for 2012.

HOW TO READ THIS CHAPTER

Within this report, for the farm surveillance data, the information is reported at the individual antimicrobial agent level, as opposed to the antimicrobial class level.

For the antimicrobial distribution data provided by the Canadian Animal Health Institute (CAHI), the data are aggregated by CAHI according to accounting rules and are provided in antimicrobial categories/classes.

For the farm surveillance data, the information is reported as both qualitative antimicrobial use metrics (e.g., number of farms reporting using an antimicrobial), as well as quantitative antimicrobial use metrics (e.g., median grams per 1,000 pig-days).

For the CAHI data, the information is reported as quantitative information (e.g., kilograms of active ingredient or as milligrams of active ingredient/population correction unit).

[6] 2012. UK Veterinary Antibiotic Resistance and Sales Surveillance Report. Veterinary Medicines Directorate - Government Department for the Environment, Food and Rural Affairs. UK-VARSS Available at: www.vmd.defra.gov.uk/pdf/VARSS.pdf. Accessed March 2014.

SUMMARY – THE TOP KEY FINDINGS

Farm Surveillance: Grower-finisher pigs

- From 2009 to 2012, 78% of grower-finisher pig herds reported using antimicrobial in feed, 59% reported use by injection, and 25% reported using antimicrobials in water.
- The proportion of grower-finisher pigs exposed to antimicrobials when they were administered through feed or water was typically 100%, compared to less than 5% when antimicrobials were administered by injection.
- The most commonly used antimicrobials by any routes of administration in grower-finisher pig herds were penicillin G (54%), lincomycin (36%), tylosin (36%) and chlortetracycline (36%).
- The most common reason for antimicrobial use in feed was for disease prevention.

Quantities of antimicrobials distributed for sale for use in animals

- In 2012, 1.6 million kilograms of antimicrobials were distributed for sale by CAHI member companies for use in animals in Canada; a decrease of 8% relative to the 2006 total and an increase of 3% relative to the 2011 total.
- Of the 1.6 million kg, 30% were in Category IV (considered to be of low importance to human medicine) or had not been categorized according to their importance to human medicine.
- When adjusted for underlying populations and weights of animals, the total quantity of antimicrobials distributed for sale from 2006 to 2012 was relatively stable.
- There were provincial differences in the quantities of antimicrobials distributed for sale.
- In 2012, the quantity of antimicrobials distributed for use in companion animals was 0.6% of the total antimicrobials distributed for sale.
- Antimicrobials distributed for use in companion animal were mostly cephalosporins, β-lactams and sulfonamides, while in production animals the most common antimicrobials were tetracyclines, ionophores, and β-lactams.

FARM SURVEILLANCE: GROWER-FINISHER PIGS

KEY FINDINGS

Feed was the most common route of administration of antimicrobials in 2012; 82% (71/87) of grow-finish periods reported using antimicrobials in feed compared to 64% (56/87) by injection and 29% (25/87) in water (Table 1).

In 2012, the most commonly used antimicrobials by any route of administration were penicillin G (54%, 47/87), lincomycin (36%, 31/87), tylosin (36%, 31/87), and chlortetracycline (36%, 31/87) (Table 2).

Ceftiofur was the only Category I (Very high importance in human medicine) antimicrobial use reported (18%, 16/87) in grower-finisher herds (Table 2).

Ninety-two percent of herds reported using antimicrobials, by any route of administration, during the grow-finish period (80/87); 7 herds (8%, 7/87) reported no antimicrobial use by any route of administration (Table 1).

ADMINISTRATION IN FEED

The median number of different rations fed per grow-finish period was 4, with a range of 1 to 16 rations. A median of 4 rations per period was consistent across all 4 years (2009 to 2012). Across herds, a median of 75% of rations were reported to be medicated with antimicrobials in 2012; which was the same proportion reported in 2009 and 2010; in 2011 the median proportion of medicated rations was 80%.

In 2012, 18% (16/87) of herds did not use any antimicrobials in feed; this is significantly lower compared to 2009 results (24%, 23/95) (Figure 2).

The most commonly used route of administration of antimicrobials is through feed. Eighty-two percent (71/87) of herds used antimicrobials in feed in 2012, followed by 64% (56/87) by injection and 29% (25/87) in water. The number of herds with “no antimicrobial use” in feed was significantly lower in 2012 (18%, 16/87) compared to 2009 (24%, 23/95) (Figure 2).

The most commonly used antimicrobials in feed were chlortetracycline (36%; 31/87), tylosin (34%; 30/87), and lincomycin (29%, 25/87).

Although reported in few herds, the use of tiamulin in feed increased between 2009 (2%, 2/95) and 2012 (8%, 7/87) (Figure 2).

In 2012, the most common primary reasons for antimicrobial use in feed were for disease prevention (49%; 43/87) or growth promotion (40%, 35/87); disease treatment was not a common reason for antimicrobial use in feed (13%, 11/87). Among herds with antimicrobials in feed, the antimicrobials most commonly used for disease prevention were chlortetracycline

(29%, 25/87), tylosin (18%, 16/87) and lincomycin (17%, 15/87). This ranking was consistent through 2009 to 2012 (Figure 3).

The antimicrobials most commonly used for growth promotion in feed were salinomycin (17%, 15/ 87) and tylosin (14%, 12/87). There was an apparent shift to more herds reporting salinomycin use in feed for growth promotion compared to tylosin between 2010 and 2012 (Figure 3).

Lincomycin, tylosin, and chlortetracycline were the antimicrobials reported for use in feed in the treatment of lameness, respiratory or enteric diseases; the number of herds using antimicrobials in feed varied by specified reason but was generally low as a means for disease treatment (Figure 4). The most common uses of antimicrobials in feed for disease prevention were chlortetracycline for respiratory disease (26%, 23/87), tylosin for enteric disease (15%, 13/87), and lincomycin for enteric disease (13%, 11/87). This ranking was consistent through 2009 to 2012. Less than 5% of herds used antimicrobials in feed for the prevention of lameness in all 4 years from 2009 to 2012 (Figure 5).

In 2012, when specified antimicrobials were used in grower-finisher pig feed, the greatest overall quantities of antimicrobial use (median grams per 1000 pig-days) were of chlortetracycline (746), tilmicosin (463), lincomycin (110), and salinomycin (61) (Table 3).

Quantitative estimates of antimicrobial use in feed (median grams per 1,000 pig-days) varied by reason for use. Generally, the quantities of antimicrobial use were highest for disease treatment compared to disease prevention and growth promotion, with lower quantities being used for growth promotion (Figure 6).

With the exception of 2011, the quantities of chlortetracycline used in feed for disease treatment and prevention were higher compared to that used for growth promotion. In 2012, 795 and 758 grams of chlortetracycline per 1000 pig-days were used in feed for disease treatment and prevention, respectively, compared to 332 grams per 1000 pig-days for growth promotion (Figure 6).

Tylosin, lincomycin, and salinomycin were used in feed throughout the grower-finisher period in all 4 years from 2009 to 2012 (Figure 7).

Virginiamycin was used in feed in more than 5% of herds in 2012 but not in 2009 to 2011; it was used throughout the grower-finisher period (Figure 7).

The greatest median days of exposure to antimicrobials through feed in 2012 were for tylosin (70 days), virginiamycin (51 days), and lincomycin (42 days) (Table 3).

ADMINISTRATION IN WATER

Less than 30% of herds used antimicrobials through water in 2012, which was consistent with results from 2009 to 2011 (Figure 8). There was a significant increase in the number of herds using streptomycin in water in 2012 (10%, 9/87) when compared to 2009 (3%, 3/95), and 2011 (1%, 1/93) (Figure 8). Penicillin and trimethoprim-sulfadoxine were the main antimicrobials used in water, primarily for the prevention and treatment of respiratory disease (Figures 9 to 11). When antimicrobials were used in water, 86% of the time (32/37) they were administered to 100% of the pigs; this level of exposure through water was consistent over all 4 years (Table 4 and Table 5).

ADMINISTRATION BY INJECTION

The number of herds reporting no antimicrobial use by injection in grower-finisher pigs was significantly lower in 2012 (36%, 31/87) when compared to 2009 (47%, 45/95) (Figure 12).

The most common antimicrobials given by injection in 2012 were penicillin (45%, 39/87) and ceftiofur (18%, 16/87); this ranking was consistent through 2009 to 2012 (Figure 12).

In 2012, herds reported antimicrobial use by injection for the treatment of lameness (penicillin 38%, 33/87) respiratory disease (penicillin 18%, 16/87; ceftiofur 13%, 11/87) and lameness (ceftiofur 8%, 7/87). This ranking was consistent through 2009 to 2012 (Figure 13).

In 2012, antimicrobials were administered by injection to less than 5% of the pigs in the grower-finisher herd 93% of the time (86/92); this level of exposure by injection was consistent over all 4 years (Table 6 and Table 7).

ANIMAL HEALTH

Animal health data were collected for the sentinel grower-finisher herds, as well as for the nursery (piglets) and sow herds associated with the grower-finisher herds. Therefore, animal health data are presented for 3 life stages.

In 2012, the diseases most commonly reported (confirmed or likely positive) in grower-finisher herds were porcine circovirus associated disease (PCVAD) (84%, 71/85), *Streptococcus suis* (76%, 65/85), and *Lawsonia* (74%, 63/85).The diseases most commonly reported (as confirmed or likely positive) in nursery were PCVAD (92%, 70/76), *Streptococcus suis* (70/76, 92%), and *E. coli* (79%, 60/76). In sow herds, over 75% reported (as confirmed or likely positive) *Escherichia coli*, *Erysipelas*, *Lawsonia*, PCVAD, and *S. suis*.

There was an increase in the percentage of grower-finisher herds and associated sow herds and nurseries reporting (confirmed or likely positive) to *Lawsonia* and *Erysipelas* from 2009 to 2012.

Antimicrobials were most commonly used for *S. suis* and *E. coli* in nurseries, and *Lawsonia* in grower-finisher pigs. This ranking was consistent through 2009 to 2012.

Vaccination for PCVAD in grower-finisher herds decreased from 46% of herds in 2009 to 25% in 2012. In each of the 4 years over 90% of nurseries vaccinated for PCVAD. Vaccination in sow herds increased from 29% in 2009 to 37% in 2012.

SUMMARY OF ANTIMICROBIAL USE BY ROUTE OF ADMINISTRATION

Table 1. A summary of antimicrobial use, and no use, by route of administration, 2012

Antimicrobial use	Route of administration			
	Any Route[a]	Feed	Water	Injection
Any antimicrobial use	80	71	25	56
No antimicrobial use	7	16	62	31
Total Herds	**87**	**87**	**87**	**87**

[a] Herds with reported use of an antimicrobial class by feed, water, injection, or any combination of these routes are included in each count.

Table 2. Number of pig herds (n = 87) reporting antimicrobial use, by route of administration, 2012

	Antimicrobial classe	Antimicrobial	Route of administration			
			Any Route[a]	Feed	Water	Injection
I	Extended-spectrum cephalosporins	Ceftiofur	16	0	0	16
II	Aminoglycosides	Streptomycin	9	0	9	0
	Lincosamides	Lincomycin	31	25	0	7
	Macrolides	Erythromycin	0	0	0	0
		Tulathromycin	7	0	0	7
		Tilmicosin	2	2	0	0
		Tylosin	31	30	0	4
	Penicillins	Ampicillin	4	0	0	4
		Penicillin G	47	5	16	39
	Streptogramins	Virginiamycin	6	6	0	0
	Potentiated sulfonamides	Trimethoprim-sulfadoxine	4	0	1	3
III	Aminocyclotols	Spectinomycin	1	0	0	1
	Aminoglycosides	Neomycin	6	0	6	0
	Bacitracins	Bacitracin	0	0	0	0
	Phenicols	Florfenicol	4	0	0	4
	Pleuromutilins[b]	Tiamulin	8	7	0	1
	Sulfonamides	Sulfonamide (unspecified)	2	2	0	0
	Tetracyclines	Chlortetracycline	31	31	0	0
		Oxytetracycline	6	0	0	6
		Tetracycline hydrochloride	5	0	5	0
IV	Flavophospholipids	Bambermycin	2	2	0	0
	Ionophores	Salinomycin	17	17	0	0

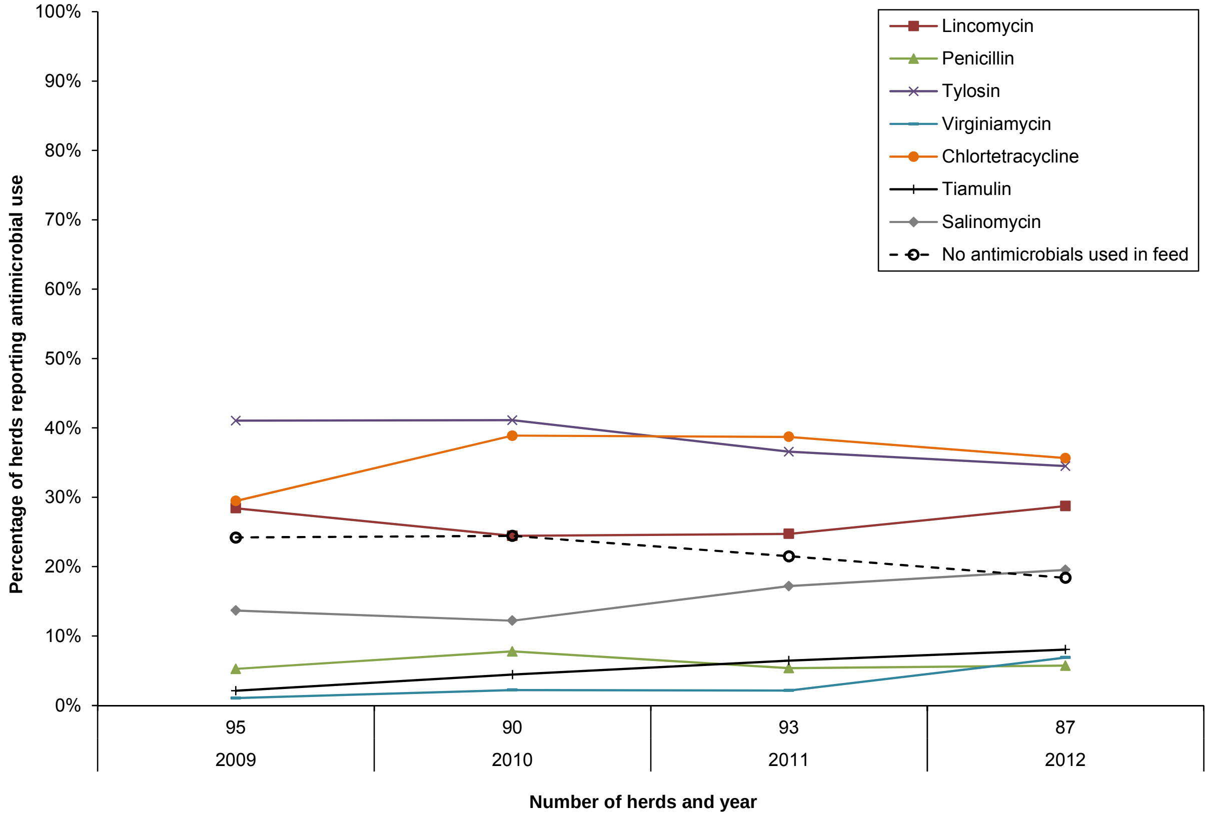
Roman numerals I to IV indicate the ranking of antimicrobials based on importance to human medicine as outlined by the Veterinary Drugs Directorate.

[a] Herds with reported use of an antimicrobial class by feed, water, injection, or any combination of these routes are included in each count.

[b] Pleuromutilins are not officially categorized in the current Health Canada Classification System. However, according to the criteria provided by Health Canada, pleuromutilins meet the criteria for Category III.

ANTIMICROBIAL USE IN FEED

Figure 2. Percentage of pig herds reporting antimicrobial use in feed, 2009–2012



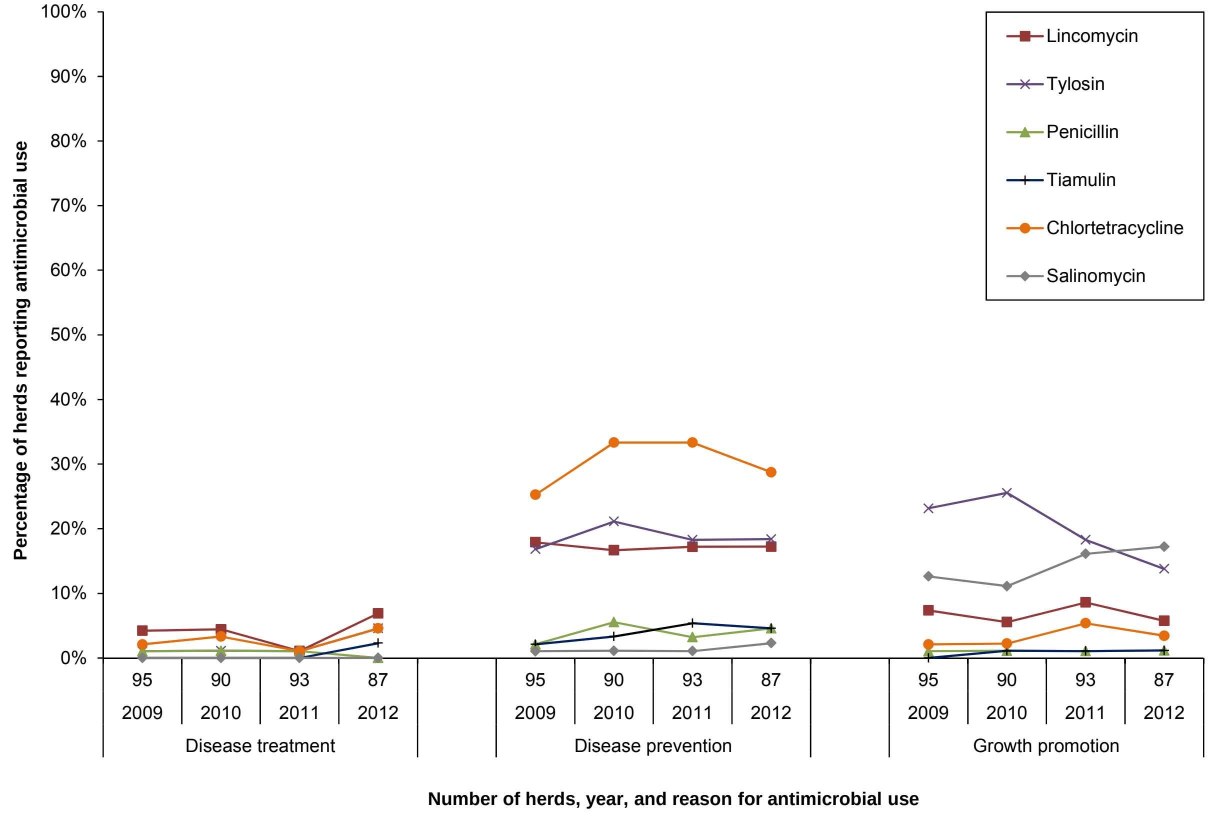
Year Number of herds		2009 95	2010 90	2011 93	2012 87
Antimicrobial					
II	Lincomycin	**28%**	24%	**25%**	**29%**
	Penicillin	**5%**	8%	**5%**	**6%**
	Tylosin	**41%**	41%	**37%**	**34%**
	Virginiamycin	**1%**	2%	**2%**	**7%**
III	Chlortetracycline	**29%**	39%	**39%**	**36%**
	Tiamulin	**2%**	4%	**6%**	**8%**
IV	Salinomycin	**14%**	12%	**17%**	**20%**
	No antimicrobials used in feed	**24%**	24%	**22%**	**18%**

Roman numerals II to IV indicate categories of importance to human medicine as outlined by the Veterinary Drugs Directorate.

Only antimicrobials used by 5% of herds or more in a given year are depicted in this figure. Antimicrobial use in feed reported by fewer than 5% of herds included: tilmicosin (Category II); bacitracin, neomycin, oxytetracycline, spectinomycin, and sulfamethazine (Category III); bambermycin (Category IV).

For the temporal analyses, the proportion (%) of herds using a specific antimicrobial in the current year has been compared to the proportion (%) of herds using the same antimicrobial in 2009 and the previous surveillance year (grey areas). The presence of blue areas indicates significant differences ($P \leq 0.05$) for a given antimicrobial.

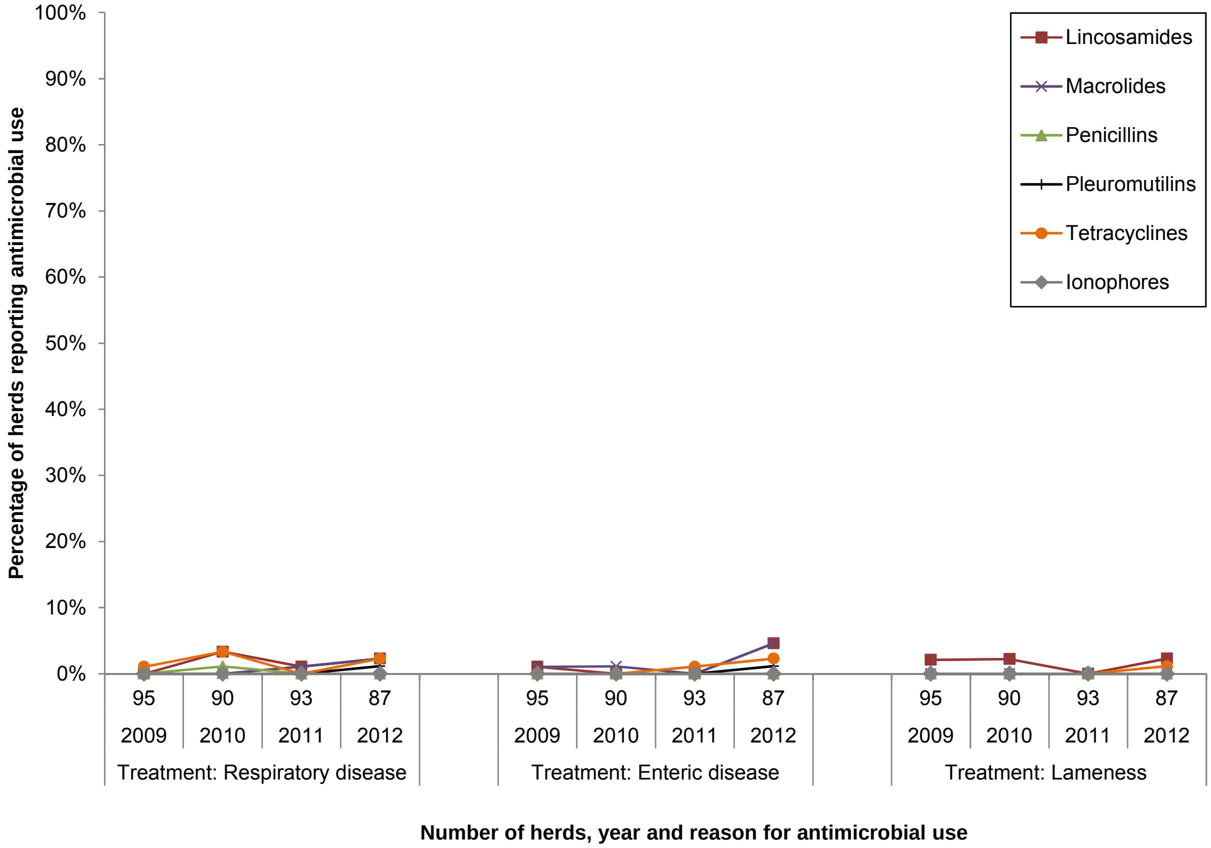
Figure 3. Percentage of pig herds reporting antimicrobial use in feed, by primary reasons, 2009–2012



Reason for use		Disease treatment				Disease prevention				Growth promotion			
Year		2009	2010	2011	2012	2009	2010	2011	2012	2009	2010	2011	2012
Number of herds		95	90	93	87	95	90	93	87	95	90	93	87
Antimicrobial													
II	Lincomycin	**4%**	4%	**1%**	**7%**	**18%**	17%	**17%**	**17%**	**7%**	6%	**9%**	**6%**
	Tylosin	**1%**	1%	**1%**	**5%**	**17%**	21%	**18%**	**18%**	**23%**	26%	**18%**	**14%**
	Penicillin	**1%**	1%	**1%**	**0%**	**2%**	6%	**3%**	**5%**	**1%**	1%	**1%**	**1%**
III	Tiamulin	**0%**	0%	**0%**	**2%**	**2%**	3%	**5%**	**5%**	**0%**	1%	**1%**	**1%**
	Chlortetracycline	**2%**	3%	**1%**	**5%**	**25%**	33%	**33%**	**29%**	**2%**	2%	**5%**	**3%**
IV	Salinomycin	**0%**	0%	**0%**	**0%**	**1%**	1%	**1%**	**2%**	**13%**	11%	**16%**	**17%**

Roman numerals II to IV indicate categories of importance to human medicine as outlined by the Veterinary Drugs Directorate.
Respondents were instructed to select only one of "Disease treatment", "Disease prevention" or "Growth promotion" as a primary reason for use of an antimicrobial.
Only antimicrobials used by 5% of herds or more in a given year are depicted in this figure.
For the temporal analyses, the proportion (%) of herds using a specific antimicrobial in the current year has been compared to the proportion (%) of herds using the same antimicrobial in 2009 and the previous surveillance year (grey areas). The presence of blue areas indicates significant differences ($P \leq 0.05$) for a given antimicrobial.

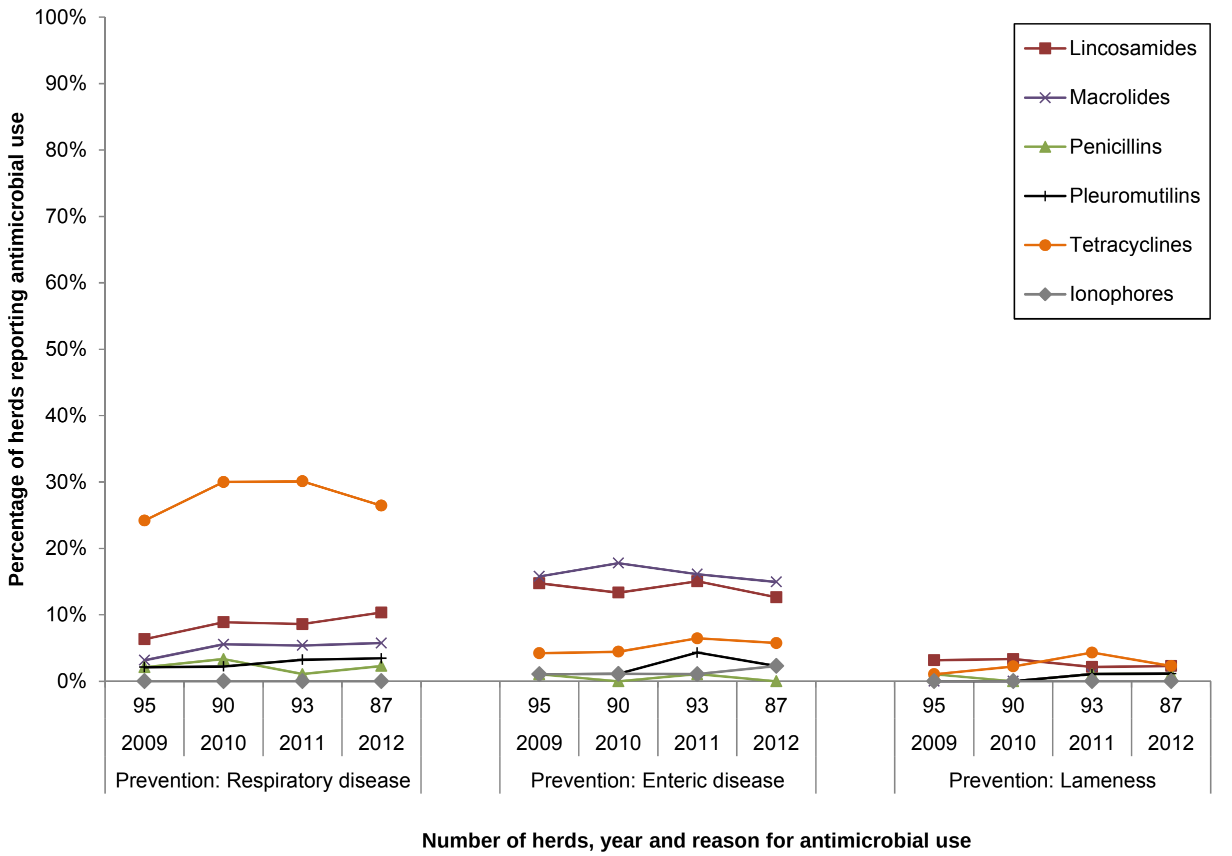
Figure 4. Percentage of pig herds reporting antimicrobial use in feed, by reasons for use under *Disease Treatment*, 2009–2012



Reason for use		Treatment: Respiratory disease				Treatment: Enteric disease				Treatment: Lameness			
Year		2009	2010	2011	2012	2009	2010	2011	2012	2009	2010	2011	2012
Number of herds		95	90	93	87	95	90	93	87	95	90	93	87
Antimicrobial class													
II	Lincosamides	0%	3%	1%	2%	1%	0%	0%	5%	2%	2%	0%	2%
II	Macrolides	0%	0%	1%	2%	1%	1%	0%	5%	0%	0%	0%	0%
II	Penicillins	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
III	Pleuromutilins	0%	0%	0%	1%	0%	0%	0%	1%	0%	0%	0%	0%
III	Tetracyclines	1%	3%	0%	2%	0%	0%	1%	2%	0%	0%	0%	1%
IV	Ionophores	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Roman numerals II to IV indicate categories of importance to human medicine as outlined by the Veterinary Drugs Directorate.
Respondents were instructed to "Check all that apply" from a list of secondary reasons for an antimicrobial use under "Treatment": "Respiratory disease", "Enteric disease", "Lameness", and "Other".
Only antimicrobials used by 5% of herds or more in a given year are depicted in this figure.
For the temporal analyses, the proportion (%) of herds using a specific antimicrobial class in the current year has been compared to the proportion (%) of herds using the same antimicrobial class in 2009 and the previous surveillance year (grey areas). The presence of blue areas indicates significant differences ($P \leq 0.05$) for a given antimicrobial class.

Figure 5. Percentage of pig herds reporting antimicrobial use in feed, by reasons for use under *Disease Prevention*, 2009–2012



Reason for use		Prevention: Respiratory disease				Prevention: Enteric disease				Prevention: Lameness			
Year		2009	2010	2011	2012	2009	2010	2011	2012	2009	2010	2011	2012
Number of herds		95	90	93	87	95	90	93	87	95	90	93	87
Antimicrobial class													
II	Lincosamides	6%	9%	9%	10%	15%	13%	15%	13%	3%	3%	2%	2%
II	Macrolides	3%	6%	5%	6%	16%	18%	16%	15%	0%	0%	1%	1%
II	Penicillins	2%	3%	1%	2%	1%	0%	1%	0%	1%	0%	1%	1%
III	Pleuromutilins	2%	2%	3%	3%	1%	1%	4%	2%	0%	0%	1%	1%
III	Tetracyclines	24%	30%	30%	26%	4%	4%	6%	6%	1%	2%	4%	2%
IV	Ionophores	0%	0%	0%	0%	1%	1%	1%	2%	0%	0%	0%	0%

Roman numerals II to IV indicate categories of importance to human medicine as outlined by the Veterinary Drugs Directorate.

Respondents were instructed to "Check all that apply" from a list of secondary reasons for an antimicrobial use under "Prevention": "Respiratory disease", "Enteric disease", "Lameness", and "Other".

Only antimicrobial classes used by 5% of herds or more in a given year are depicted in this figure.

For the temporal analyses, the proportion (%) of herds using a specific antimicrobial class in the current year has been compared to the proportion (%) of herds using the same antimicrobial class in 2009 and the previous surveillance year (grey areas). The presence of blue areas indicates significant differences ($P \leq 0.05$) for a given antimicrobial class.

Table 3. Summary of antimicrobial exposure through feed by active ingredient (n = 87 pig herds), 2012

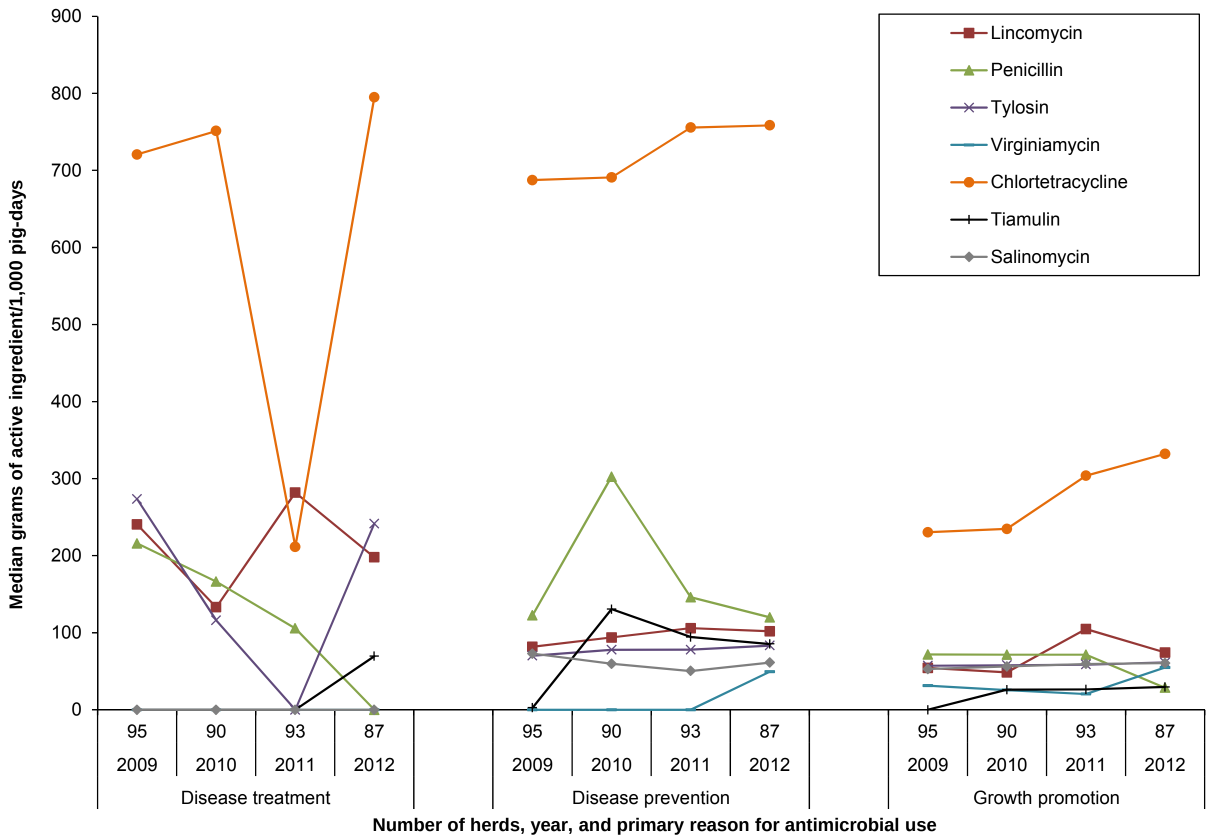
	Antimicrobial	Number of Herds (%)	Days exposed median (min.; max.)	Percentage (%) of herds exposed median (min.; max.)	Drug level in feed grams/tonne median (min.; max.)	Antimicrobial consumption[a] grams/1,000 pig-days median (min.; max.)
II	Lincomycin	25 (29)	21 (3; 56)	100 (25; 100)	44 (11; 220)	110 (29; 462)
	Penicillin	5 (6)	14 (5; 21)	100 (100; 100)	66 (22; 110)	94 (29; 147)
	Tilmicosin	2 (2)	14 (14; 14)	100 (100; 100)	200 (200; 200)	463 (454; 472)
	Tylosin	30 (34)	28 (1; 70)	100 (20; 100)	44 (11; 110)	83 (26; 300)
	Virginiamycin	6 (7)	28 (13; 56)	100 (50; 100)	22 (22; 22)	54 (35; 61)
III	Chlortetracycline	31 (36)	17 (1; 77)	100 (50; 100)	550 (44; 1210)	746 (57; 1584)
	Sulfamethazine	2 (2)	9 (5; 14)	100 (100; 100)	77 (44; 110)	105 (57; 153)
	Tiamulin	7 (8)	16 (1; 56)	100 (100; 100)	41 (18; 80)	72 (30; 144)
IV	Bambermycin	2 (2)	49 (14; 84)	100 (100; 100)	4 (4; 4)	10 (10; 11)
	Salinomycin	17 (20)	27 (7; 49)	100 (35; 100)	25 (25; 417)	61 (28; 1021)

Roman numerals II to IV indicate categories of importance to human medicine as outlined by the Veterinary Drugs Directorate.

[a] Antimicrobial consumption estimates were calculated using reported ration days fed and predicted feed intake[7], adjusted for herd average daily gain; only rations medicated with the specified antimicrobial were included in the analysis for each antimicrobial.

[7] National Research Council. 2012. Nutrient Requirements of Swine, Eleventh Edition. Washington, DC: National Academy Press.

Figure 6. Quantity of antimicrobials used in feed, by reason for use, 2009–2012

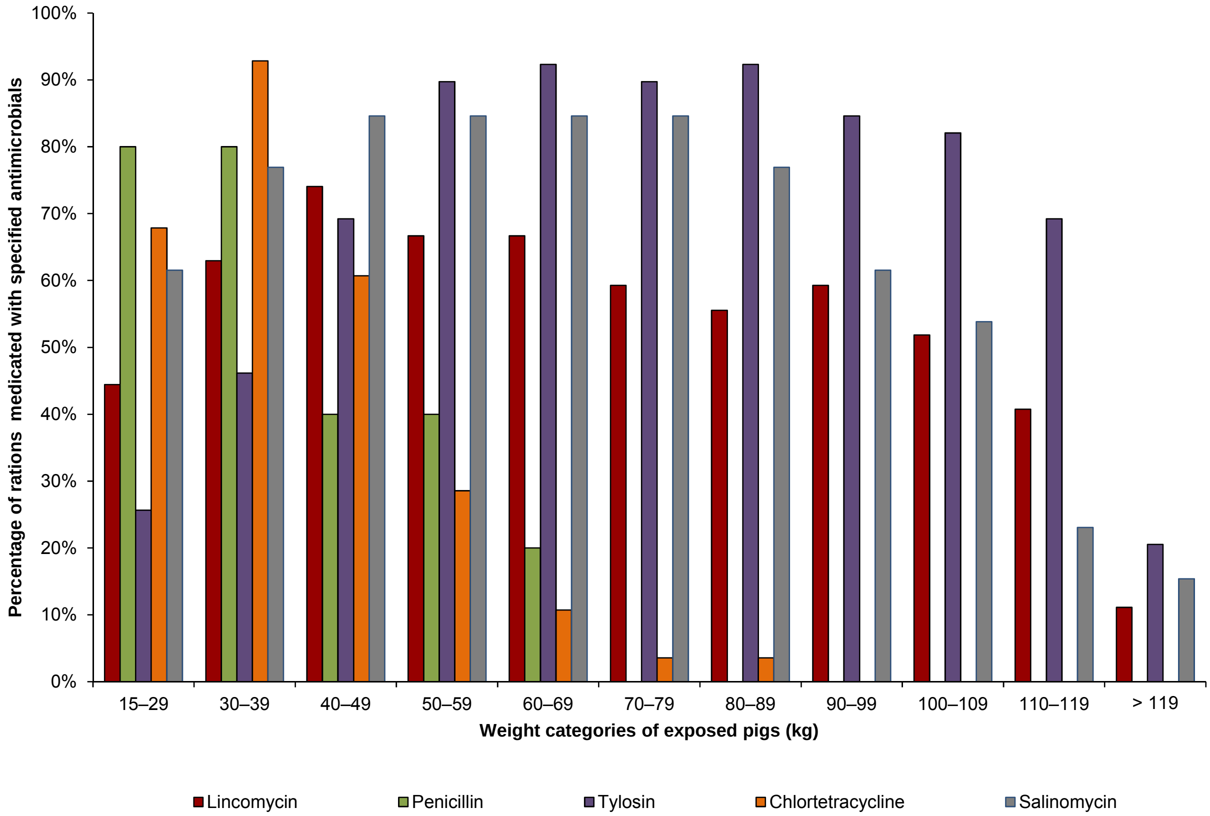


Reason for use		Disease treatment				Disease prevention				Growth promotion			
Year		2009	2010	2011	2012	2009	2010	2011	2012	2009	2010	2011	2012
Number of herds		95	90	93	87	95	90	93	87	95	90	93	87
Antimicrobial		Median grams/1,000 pig-days[a]											
II	Lincomycin	240	133	282	198	82	94	106	102	54	48	105	74
	Penicillin	216	166	106	0	122	303	146	120	72	72	72	29
	Tylosin	273	116	0	242	70	78	78	83	57	58	59	61
	Virginiamycin	0	0	0	0	0	0	0	49	31	26	21	55
III	Chlortetracycline	721	751	212	795	687	691	756	758	230	235	304	332
	Tiamulin	0	0	0	70	3	131	94	85	0	26	26	30
IV	Salinomycin	0	0	0	0	73	60	50	61	53	56	60	61

Roman numerals II to IV indicate categories of importance to human medicine as outlined by the Veterinary Drugs Directorate.
Respondents were instructed to select only one of "Disease treatment", "Disease prevention" or "Growth promotion" as a primary reason for use of an antimicrobial.
Only antimicrobials used by 5% of herds or more in a given year are depicted in this figure.
[a] Median antimicrobial consumption estimates were calculated using reported ration days fed and predicted feed intake[8], adjusted for herd average daily gain; only rations medicated with the specified antimicrobial were included in the analysis for each antimicrobial.

[8] National Research Council. 2012. Nutrient Requirements of Swine, Eleventh Edition. Washington, DC: National Academy Press.

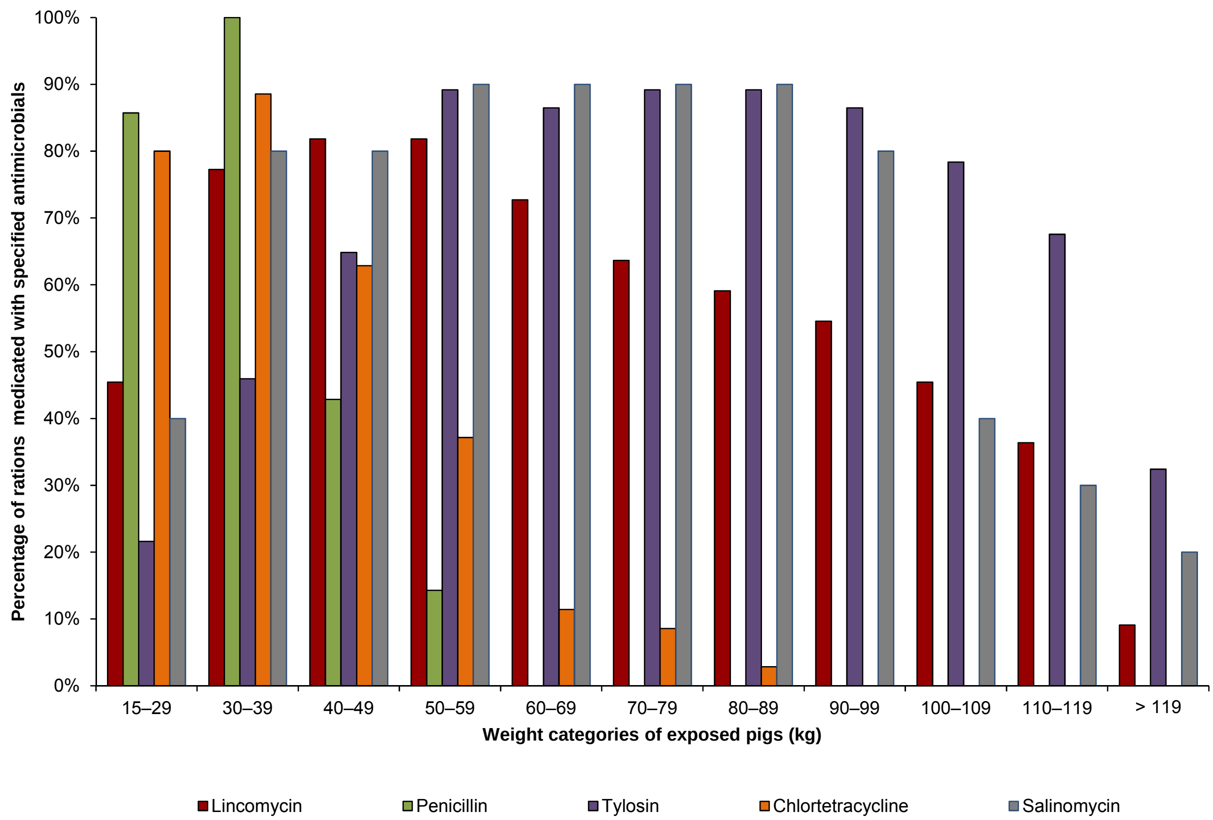
Figure 7. Percentage of rations medicated with specified antimicrobials fed over the grow-finish period by reported pig weights, 2009



	Antimicrobial	Number of medicated rations	Pig weight categories over the grow-finish period (kg)										
			15–29	30–39	40–49	50–59	60–69	70–79	80–89	90–99	100–109	110–119	> 119
II	Lincomycin	27	44%	63%	74%	67%	67%	59%	56%	59%	52%	41%	11%
	Penicillin	5	80%	80%	40%	40%	20%	0%	0%	0%	0%	0%	0%
	Tylosin	39	26%	46%	69%	90%	92%	90%	92%	85%	82%	69%	21%
III	Chlortetracycline	28	68%	93%	61%	29%	11%	4%	4%	0%	0%	0%	0%
IV	Salinomycin	13	62%	77%	85%	85%	85%	85%	77%	62%	54%	23%	15%

Roman numerals II to IV indicate categories of importance to human medicine as outlined by the Veterinary Drugs Directorate.
Only antimicrobials used by 5% of herds or more in a given year are depicted in this figure.
Antimicrobials used in medicated rations by fewer than 5% of herds included: tilmicosin and virginiamycin (Category II); oxytetracycline, spectinomycin, sulfamethazine, and tiamulin (Category III); bambermycin (Category IV).

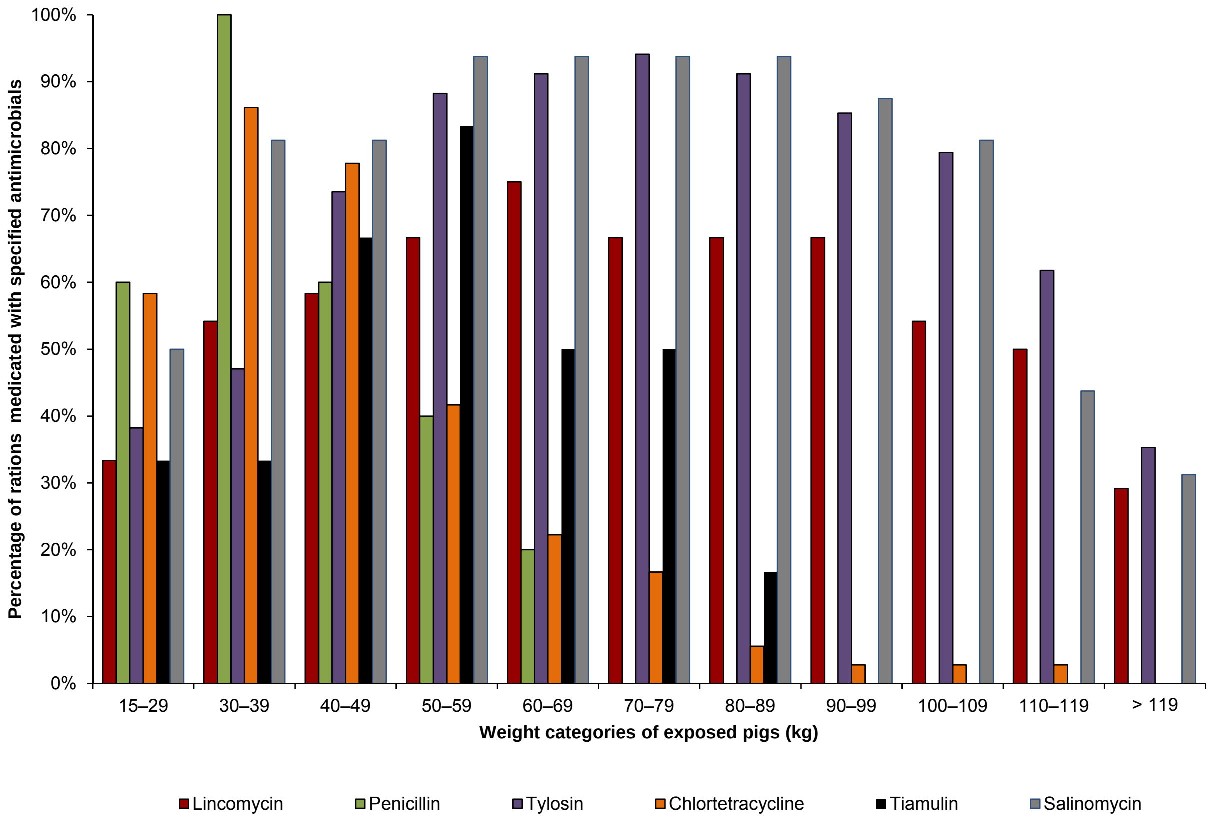
Figure 7 (cont'd). Percentage of rations medicated with specified antimicrobials fed over the grow-finish period by reported pig weights, 2010



	Antimicrobial	Number of medicated rations	Pig weight categories over the grow-finish period (kg)										
			15–29	30–39	40–49	50–59	60–69	70–79	80–89	90–99	100–109	110–119	> 119
II	Lincomycin	22	45%	77%	82%	82%	73%	64%	59%	55%	45%	36%	9%
	Penicillin	7	86%	100%	43%	14%	0%	0%	0%	0%	0%	0%	0%
	Tylosin	37	22%	46%	65%	89%	86%	89%	89%	86%	78%	68%	32%
III	Chlortetracycline	35	80%	89%	63%	37%	11%	9%	3%	0%	0%	0%	0%
IV	Salinomycin	10	40%	80%	80%	90%	90%	90%	90%	80%	40%	30%	20%

Roman numerals II to IV indicate categories of importance to human medicine as outlined by the Veterinary Drugs Directorate.
Only antimicrobials used by 5% of herds or more in a given year are depicted in this figure.
Antimicrobials used in medicated rations by fewer than 5% of herds included: tilmicosin and virginiamycin (Category II); bacitracin, oxytetracycline, spectinomycin, sulfamethazine, and tiamulin (Category III); bambermycin (Category IV).

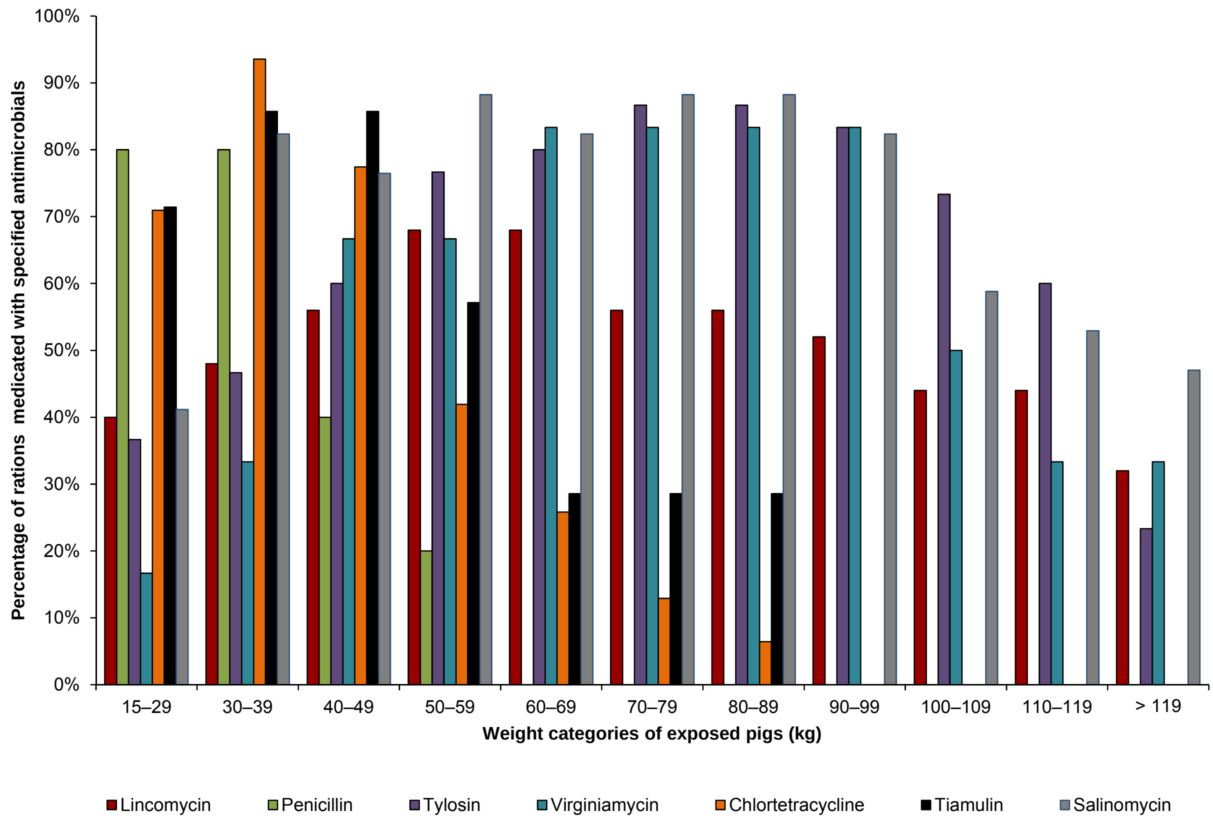
Figure 7 (cont'd). Percentage of rations medicated with specified antimicrobials fed over the grow-finish period by reported pig weights, 2011



	Antimicrobial	Number of medicated rations	Pig weight categories over the grow-finish period (kg)										
			15–29	30–39	40–49	50–59	60–69	70–79	80–89	90–99	100–109	110–119	> 119
II	Lincomycin	24	33%	54%	58%	67%	75%	67%	67%	67%	54%	50%	29%
	Penicillin	5	60%	100%	60%	40%	20%	0%	0%	0%	0%	0%	0%
	Tylosin	34	38%	47%	74%	88%	91%	94%	91%	85%	79%	62%	35%
III	Chlortetracycline	36	58%	86%	78%	42%	22%	17%	6%	3%	3%	3%	0%
	Tiamulin	6	33%	33%	67%	83%	50%	50%	17%	0%	0%	0%	0%
IV	Salinomycin	16	50%	81%	81%	94%	94%	94%	94%	88%	81%	44%	31%

Roman numerals II to IV indicate categories of importance to human medicine as outlined by the Veterinary Drugs Directorate.
Only antimicrobials used by 5% of herds or more in a given year are depicted in this figure.
Antimicrobials used in medicated rations by fewer than 5% of herds included: tilmicosin and virginiamycin (Category II); spectinomycin, and sulfamethazine (Category III); bambermycin (Category IV).

Figure 7 (cont'd). Percentage of rations medicated with specified antimicrobials fed over the grow-finish period by reported pig weights, 2012

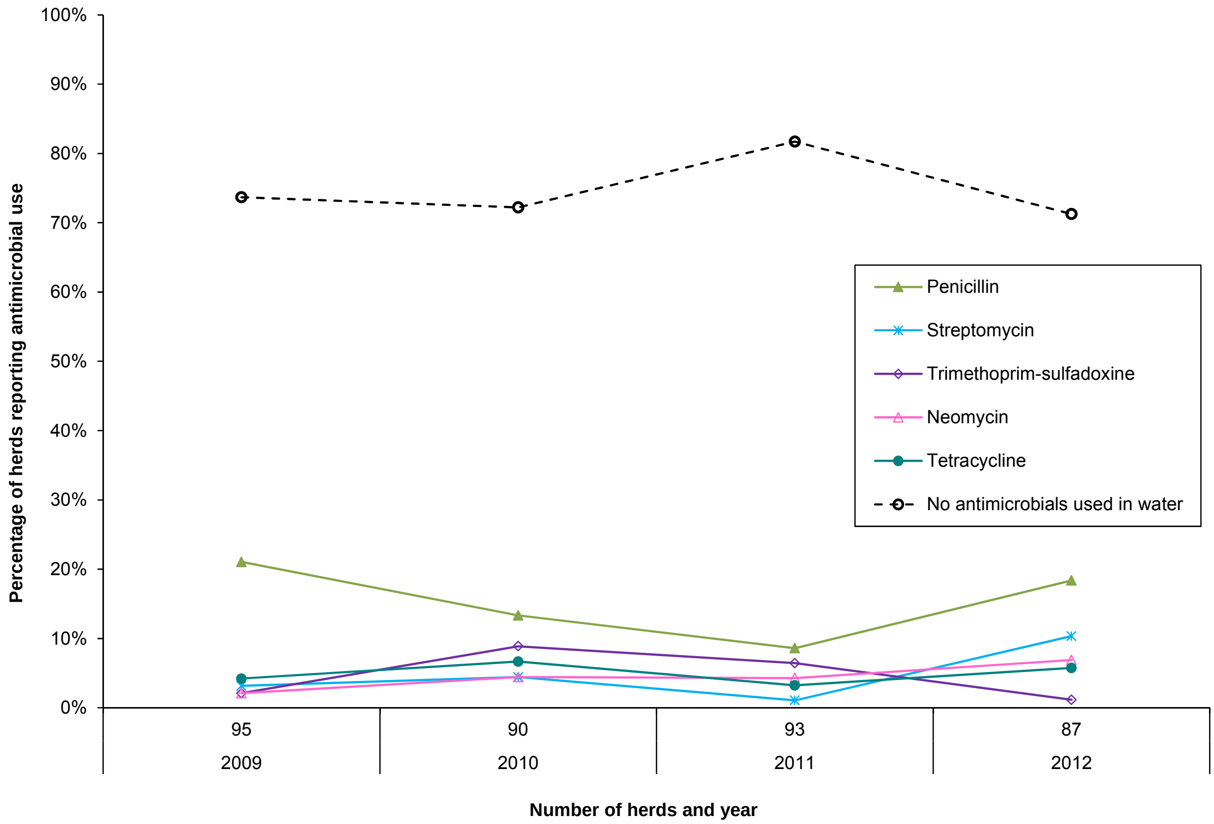


	Antimicrobial	Number of medicated rations	Pig weight categories over the grow-finish period (kg)										
			15–29	30–39	40–49	50–59	60–69	70–79	80–89	90–99	100–109	110–119	> 119
II	Lincomycin	25	40%	48%	56%	68%	68%	56%	56%	52%	44%	44%	32%
	Penicillin	5	80%	80%	40%	20%	0%	0%	0%	0%	0%	0%	0%
	Tylosin	30	37%	47%	60%	77%	80%	87%	87%	83%	73%	60%	23%
	Virginiamycin	6	17%	33%	67%	67%	83%	83%	83%	83%	50%	33%	33%
III	Chlortetracycline	31	71%	94%	77%	42%	26%	13%	6%	0%	0%	0%	0%
	Tiamulin	7	71%	86%	86%	57%	29%	29%	29%	0%	0%	0%	0%
IV	Salinomycin	17	41%	82%	76%	88%	82%	88%	88%	82%	59%	53%	47%

Roman numerals II to IV indicate categories of importance to human medicine as outlined by the Veterinary Drugs Directorate.
Only antimicrobials used by 5% of herds or more in a given year are depicted in this figure.
Antimicrobials used in medicated rations by fewer than 5% of herds included: tilmicosin (Category II); sulfamethazine (Category III); bambermycin (Category IV).

ANTIMICROBIAL USE IN WATER

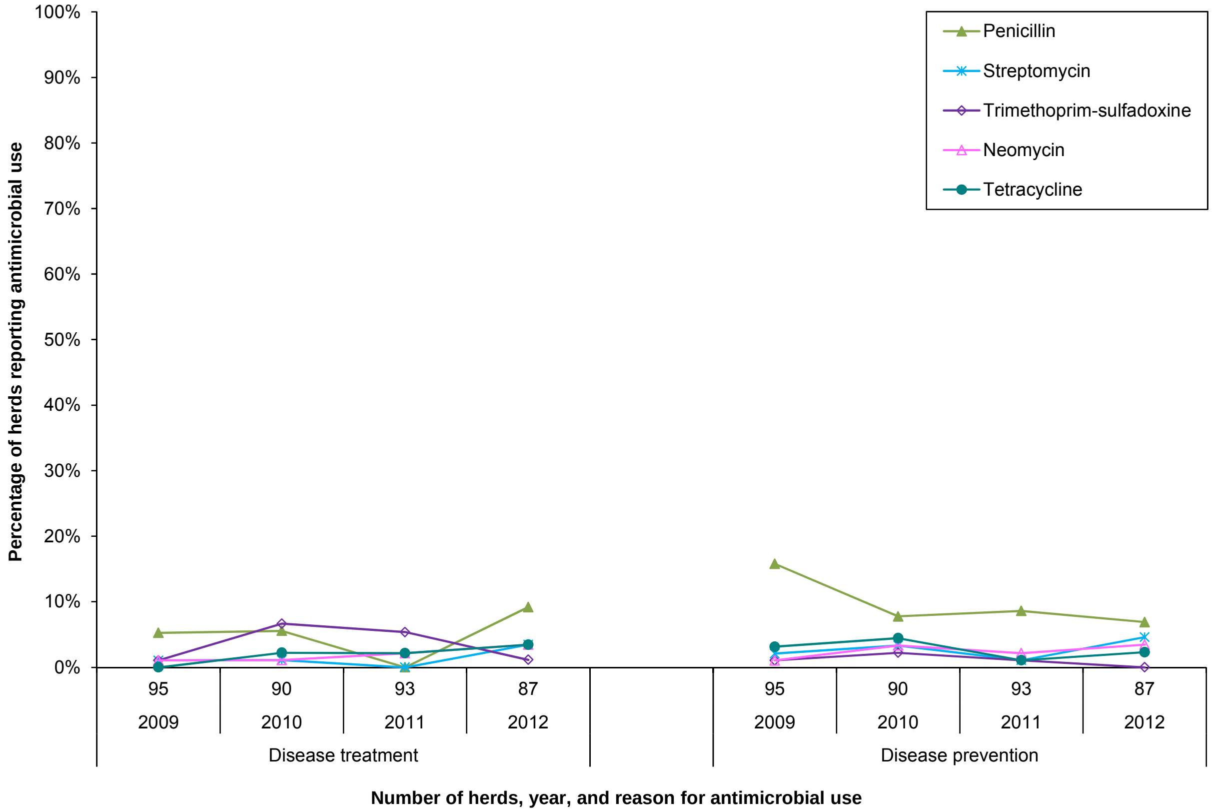
Figure 8. Percentage of pig herds reporting antimicrobial use in water, 2009–2012



	Year Number of herds	2009 95	2010 90	2011 93	2012 87
Antimicrobial					
II	Penicillin	21%	13%	9%	18%
II	Streptomycin	3%	4%	1%	10%
II	Trimethoprim-sulfadoxine	2%	9%	6%	1%
III	Neomycin	2%	4%	4%	7%
III	Tetracycline	4%	7%	3%	6%
	No antimicrobials used in water	74%	72%	82%	71%

Roman numerals II to III indicate categories of importance to human medicine as outlined by the Veterinary Drugs Directorate.
Only antimicrobials used by 5% of herds or more in a given year are depicted in this figure.
Antimicrobial use in water reported by fewer than 5% of herds included: lincomycin (Category II); sulfonamides (Category III).
For the temporal analyses, the proportion (%) of herds using a specific antimicrobial in the current year has been compared to the proportion (%) of herds using the same antimicrobial in 2009 and the previous surveillance year (grey areas). The presence of blue areas indicates significant differences ($P \leq 0.05$) for a given antimicrobial.

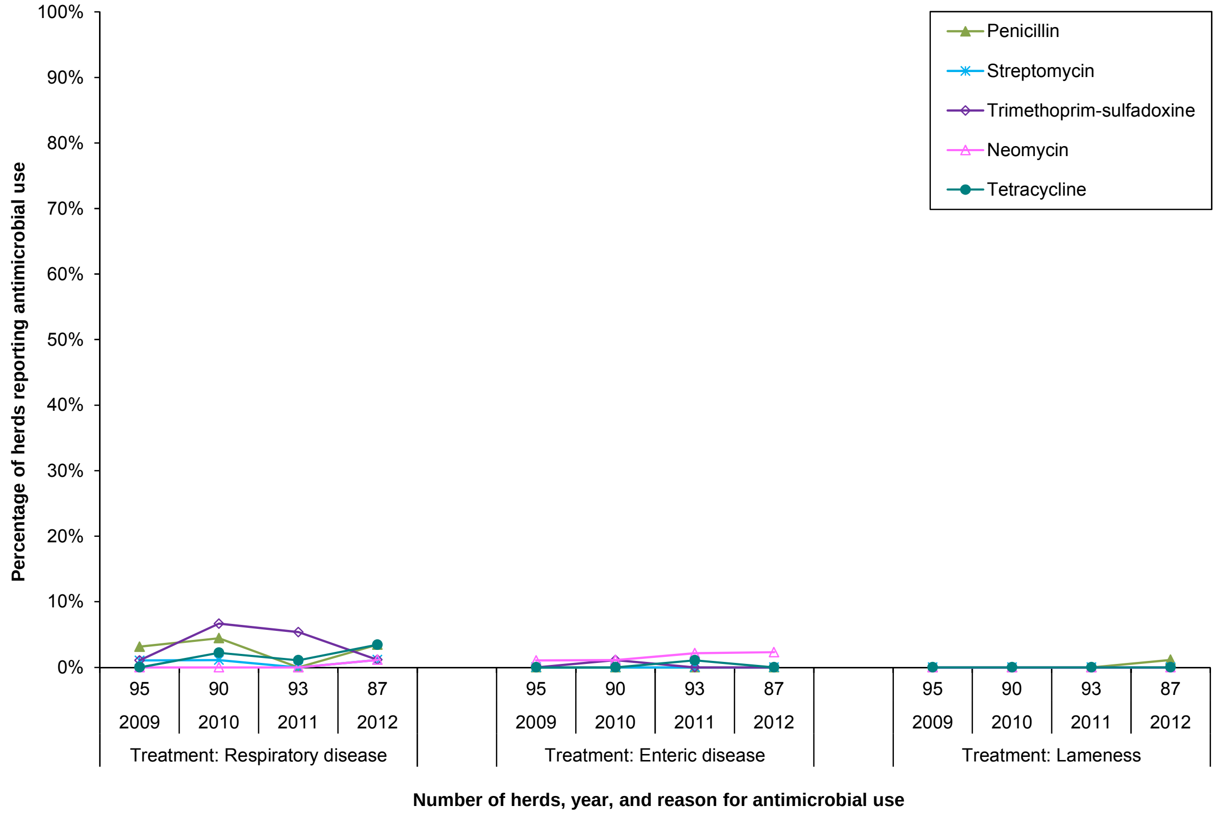
Figure 9. Percentage of pig herds reporting antimicrobial use in water, by primary reasons, 2009–2012



Reason for use		Disease treatment				Disease prevention			
Year		2009	2010	2011	2012	2009	2010	2011	2012
Number of herds		95	90	93	87	95	90	93	87
Antimicrobial									
II	Penicillin	5%	6%	0%	9%	16%	8%	9%	7%
II	Streptomycin	1%	1%	0%	3%	2%	3%	1%	5%
II	Trimethoprim-sulfadoxine	1%	7%	5%	1%	1%	2%	1%	0%
III	Neomycin	1%	1%	2%	3%	1%	3%	2%	3%
III	Tetracycline	0%	2%	2%	3%	3%	4%	1%	2%

Roman numerals II to III indicate categories of importance to human medicine as outlined by the Veterinary Drugs Directorate.
Respondents were instructed to select either "Disease treatment" or "Disease prevention" as a primary reason for use of an antimicrobial.
Only antimicrobials used by 5% of herds or more in a given year are depicted in this figure.
Antimicrobial use in water reported by fewer than 5% of herds included: lincomycin (Category II); sulfonamides (Category III).
For the temporal analyses, the proportion (%) of herds using a specific antimicrobial in the current year has been compared to the proportion (%) of herds using the same antimicrobial in 2009 and the previous surveillance year (grey areas). The presence of blue areas indicates significant differences ($P \leq 0.05$) for a given antimicrobial.

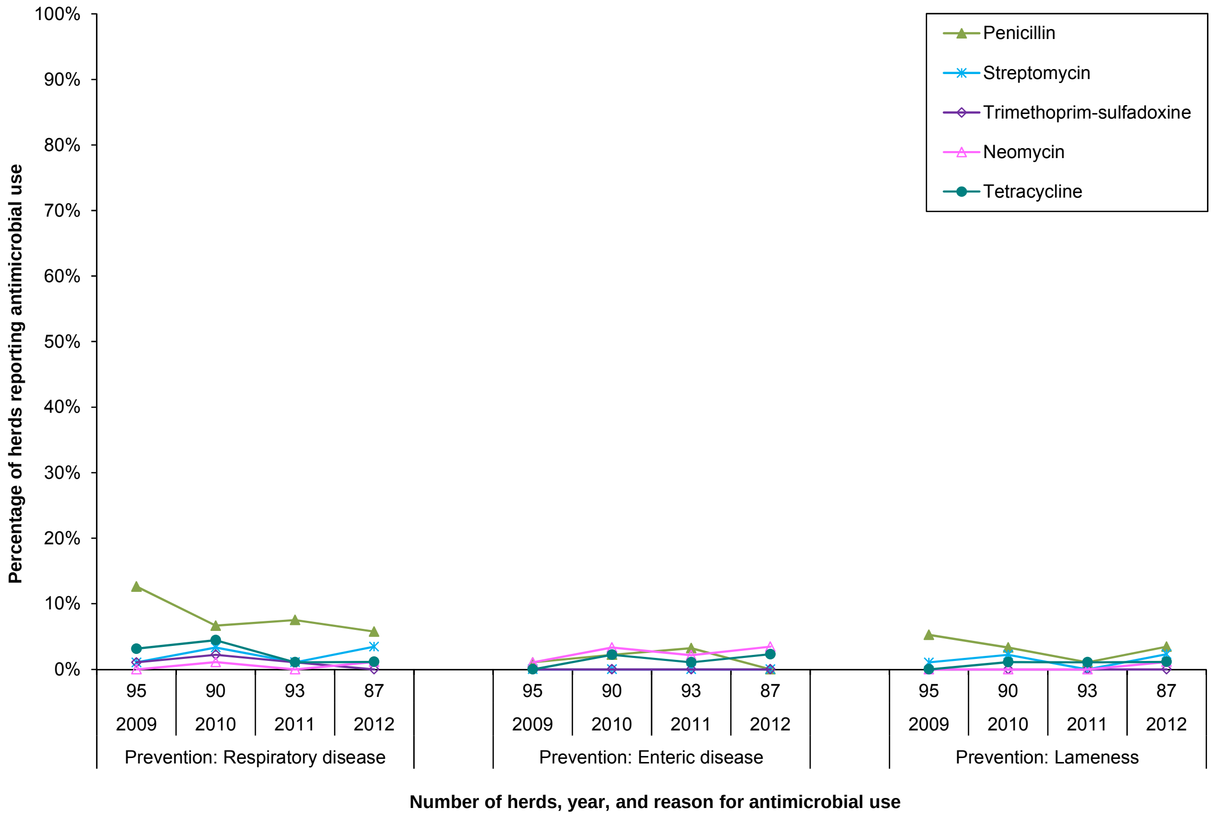
Figure 10. Percentage of pig herds reporting antimicrobial use in water, by reasons for use under *Disease Treatment*, 2009–2012



Reason for use		Traitement: Respiratory disease				Traitement: Enteric disease				Traitement: Lameness			
Year		2009	2010	2011	2012	2009	2010	2011	2012	2009	2010	2011	2012
Number of herds		95	90	93	87	95	90	93	87	95	90	93	87
Antimicrobial													
II	Penicillin	3%	4%	0%	3%	0%	0%	0%	0%	0%	0%	0%	1%
II	Streptomycin	1%	1%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
II	Trimethoprim-sulfadoxine	1%	7%	5%	1%	0%	1%	0%	0%	0%	0%	0%	0%
III	Neomycin	0%	0%	0%	1%	1%	1%	2%	2%	0%	0%	0%	0%
III	Tetracycline	0%	2%	1%	3%	0%	0%	1%	0%	0%	0%	0%	0%

Roman numerals II to III indicate categories of importance to human medicine as outlined by the Veterinary Drugs Directorate.
Respondents were instructed to "Check all that apply" from a list of secondary reasons for an antimicrobial use under "Treatment": "Respiratory disease", "Enteric disease", "Lameness", and "Other"
Only antimicrobials used by 5% of herds or more in a given year are depicted in this figure.
Antimicrobial use in water reported by fewer than 5% of herds included: lincomycin (Category II); sulfonamides (Category III).
For the temporal analyses, the proportion (%) of herds using a specific antimicrobial in the current year has been compared to the proportion (%) of herds using the same antimicrobial in 2009 and the previous surveillance year (grey areas). The presence of blue areas indicates significant differences ($P \leq 0.05$) for a given antimicrobial.

Figure 11. Percentage of pig herds reporting antimicrobial use in water, by reasons for use under *Disease Prevention*, 2009–2012



Reason for use		Prevention: Respiratory disease				Prevention: Enteric disease				Prevention: Lameness			
Year		2009	2010	2011	2012	2009	2010	2011	2012	2009	2010	2011	2012
Number of herds		95	90	93	87	95	90	93	87	95	90	93	87
Antimicrobial													
II	Penicillin	**13%**	7%	**8%**	**6%**	**1%**	2%	**3%**	**0%**	**5%**	3%	**1%**	**3%**
II	Streptomycin	**1%**	3%	**1%**	**3%**	**0%**	0%	**0%**	**0%**	**1%**	2%	**0%**	**2%**
II	Trimethoprim-sulfadoxine	**1%**	2%	**1%**	**0%**	**0%**	0%	**0%**	**0%**	**0%**	0%	**0%**	**0%**
III	Neomycin	**0%**	1%	**0%**	**1%**	**1%**	3%	**2%**	**3%**	**0%**	0%	**0%**	**1%**
III	Tetracycline	**3%**	4%	**1%**	**1%**	**0%**	2%	**1%**	**2%**	**0%**	1%	**1%**	**1%**

Roman numerals II to III indicate categories of importance to human medicine as outlined by the Veterinary Drugs Directorate.
Respondents were instructed to "Check all that apply" from a list of secondary reasons for an antimicrobial use under "Prevention": "Respiratory disease", "Enteric disease", "Lameness", and "Other".
Only antimicrobials used by 5% of herds or more in a given year are depicted in this figure.
Antimicrobial use in water reported by fewer than 5% of herds included: lincomycin (Category II); sulfonamides (Category III).
For the temporal analyses, the proportion (%) of herds using a specific antimicrobial in the current year has been compared to the proportion (%) of herds using the same antimicrobial in 2009 and the previous surveillance year (grey areas). The presence of blue areas indicates significant differences ($P \leq 0.05$) for a given antimicrobial.

Table 4. Frequency of antimicrobial use in water by the proportion of pigs exposed, 2009–2012

	Antimicrobial	Proportion of pigs exposed 1–25%	26–50%	51–75%	76–100%	Total
		Number of medicated water uses (% of total)				
II	Lincomycin	0 (0%)	1 (1%)	0 (0%)	1 (1%)	**2 (2%)**
II	Penicillin	0 (0%)	5 (4%)	2 (2%)	50 (38%)	**57 (43%)**
II	Streptomycin	0 (0%)	2 (2%)	0 (0%)	15 (11%)	**17 (13%)**
II	Trimethoprim	0 (0%)	2 (2%)	0 (0%)	15 (11%)	**17 (13%)**
III	Neomycin	0 (0%)	0 (0%)	1 (1%)	15 (11%)	**16 (12%)**
III	Spectinomycin	0 (0%)	0 (0%)	0 (0%)	1 (1%)	**1 (1%)**
III	Sulfonamide	1 (1%)	0 (0%)	0 (0%)	3 (2%)	**4 (3%)**
III	Tetracycline	0 (0%)	0 (0%)	0 (0%)	18 (14%)	**18 (14%)**
	Total	**1 (1%)**	**10 (8%)**	**3 (2%)**	**118 (89%)**	**132 (100%)**

Roman numerals II to III indicate categories of importance to human medicine as outlined by the Veterinary Drugs Directorate.

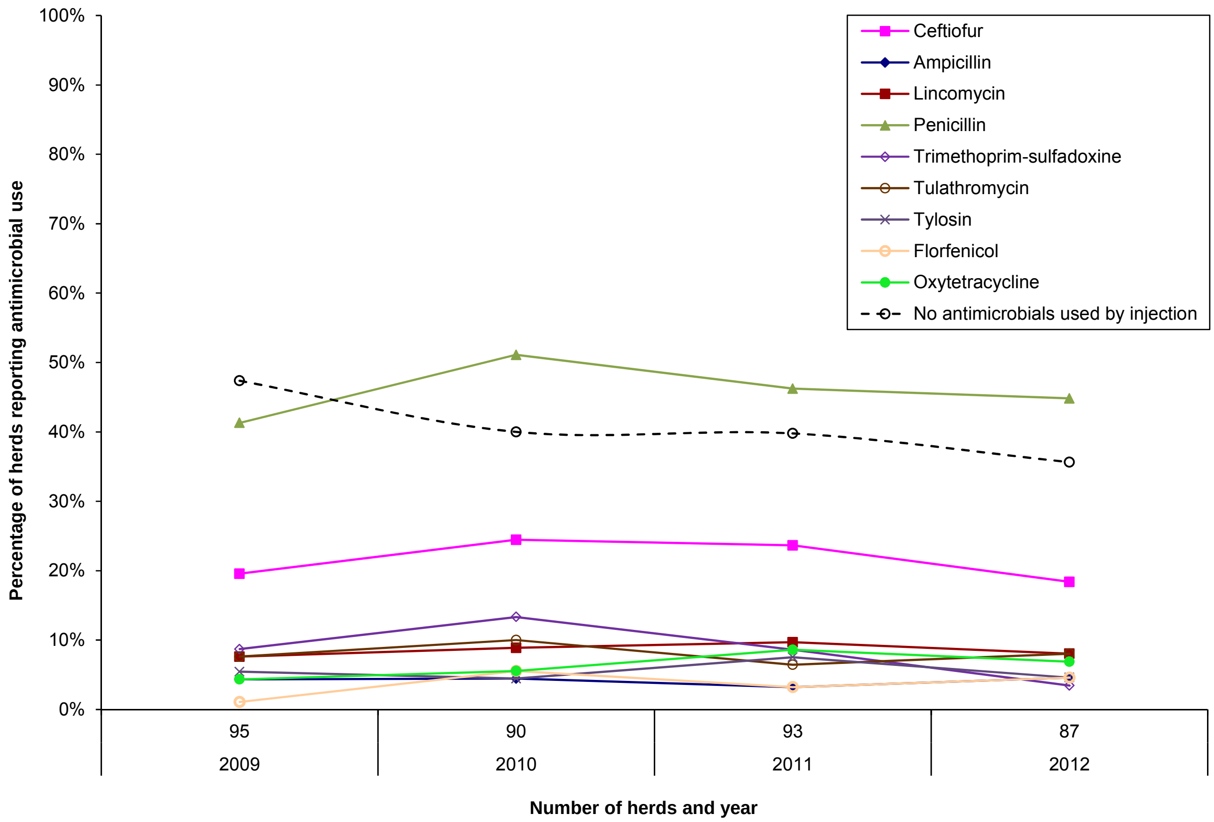
Table 5. Frequency of antimicrobial use in water by the proportion of pigs exposed, 2012

	Antimicrobial	Proportion of pigs exposed 1–25%	26–50%	51–75%	76–100%	Total
		Number of medicated water uses (% of total)				
II	Neomycin	0 (0%)	0 (0%)	0 (0%)	6 (16%)	**6 (16%)**
II	Penicillin	0 (0%)	3 (8%)	0 (0%)	13 (35%)	**16 (43%)**
II	Streptomycin	0 (0%)	2 (5%)	0 (0%)	7 (19%)	**9 (24%)**
II	Trimethoprim	0 (0%)	0 (0%)	0 (0%)	1 (3%)	**1 (3%)**
III	Tetracycline	0 (0%)	0 (0%)	0 (0%)	5 (14%)	**5 (14%)**
	Total	**0 (0%)**	**5 (14%)**	**0 (0%)**	**32 (86%)**	**37 (100%)**

Roman numerals II to III indicate categories of importance to human medicine as outlined by the Veterinary Drugs Directorate.

ANTIMICROBIAL USE BY INJECTION

Figure 12. Percentage of pig herds reporting antimicrobial use by injection, 2009–2012



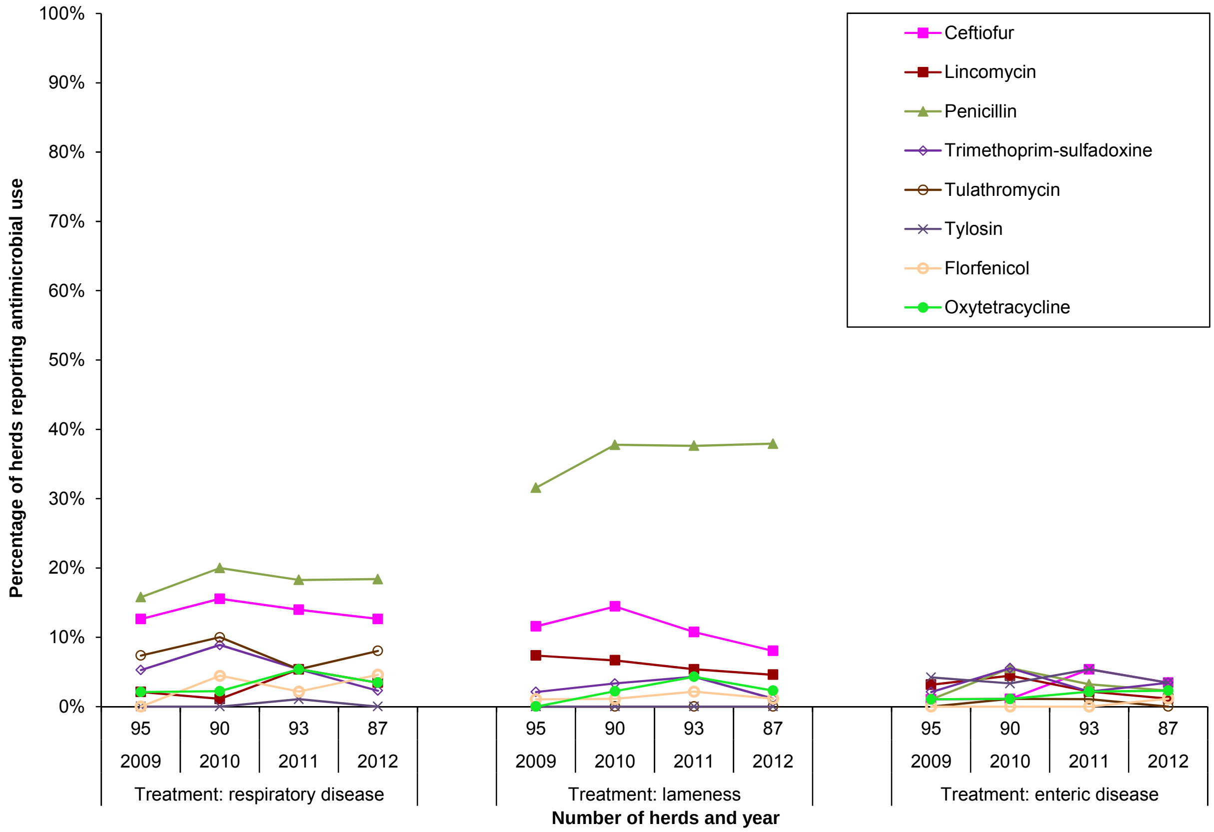
Year / Number of herds		2009 / 95	2010 / 90	2011 / 93	2012 / 87
Antimicrobial					
I	Ceftiofur	20%	24%	24%	18%
I	Ampicillin	4%	4%	3%	5%
II	Lincomycin	8%	9%	10%	8%
II	Penicillin	41%	51%	46%	45%
II	Trimethoprim-sulfadoxine	9%	13%	9%	3%
II	Tulathromycin	8%	10%	6%	8%
II	Tylosin	5%	4%	8%	5%
III	Florfenicol	1%	6%	3%	5%
III	Oxytetracycline	4%	6%	9%	7%
	No antimicrobials used by injection	47%	40%	40%	36%

Roman numerals I to III indicate categories of importance to human medicine as outlined by the Veterinary Drugs Directorate.

Only antimicrobials used by 5% of herds or more in a given year are depicted in this figure.

For the temporal analyses, the proportion (%) of herds using a specific antimicrobial in the current year has been compared to the proportion (%) of herds using the same antimicrobial in 2009 and the previous surveillance year (grey areas). The presence of blue areas indicates significant differences ($P \leq 0.05$) for a given antimicrobial.

Figure 13. Percentage of pig herds reporting antimicrobial use by injection, by reasons for use under *Disease Treatment*, 2009–2012



	Reason for use	Treatment: respiratory disease				Treatment: lameness				Treatment: enteric disease			
	Year	2009	2010	2011	2012	2009	2010	2011	2012	2009	2010	2011	2012
	Number of herds	95	90	93	87	95	90	93	87	95	90	93	87
Antimicrobial													
I	Ceftiofur	13%	16%	14%	13%	12%	14%	11%	8%	1%	1%	5%	3%
II	Lincomycin	2%	1%	5%	3%	7%	7%	5%	5%	3%	4%	2%	1%
	Penicillin	16%	20%	18%	18%	32%	38%	38%	38%	1%	6%	3%	2%
	Trimethoprim-sulfadoxine	5%	9%	5%	2%	2%	3%	4%	1%	2%	6%	2%	3%
	Tulathromycin	7%	10%	5%	8%	0%	0%	0%	0%	0%	1%	1%	0%
	Tylosin	0%	0%	1%	0%	0%	0%	0%	0%	4%	3%	5%	3%
III	Florfenicol	0%	4%	2%	5%	1%	1%	2%	1%	0%	0%	0%	1%
	Oxytetracycline	2%	2%	5%	3%	0%	2%	4%	2%	1%	1%	2%	2%

Roman numerals I to III indicate categories of importance to human medicine as outlined by the Veterinary Drugs Directorate.
Respondents were instructed to "Check all that apply" from a list of reasons for an antimicrobial use: "Respiratory disease", "Enteric disease", "Lameness", and "Other ".
Only antimicrobials used by 5% of herds or more in a given year are depicted in this figure.
Antimicrobials used by fewer than 5 % of herds included: Ampicillin, erythromycin, and tiamulin (Category II); spectinomycin (Category III).
For the temporal analyses, the proportion (%) of herds using a specific antimicrobial in the current year has been compared to the proportion (%) of herds using the same antimicrobial in 2009 and the previous surveillance year (grey areas). The presence of blue areas indicates significant differences ($P \leq 0.05$) for a given antimicrobial.

Table 6. Frequency of antimicrobial treatments by injection, by the proportion of pigs exposed, 2009–2012

	Antimicrobial	Proportion of pigs exposed < 5%	6–25%	26–50%	51–75%	76–100%	Total
		Number of medicated water uses (% of total)					
I	Ceftiofur	71 (17)	6 (1)	0 (0)	0 (0)	1 (0)	**78 (19)**
II	Ampicillin	15 (4)	0 (0)	0 (0)	0 (0)	0 (0)	**15 (4)**
	Erythromycin	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	**1 (0)**
	Lincomycin	30 (7)	1 (0)	0 (0)	0 (0)	0 (0)	**31 (8)**
	Penicillin	157 (38)	9 (2)	1 (0)	1 (0)	0 (0)	**168 (41)**
	Trimethoprim-sulfadoxine	28 (7)	3 (1)	0 (0)	0 (0)	0 (0)	**31 (8)**
	Tulathromycin	27 (7)	2 (0)	0 (0)	0 (0)	0 (0)	**29 (7)**
	Tylosin	20 (5)	0 (0)	0 (0)	0 (0)	0 (0)	**20 (5)**
III	Florfenicol	10 (2)	3 (1)	0 (0)	0 (0)	0 (0)	**13 (3)**
	Oxytetracycline	23 (6)	0 (0)	0 (0)	0 (0)	0 (0)	**23 (6)**
	Spectinomycin	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	**1 (0)**
	Tiamulin	2 (0)	0 (0)	0 (0)	0 (0)	0 (0)	**2 (0)**
	Total	**385 (93)**	**24 (6)**	**1 (0)**	**1 (0)**	**1 (0)**	**412 (100)**

Roman numerals I to III indicate categories of importance to human medicine as outlined by the Veterinary Drugs Directorate.

Table 7. Frequency of antimicrobial treatments by injection, by the proportion of pigs exposed, 2012

	Antimicrobial	Proportion of pigs exposed < 5%	6–25%	26–50%	51–75%	76–100%	Total
		Number of medicated water uses (% of total)					
I	Ceftiofur	14 (15)	2 (2)	0 (0)	0 (0)	0 (0)	**16 (17)**
II	Ampicillin	4 (4)	0 (0)	0 (0)	0 (0)	0 (0)	**4 (4)**
	Lincomycin	7 (8)	0 (0)	0 (0)	0 (0)	0 (0)	**7 (8)**
	Penicillin	36 (39)	2 (2)	1 (1)	0 (0)	0 (0)	**39 (42)**
	Trimethoprim-sulfadoxine	3 (3)	0 (0)	0 (0)	0 (0)	0 (0)	**3 (3)**
	Tulathromycin	7 (8)	0 (0)	0 (0)	0 (0)	0 (0)	**7 (8)**
	Tylosin	4 (4)	0 (0)	0 (0)	0 (0)	0 (0)	**4 (4)**
III	Florfenicol	3 (3)	1 (1)	0 (0)	0 (0)	0 (0)	**4 (4)**
	Oxytetracycline	6 (7)	0 (0)	0 (0)	0 (0)	0 (0)	**6 (7)**
	Spectinomycin	1 (1)	0 (0)	0 (0)	0 (0)	0 (0)	**1 (1)**
	Tiamulin	1 (1)	0 (0)	0 (0)	0 (0)	0 (0)	**1 (1)**
	Total	**86 (93)**	**5 (5)**	**1 (1)**	**0 (0)**	**0 (0)**	**92 (100)**

Roman numerals I to III indicate categories of importance to human medicine as outlined by the Veterinary Drugs Directorate.

SURVEILLANCE OF THE QUANTITIES OF ANTIMICROBIALS DISTRIBUTED FOR SALE FOR USE IN ANIMALS

KEY FINDINGS

- In 2012, 1.6 million kilograms of antimicrobials were distributed for sale by CAHI member companies for use in animals in Canada; a decrease by 8% relative to the 2006 total and increased by 3% relative to the 2011 total (Table 8).
- Of the 1.6 million kg, 30% were in Category IV (Low importance in human medicine) or not categorized according to human health importance; these included ionophore coccidiostats, chemical coccidiostats, and arsenicals (Table 8 and Figure 14).
- The predominant classes of antimicrobials distributed for sale in 2012 based on kilograms of active ingredient were the tetracyclines, ionophores, β-lactams, "other antimicrobials"[9], and the macrolides (Table 8 and Figure 14).
- The quantity of fluoroquinolones distributed for use in animals in 2012 decreased by 31% relative to the 2006 total and decreased by 22% relative to the 2011 total (based on kilograms of active ingredient; Table 8).
- In 2012, the quantity of antimicrobials distributed for use in companion animals represented 0.6% of the total antimicrobials distributed for sale (Table 9). Antimicrobials distributed for sale for use in companion animal were mostly cephalosporins, β-lactams and sulfonamides including trimethoprim, while production animals were mostly tetracyclines, ionophores, and β-lactams.
- Regardless of population sizes, the quantity of fluoroquinolones distributed for use in companion animals (215 kg) was higher than the quantity distributed for production animals (191 kg) (Table 9).
- Provincial differences were observed between the quantities of antimicrobials distributed for sale (Table 10, Figure 15, and Figure 16). These differences could be related to different numbers and types of animals in each province, differences in disease pressure, or differences in antimicrobial use practices. The quantities reported per province reflect the quantities distributed to veterinary clinics, feed mills, and over-

[9] Bacitracins, bambermycin, chloramphenicol, clavulanic acid, florfenicol, nitrofurantoin, nitrofurazone, novobiocin, ormethoprim, polymyxin, tiamulin, and virginiamycin.

the-counter outlets by CAHI member companies. There may be subsequent re-distribution of antimicrobials across provincial borders after this point.

- The animal biomass (number and weight of animals—the population correction unit) in Canada has decreased 15% overall since 2006 (Figure 17).
- Comparing the 2012 animal biomass to 2006, the respective declines in the PCU were as follows: cattle 21%, swine 12%, poultry 4%, sheep and goats 1%, horses 8%. Fish have increased by 1% and rabbits have increased by 7% (Figure 17).
- Including data on companion animals in the numerator, the mg/PCU in 2012 increased by 2% compared to the 2006 total and increased by 1% in comparison to the 2011 total (Figure 18).
- For international comparison, the European Surveillance of Veterinary Antimicrobial Consumption (ESVAC), at the time of writing, had data available for 26 member countries for 2012[10]. In comparison to the countries reporting to the ESVAC network, Canada ranked 4th for PCU in 2012, lower than France, Germany, and Spain which had the highest levels of PCU.
- When compared to the countries participating in the ESVAC network for 2012, for the mg/PCU, Canada was 21st out of 27 countries (Figure 19), when ranked from smallest to highest mg/PCU. However, ESVAC excludes tablets (which they state are almost solely used in companion animals)[10]. Canada's ranking would change however if OUI/API were accounted for; if OUI/API were accounted for, this would increase Canada's use (numerator) and Canada would then rank relatively higher.
- A new macrolide molecule was registered in Canada in 2012; the volume is reported in the 2012 data.

[10] European Medicines Agency, European Surveillance of Veterinary Antimicrobial Consumption, 2014. Sales of veterinary antimicrobial agents in 26 EU/EEA countries in 2012. (EMA/333921/2014). www.ema.europa.eu/docs/en_GB/document_library/Report/2014/10/WC500175671.pdf; Accessed Nov. 30, 2014.

NATIONAL-LEVEL ANTIMICROBIAL DISTRIBUTION DATA

Table 8. Quantity of antimicrobials in dosage form distributed in Canada for sale for use in animals, 2006–2012

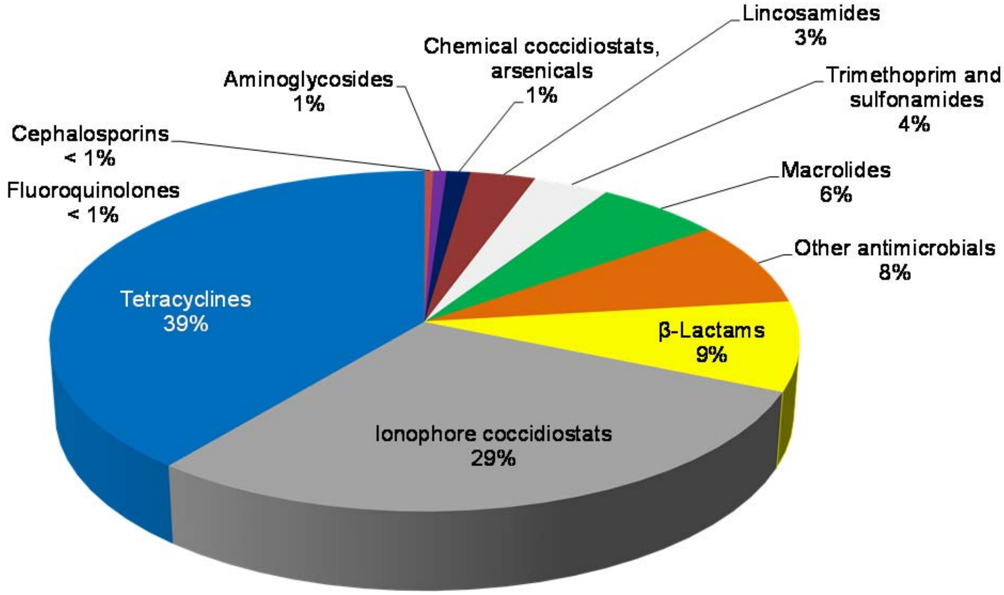
Antimicrobial class aggregation	Quantity of active ingredient (kg)							Change (%) from	Change (%) from
	2006	2007	2008	2009	2010	2011	2012	2006 to 2012	2011 to 2012
Aminoglycosides	5,122	4,302						NA	NA
			5,817	4,652	3,961			NA	NA
						12,250	10,372	NA	-15%
Amphenicols	NA	NA	3,242	4,001	4,391	NA	NA	NA	NA
β-Lactams	58,538	52,594						NA	NA
			109,153	118,109	201,934			NA	NA
						147,908		NA	NA
							136,611	NA	NA
Cephalosporins	702	850	NA	NA	NA			NA	NA
						6,725	6,388	NA	-0.05
Fluoroquinolones	591	443	411	377	381	519	406	-31%	-22%
Ionophores, chemical anticoccidials, and arsenicals[a]	455,753	445,952	NA	NA	NA	NA	NA	NA	NA
Ionophores, chemical anticoccidials, arsenicals, and nitroimidazoles[a]			472,384	491,152	490,355	NA	NA	NA	NA
Chemical coccidiostats and arsenicals[a]	NA	NA	NA	NA	NA	22,372		NA	NA
							18,471	NA	NA
Ionophore coccidiostats[a]	NA	NA	NA	NA	NA	433,897		NA	NA
							473,595	NA	NA
Lincosamides	67,825	55,872	41,222	44,137	46,373	43,261	51,027	-25%	18%
Macrolides and pleuromutilins	136,497	118,725	NA	NA	NA	NA	NA	NA	NA
Macrolides, pleuromutilins, and bacitracins	NA	NA	210,869	204,169	170,154	NA	NA	NA	NA
Macrolides	NA	NA	NA	NA	NA	108,862	98,622	NA	-9%
Other antimicrobials	143,029	146,880						NA	NA
			32,706	21,339	26,757			NA	NA
						130,911		NA	NA
							129,614	NA	NA
Tetracyclines	847,281	753,168	680,601	686,832	535,142	600,930	635,435	-25%	6%
Trimethoprim and sulfonamides	50,789	38,961	59,166	57,596	48,221	70,465	58,716	16%	-17%
Total	**1,766,126**	**1,617,748**	**1,615,571**	**1,632,365**	**1,527,669**	**1,578,100**	**1,619,257**	**-8%**	**3%**

See corresponding footnotes on next page.

Table 8. Quantity of antimicrobials in dosage form distributed in Canada for sale for use in animals, 2006–2012 (cont'd)

Values do not include own use imports or active pharmaceutical ingredients used in compounding.
NA = Not available or no longer applicable.
CAHI provides the information according to a “3 company accounting rule” established by CAHI to comply with the European Union and the United States' anti-competition regulations. CAHI added in some cases a “90% rule” to be sure not to infringe the regulations in the United States. These accounting rules can result in changes to the categorization of specific antimicrobials over time; hence within an antimicrobial category, columns with different colours should not be compared.
Changes in percentage over time from 2006 to 2012 are relative to the quantities reported in 2006. Changes in percentage over time from 2011 to 2012 are relative to the quantities reported in 2011.
"Other antimicrobials" for 2012 included: bacitracin, bambermycin, chloramphenicol, clavulanic acid, florfenicol, nitrofurantoin, nitrofurazone, novobiocin, ormethoprim, polymyxin, tiamulin, and virginiamycin.
[a] These antimicrobial classes are considered of low importance to human medicine (Category IV) as outlined by the Health Canada's Veterinary Drugs Directorate.

Figure 14. Percentages of the quantities (kg of active ingredient) of antimicrobials in dosage form distributed in Canada for sale for use in animals, 2012



Values do not include own use imports or active pharmaceutical ingredients used in compounding.
"Other antimicrobials" for 2012 included: bacitracin, bambermycin, chloramphenicol, clavulanic acid, florfenicol, nitrofurantoin, nitrofurazone, novobiocin, ormethoprim, polymyxin, tiamulin, and virginiamycin.

Table 9. Quantity of antimicrobials distributed for sale for use, by animal type, 2012

Antimicrobial class	Production animal (kg)	Companion animal (kg)	Total (animal type combined)
Aminoglycosides	10,356	17	10,373
β-Lactams and penicillins	133,223	3,388	136,611
Cephalosporins	2,440	3,948	6,388
Fluoroquinolones	191	215	406
Ionophore coccidiostats, chemical coccidiostats, and arsenicals	492,066	0	492,066
Lincosamides	50,925	102	51,027
Macrolides	98,622	0	98,622
Other antimicrobials	128,694	920	129,614
Sulfonamides and trimethoprim	57,571	1,145	58,716
Tetracyclines	635,435	0	635,435
Total	1,609,522	9,735	**1,619,257**
Percentage (%) of total use that is companion animals			**0.60**

Values do not include own use imports or active pharmaceutical ingredients used in compounding.
Production animals include horses.
"Other antimicrobials" for 2012 included: bacitracin, bambermycin, chloramphenicol, clavulanic acid, florfenicol, nitrofurantoin, nitrofurazone, novobiocin, ormethoprim, polymyxin, tiamulin, and virginiamycin.
The attribution of antimicrobials sold in each province to each animal type (companion animals or production animals) was based on multiplying a national average percentage of the antimicrobial sold for companion animals or production animals by the total reported in that province.

PROVINCIAL-LEVEL ANTIMICROBIAL DISTRIBUTION DATA

Table 10. Quantity of antimicrobials (kg) distributed for sale for use in animals, by province and animal type, 2012

Animal type /province	Aminoglycosides	B-Lactams and penicillin	Cephalosporins	Fluoroquinolones	Chemical coccidiostats	Ionophores	Lincosamides	Macrolides	Other antimicrobials	Tetracyclines	Trimethoprim and sulfonamides	Total
Production animal												
BC	597	9,719	251	20	1,017	26,973	81	454	17,133	15,233	2,059	73,536
AB	642	20,420	421	41	1,745	181,282	6,907	30,355	14,489	113,282	10,043	379,628
SK	294	5,314	87	3	300	27,290	4,572	2,939	5,024	28,622	3,140	77,584
MB	673	15,659	154	10	1,001	34,213	13,149	11,434	9,219	84,755	7,410	177,677
ON	3,007	52,691	859	81	5,436	113,602	11,772	23,651	37,467	114,729	20,106	383,400
QC	4,168	25,670	526	30	8,430	78,308	14,049	29,163	27,550	236,532	13,892	438,319
NS	519	1,584	76	3	489	7,658	48	590	7,518	31,534	546	50,565
NB	116	1,299	38	2	52	720	342	11	1,053	4,018	200	7,850
PEI	45	487	13	1	2	0	3	7	685	2,382	115	3,740
NL	293	382	15	1	0	3,549	2	18	8,555	4,347	61	17,224
Total	**10,356**	**133,223**	**2,440**	**191**	**18,471**	**473,595**	**50,925**	**98,622**	**128,694**	**635,435**	**57,571**	**1,609,522**
Companion animal												
BC	1	247	406	22	0	0	0	0	123	0	41	840
AB	1	519	681	47	0	0	14	0	104	0	200	1,565
SK	0	135	141	3	0	0	9	0	36	0	62	388
MB	1	398	250	11	0	0	26	0	66	0	147	900
ON	5	1,340	1,390	91	0	0	24	0	268	0	400	3,517
QC	7	653	850	34	0	0	28	0	197	0	276	2,045
NS	1	40	123	4	0	0	0	0	54	0	11	232
NB	0	33	61	2	0	0	1	0	8	0	4	109
PEI	0	12	21	1	0	0	0	0	5	0	2	41
NL	0	10	25	1	0	0	0	0	61	0	1	98
Total	**17**	**3,388**	**3,948**	**215**	**0**	**0**	**102**	**0**	**920**	**0**	**1,145**	**9,735**
Total (animal types combined)												
	10,372	**136,611**	**6,388**	**406**	**18,471**	**473,595**	**51,027**	**98,622**	**129,614**	**635,435**	**58,716**	**1,619,257**

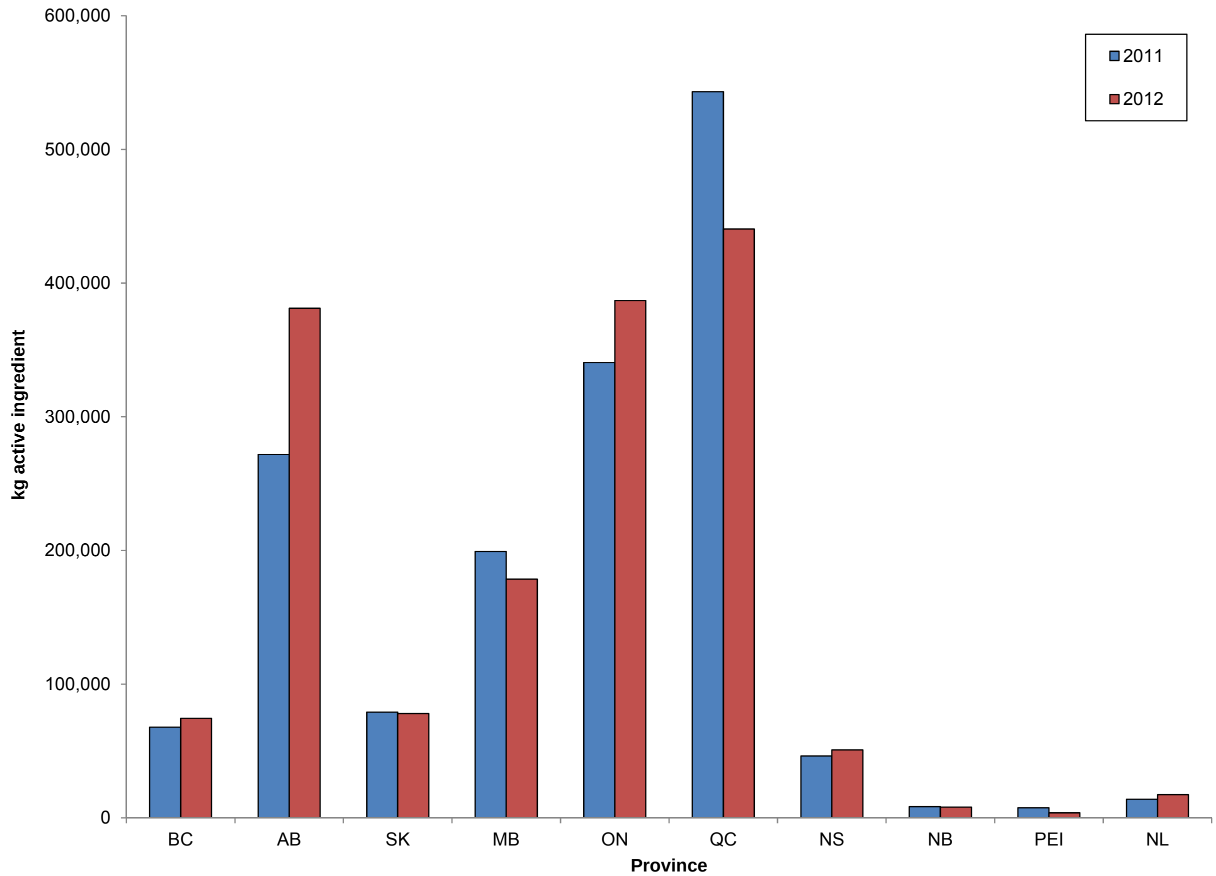
Values do not include own use imports or active pharmaceutical ingredients used in compounding.
There may be subsequent distribution of antimicrobials across provincial borders after being distributed to the veterinary clinics.
"Other antimicrobials" for 2012 included: bacitracin, bambermycin, chloramphenicol, clavulanic acid, florfenicol, nitrofurantoin, nitrofurazone, novobiocin, ormethoprim, polymyxin, tiamulin, and virginiamycin.
British Columbia (BC), Alberta (AB), Saskatchewan (SA), Manitoba (MB), Ontario (ON), Québec (QC), Nova Scotia (NS), New Brunswick (NB), Prince Edward Island (PEI), and Newfoundland and Labrador (NL).

Table 11. Quantity of antimicrobials (kg) distributed for sale for use in animals, by province, 2011–2012

Year	Animal Type / Province	Aminoglycosides	B-Lactams and penicillin	Cephalosporins	Fluoroquinolones	Chemical coccidiostats	Ionophores	Lincosamides	Macrolides	Other antimicrobials	Tetracyclines	Trimethoprim and sulfonamides	Total
	Animal types combined												
	BC	598	9,966	658	42	1,017	26,973	81	454	17,255	15,233	2,100	74,376
	AB	643	20,939	1,102	88	1,745	181,282	6,921	30,355	14,592	113,282	10,242	381,193
	SK	294	5,449	229	6	300	27,290	4,581	2,939	5,060	28,622	3,203	77,971
	MB	674	16,057	404	21	1,001	34,213	13,175	11,434	9,285	84,755	7,557	178,577
2012	ON	3,012	54,031	2,248	172	5,436	113,602	11,796	23,651	37,735	114,729	20,505	386,917
	QC	4,175	26,322	1,376	65	8,430	78,308	14,077	29,163	27,747	236,532	14,168	440,364
	NS	520	1,624	199	7	489	7,658	48	590	7,572	31,534	556	50,797
	NB	116	1,332	99	4	52	720	343	11	1,060	4,018	203	7,959
	PEI	46	499	34	1	2	0	3	7	690	2,382	117	3,781
	NL	294	391	40	2	0	3,549	2	18	8,617	4,347	62	17,322
Total		**10,372**	**136,611**	**6,388**	**406**	**18,471**	**473,595**	**51,027**	**98,622**	**129,614**	**635,435**	**58,716**	**1,619,257**
	Animal types combined												
	BC	775	11,690	583	50	1,190	24,089	113	827	15,186	10,371	2,881	67,755
	AB	930	22,497	1,190	137	2,338	71,682	6,711	41,567	13,015	97,868	13,853	271,788
	SK	206	6,112	308	15	1,294	22,369	4,821	5,187	4,600	28,401	5,786	79,099
	MB	1,117	17,896	501	22	928	57,400	9,849	14,326	7,119	80,852	9,156	199,166
2011	ON	3,448	54,305	1,938	206	4,433	89,954	8,410	13,326	39,170	105,905	19,388	340,483
	QC	4,443	30,277	1,881	73	9,330	156,118	12,952	32,275	34,709	242,951	18,126	543,135
	NS	614	1,919	140	9	2,742	8,577	48	615	8,875	22,069	684	46,292
	NB	156	2,244	98	4	117	666	351	566	945	2,915	267	8,329
	PEI	60	531	40	1	0	1,271	0	153	586	4,626	197	7,465
	NL	493	382	37	2	0	1,206	1	16	6,694	4,960	116	13,907
Total		**12,242**	**147,853**	**6,716**	**519**	**22,372**	**433,332**	**43,256**	**108,858**	**130,899**	**600,918**	**70,454**	**1,577,419**

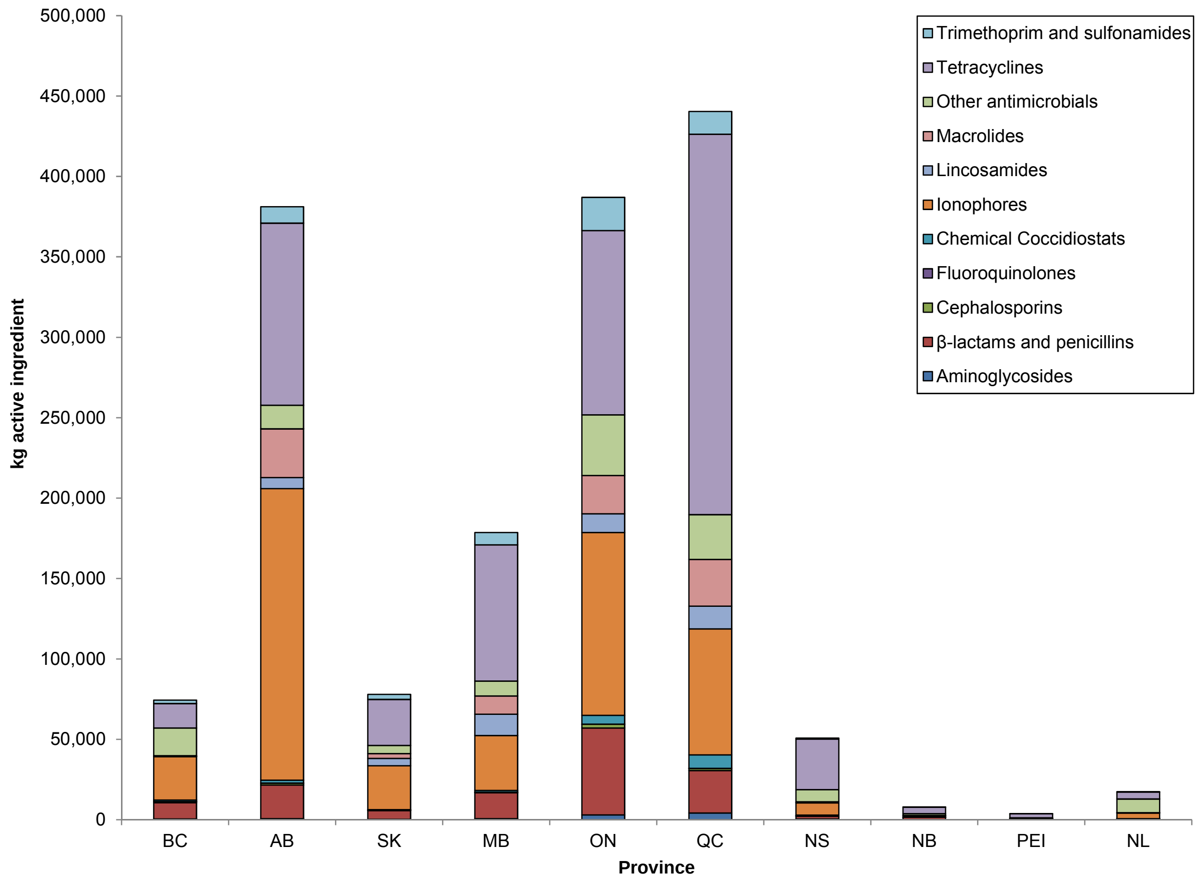
Values do not include own use imports or active pharmaceutical ingredients used in compounding.
There may be subsequent distribution of antimicrobials across provincial borders after being distributed to the veterinary clinics.
"Other antimicrobials" for 2012 included: bacitracin, bambermycin, chloramphenicol, clavulanic acid, florfenicol, nitrofurantoin, nitrofurazone, novobiocin, ormethoprim, polymixin, tiamulin, and virginiamycin.
British Columbia (BC), Alberta (AB), Saskatchewan (SA), Manitoba (MB), Ontario (ON), Québec (QC), Nova Scotia (NS), New Brunswick (NB), Prince Edward Island (PEI), and Newfoundland and Labrador (NL).

Figure 15. Quantity of antimicrobials distributed for sale for use in animals, by province, 2011–2012



Values do not include own use imports or active pharmaceutical ingredients used in compounding.
There may be subsequent distribution of antimicrobials across provincial borders after being distributed to the veterinary clinics.
This figure does not account for provincial differences in numbers or types of animals.
British Columbia (BC), Alberta (AB), Saskatchewan (SA), Manitoba (MB), Ontario (ON), Québec (QC), Nova Scotia (NS), New Brunswick (NB), Prince Edward Island (PEI), and Newfoundland and Labrador (NL).

Figure 16. Quantity of antimicrobials distributed for use in animals by province and antimicrobial class, 2012



Values do not include own use imports or active pharmaceutical ingredients used in compounding.
There may be subsequent distribution of antimicrobials across provincial borders after being distributed to the veterinary clinics.
This figure does not account for provincial differences in numbers or types of animals.
"Other antimicrobials" for 2012 included: bacitracin, bambermycin, chloramphenicol, clavulanic acid, florfenicol, nitrofurantoin, nitrofurazone, novobiocin, ormethoprim, polymyxin, tiamulin, and virginiamycin.
British Columbia (BC), Alberta (AB), Saskatchewan (SA), Manitoba (MB), Ontario (ON), Québec (QC), Nova Scotia (NS), New Brunswick (NB), Prince Edward Island (PEI), and Newfoundland and Labrador (NL).

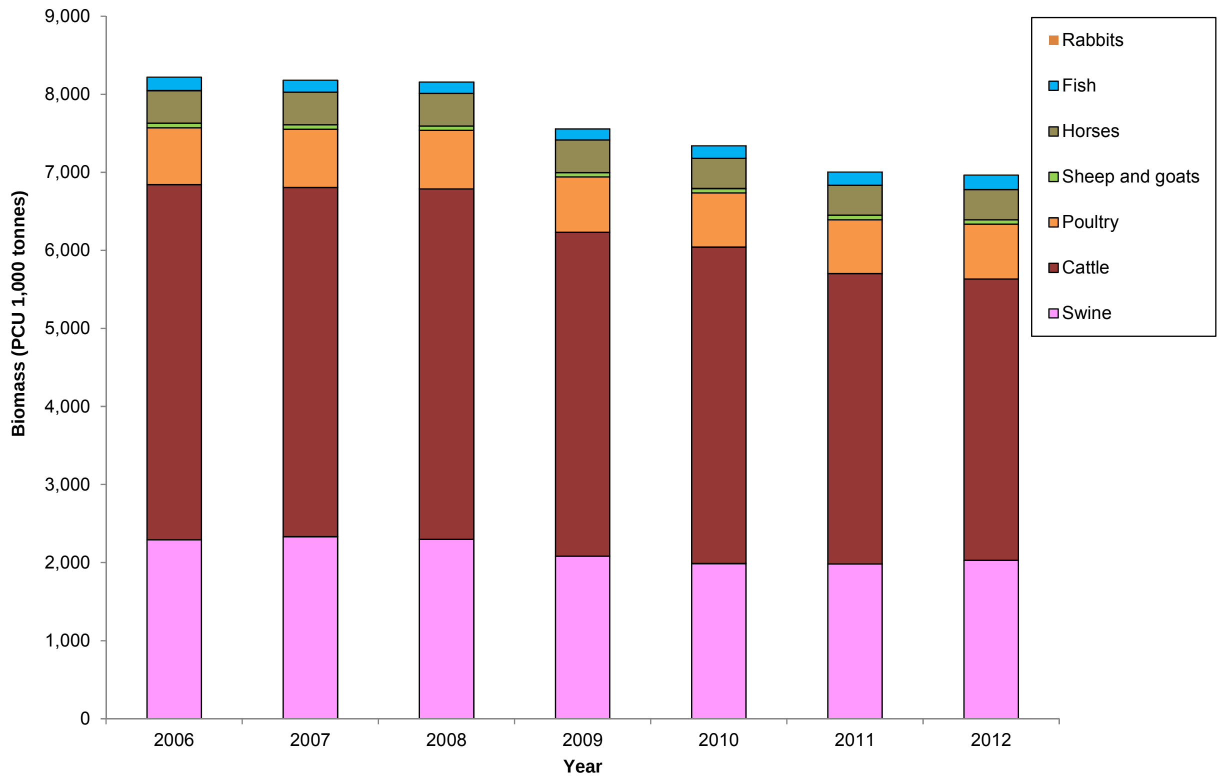
ANTIMICROBIAL DISTRIBUTION DATA AND ANIMAL POPULATION CORRECTION UNIT

For more detailed information on data sources and specific information on production stages, imports, exports, please see table at the end of this section.

Table 12. Population numbers and population correction unit (PCU) of Canadian animal population, 2012

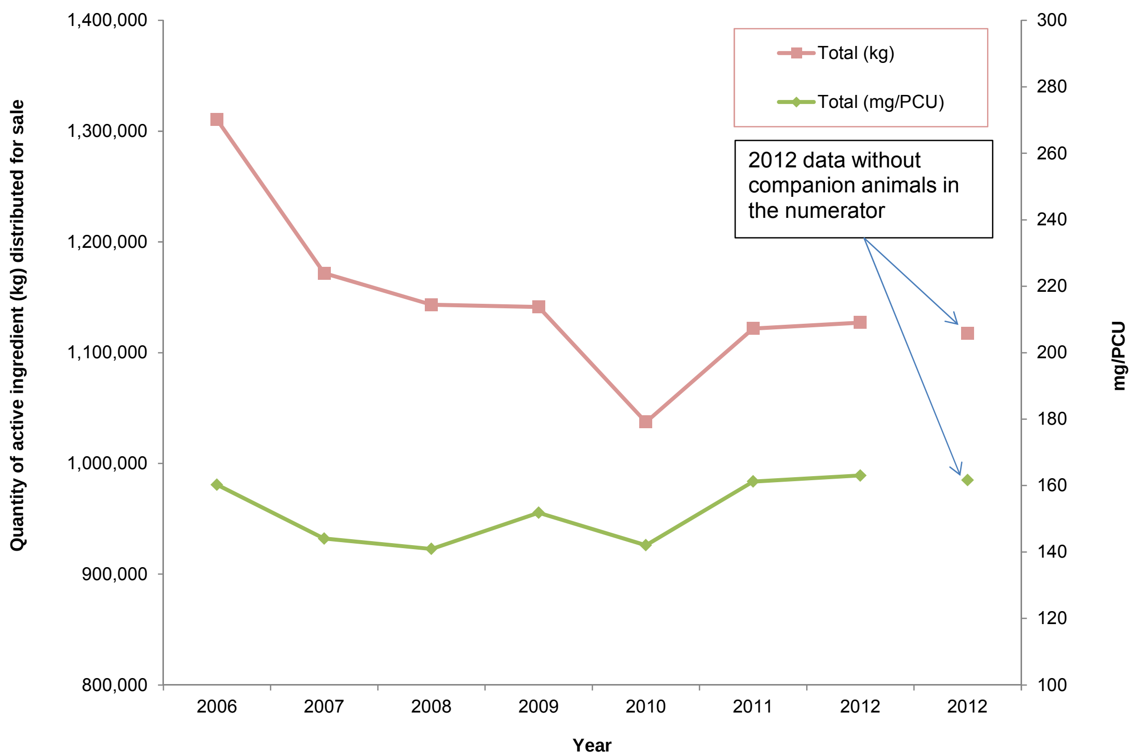
Animal species	Number of animals and/or fish weight (kg)	PCU (1,000 tonnes)
Cattle	8,474,766	3,605
Swine	27,988,205	2,028
Poultry	600,683,382	703
Sheep and goats	1,328,697	58
Horses	963,500	385
Fish	173,252,000	173
Rabbit	642,827	1
Total		**6,953**

Figure 17. Canadian animal biomass as measured by the population correction unit over time, using European weights and ESVAC production classes, 2006–2012



Sales of veterinary antimicrobial agents in 25 EU/EEA countries in 2011 (EMA/236501/2013). European Medicines Agency. European Surveillance of Veterinary Antimicrobial Consumption (ESVAC) Available at: www.ema.europa.eu/docs/en_GB/document_library/Report/2013/10/WC500152311.pdf. Accessed March 2014.

Figure 18. Sales of antimicrobials for use in animals over time, 2006–2012

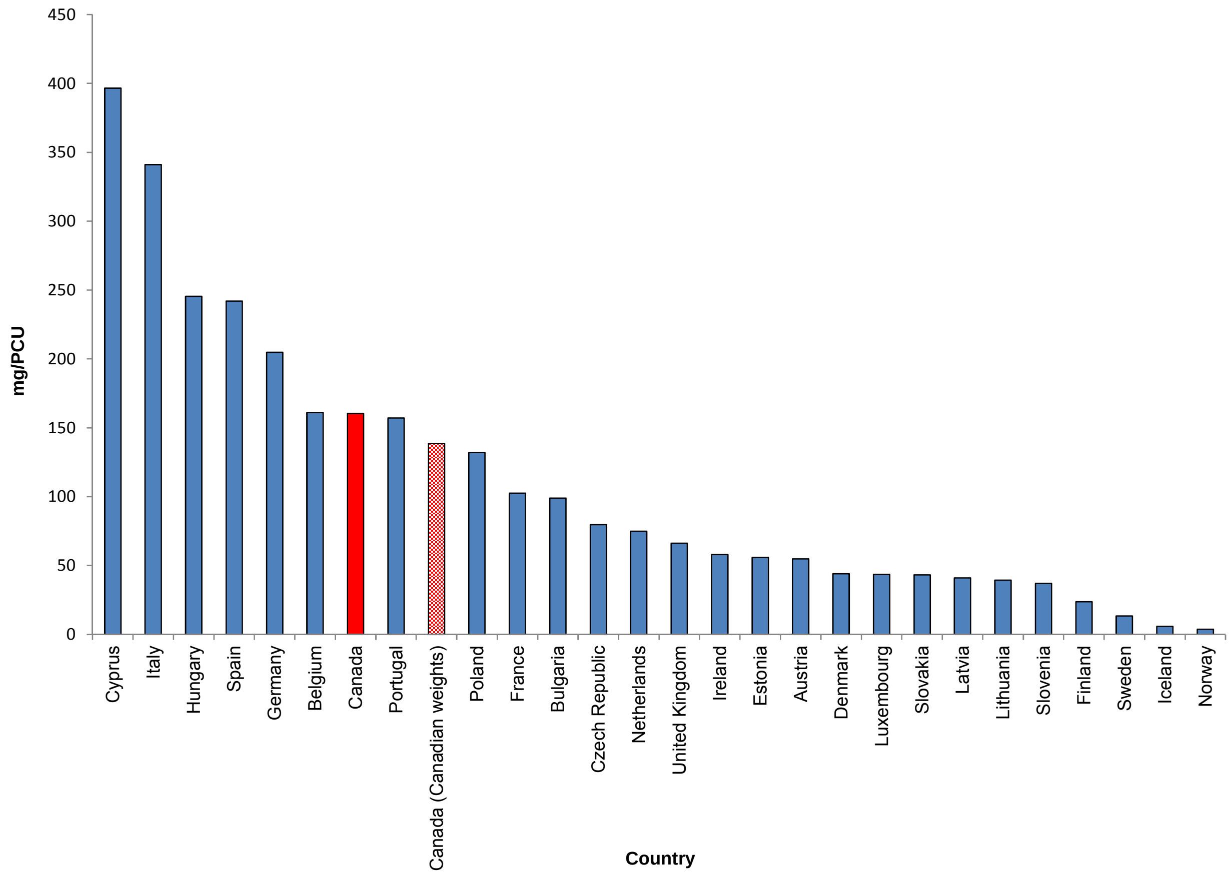


PCU = population correction unit.
Ionophores, chemical coccidiostats, and arsenicals are excluded from these data.
Values do not include own use imports or active pharmaceutical ingredients used in compounding.
Denominator data for the PCU was calculated using standard weights used by the European Surveillance of Veterinary Antimicrobial Consumption[11].
Stratification of the data by production animal/companion animal was only available for 2012.

[11] European Medicines Agency. European Surveillance of Veterinary Antimicrobial Consumption (ESVAC). Available at: www.ema.europa.eu/docs/en_GB/document_library/Report/2013/10/WC500152311.pdf. Accessed March 2014.

International Comparisons

Figure 19. Antimicrobial sales for animals (mg/PCU) for Canada and countries participating in the European Surveillance of Veterinary Antimicrobial Consumption network, 2012



PCU = population correction unit.
Own-use importation and active pharmaceutical ingredient importation are not included for the Canadian data.
Ionophores were excluded.
The PCU denominator was harmonized with the European Surveillance of Veterinary Antimicrobial Consumption (ESVAC)[12]. ESVAC approach excludes companion animal data from the numerator.
Data from all countries shown are using the same average weights at treatment. However, Canadian average weights in many production classes are heavier than European average weights. As per stakeholder request, based on very preliminary analysis, the lighter red column for Canada indicates where Canada would rank if Canadian average weights at treatment were used in the calculations. Canadian stakeholder experts are working with CIPARS to refine this analysis.

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[12] European Medicines Agency, European Surveillance of Veterinary Antimicrobial Consumption, 2014. Sales of veterinary antimicrobial agents in 26 EU/EEA countries in 2012. (EMA/333921/2014). www.ema.europa.eu/docs/en_GB/document_library/Report/2014/10/WC500175671.pdf. Accessed November 2014.

APPENDIX

Table 13. Detailed information on population numbers, 2012

Animal species	Animal class / Production class	Production stage	Number of Animals	Average weight at treatment or standard weight for import/export (kg)[a]	PCU (1000 tonnes)
			n	w	(n*w)/(1000 *1000) (imports subtracted)
Cattle					
	Cattle	Slaughter[b]	2,782,038	425	1,182
	Calves	Slaughter[c]	277,924	140	39
	Cattle and calves	Live cattle and calf import from the United States (US) for slaughter[d]	55	425	0
	Slaughter cattle and calves	Export for slaughter to the US[e]	619,045	425	263
	Calves	Live cattle and calf international import	43,828	140	6
	Feeder cattle and calves	Export for feeding to US[g]	169,166	140	24
	Beef cows	On farm[h]	3,990,000	425	1,696
	Dairy cows	On farm[h]	958,400	425	407
	Total		8,474,766		3,605
Swine					
	Grower-finishers	Slaughter[i]	21,120,505	65	1,373
	All swine	International import[j]	2,300	65	0
	All swine	International export[j]	5,676,500	65	369
	Sows and gilts	On farm[k]	1,193,500	240	286
	Total		27,988,205		2,028
Poultry					
	Broiler chickens	Slaughter[l]	622,643,858	1	623
	Turkey (> 6.2 to < 13.3 kg)	Slaughter[m]	20,675,826	6.5	134
	Poultry (< 185 g)	Live poutry for import[n]	32,326,604	0.2	6
	Poultry (> 185 g)	Live poutry for import[n]	26,279,753	2	53
	Poultry (< 185 g)	Export[n]	15,044,107	0.2	3
	Poultry (> 185 g)	Export[n]	925,948	2	2
	Total		600,683,382		703
Sheep and goats					
	Sheep and lamb	Slaughter[o]	734,900	20	15
	Goats	Slaughter[p]	61,397	20	1
	Sheep	International import[o]	32,900	20	1
	Sheep	International export[o]	2,700	20	0
	Ewes	On farm[q]	562,600	75	42
	Total		1,328,697		58
Horses	Horses	Living[r]	963,500	400	385
Fish					
	Finfish	Biomass live weight slaughtered (kg)[s]	131,951,000	N/A	132
	Shellfish	Biomass live weight slaughtered (kg)[t]	41,301,000	N/A	41
	Total		173,252,000		173
Rabbit	Rabbit	Slaughter[t]	642,827	1.4	1
Total PCU					**6,953**

See corresponding footnotes on next pages.

Table 13. Detailed information on population numbers, 2012 (cont'd)

For cattle, pigs, and sheep on farm, the number of animals entered for a calendar year was the number captured on January 1st of that calendar year (this was sometimes reported in the previous year's end of year number; e.g. for sows and gilts on farm for January 1, 2009 in the Statistics Canada CANSIM table, this was reported for the second period of 2008).
For horses, data on number of horses on farm were only reported for 2006 & 2010. The assumption was that for 2012, the number was the same.
N/A: Not applicable.

[a] As per European Surveillance of Veterinary Antimicrobial Consumption (ESVAC), unless otherwise specified.
[b] Data from federal and provincial slaughter plants. Available at: http://aimis-simia.agr.gc.ca/rp/index-eng.cfm?action=rR&pdctc=&r=105&menupos=1.02.06 or at: http://aimis-simia.agr.gc.ca/rp/index-eng.cfm?action=rR&pdctc=&r=111&menupos=1.02.06. Accessed February 2015.
[c] Number of calves slaughtered in federally and provincially inspected slaughter plants. Available at: http://www.agr.gc.ca/eng/industry-markets-and-trade/statistics-and-market-information/by-product-sector/red-meat-and-livestock/red-meat-market-information-canadian-industry/slaughter/?id=1415860000003#cattle. Accessed Nov. 24, 2014.
[d] Import from the US for slaughter. Available at: www.agr.gc.ca/redmeat/rpt/tbl6_eng.htm#cattle. Accessed March 10, 2014.
[e] Includes steers, heifers, cows, and bulls. Available at: http://www.agr.gc.ca/eng/industry-markets-and-trade/statistics-and-market-information/by-product-sector/red-meat-and-livestock/red-meat-market-information-canadian-industry/imports-and-exports/annual-imports-and-exports-of-cattle-sheep-and-hogs-from-to-the-united-states/?id=1415860000011. Accessed March 13, 2014.
[f] Included veal, beef, and dairy. Available at: www.agr.gc.ca/redmeat/rpt/tbl6_eng.htm#cattle. Accessed March 10, 2014.
[g] Available at: www.agr.gc.ca/redmeat/rpt/tbl56_eng.htm#Imports. Accessed March 13, 2014.
[h] Table 003-0032. Available at: www5.statcan.gc.ca/cansim/a05?searchTypeByValue=1&lang=eng&id=30032&pattern=30032. Accessed March 13, 2014.
[i] Agriculture and Agri-Food Canada (Report A005C). Available at: http://aimis-simia.agr.gc.ca/rp/index-eng.cfm?action=rR&pdctc=&r=93&menupos=1.02.06. Accessed March 6, 2014.
[j] Added for periods I and II. Statistics Canada (CANSIM 003-0102). Available at: http://www5.statcan.gc.ca/cansim/a05. Accessed March 6, 2014.
[k] Number of animals recorded on period II for 2011 (inventories at Jan. 1, 2012). Statistics Canada (CANSIM 003-0100). Available at: www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/prim51a-eng.htm. Accessed March 6, 2014.
[l] Mature chicken excluded. Live weight. Agriculture and Agri-Food Canada (Poultry Slaughter - Report 001). Available at: http://aimis-simia.agr.gc.ca/rp/index-eng.cfm?action=pR&r=1&pdctc=. Accessed March 11, 2014.
[m] Included mature turkeys. Agriculture and Agri-Food Canada (Poultry Slaughter - Report 001). Available at: http://aimis-simia.agr.gc.ca/rp/index-eng.cfm?action=pR&r=1&pdctc=. Accessed March 11, 2014.
[n] Included all poultry. Agriculture and Agri-Food Canada (Poultry and Egg Trade Balance Report). Available at : http://www.agr.gc.ca/eng/industry-markets-and-trade/statistics-and-market-information/by-product-sector/poultry-and-eggs/poultry-and-egg-market-information-canadian-industry/imports-and-exports/statistics-canada-poultry-and-egg-trade-reports/2012/?id=1384971854406. Accessed March 11, 2014.
[o] Statistics Canada (CANSIM 003-0028). Available at: www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=0030028&tabMode=dataTable&srchLan=-1&p1=-1&p2=9. Accessed March 13, 2014.
[p] Added numbers from federally and provincially inspected establishments. Agriculture and Agri-Food Canada (Annual Goats Slaughtered in Federally and Provincially Inspected Establishments in Canada). Available at: www.agr.gc.ca/redmeat-vianderouge/rpt/tbl36a_eng.htm. Accessed March 11, 2014.

[q] Number of animals recorded on January 1st, 2013 Statistics Canada (CANSIM 003-0031). Available at: www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=0030031&tabMode=dataTable&srchLan=-1&p1=-1&p2=9. Accessed March 13, 2014.
[r] Available at: www.equinecanada.ca/industry/index.php?option=com_content&view=section&id=103&Itemid=559&lang=en. Accessed March 13, 2014.
[s] Table 003-0001. Available at: www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=0030001&pattern=aquaculture&tabMode=dataTable&srchLan=-1&p1=1&p2=49. Accessed March 13, 2014.
[t] Federal and provincial slaughter. Available at: www.agr.gc.ca/redmeat-vianderouge/rpt/tbl38a_eng.htm. Accessed March 11, 2014.