CIPARS Farm Surveillance Component: Grower-Finisher Pigs

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World AMR Awareness Week
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Public Health Agency of Canada
Agence de la santé publique du Canada

Canada

Agenda

- CIPARS Farm Swine component overview
- Animal Health and Farm information
- Antimicrobial use (AMU)
  - Farm results
  - Sales data (VASR)
- Antimicrobial resistance
- Key messages

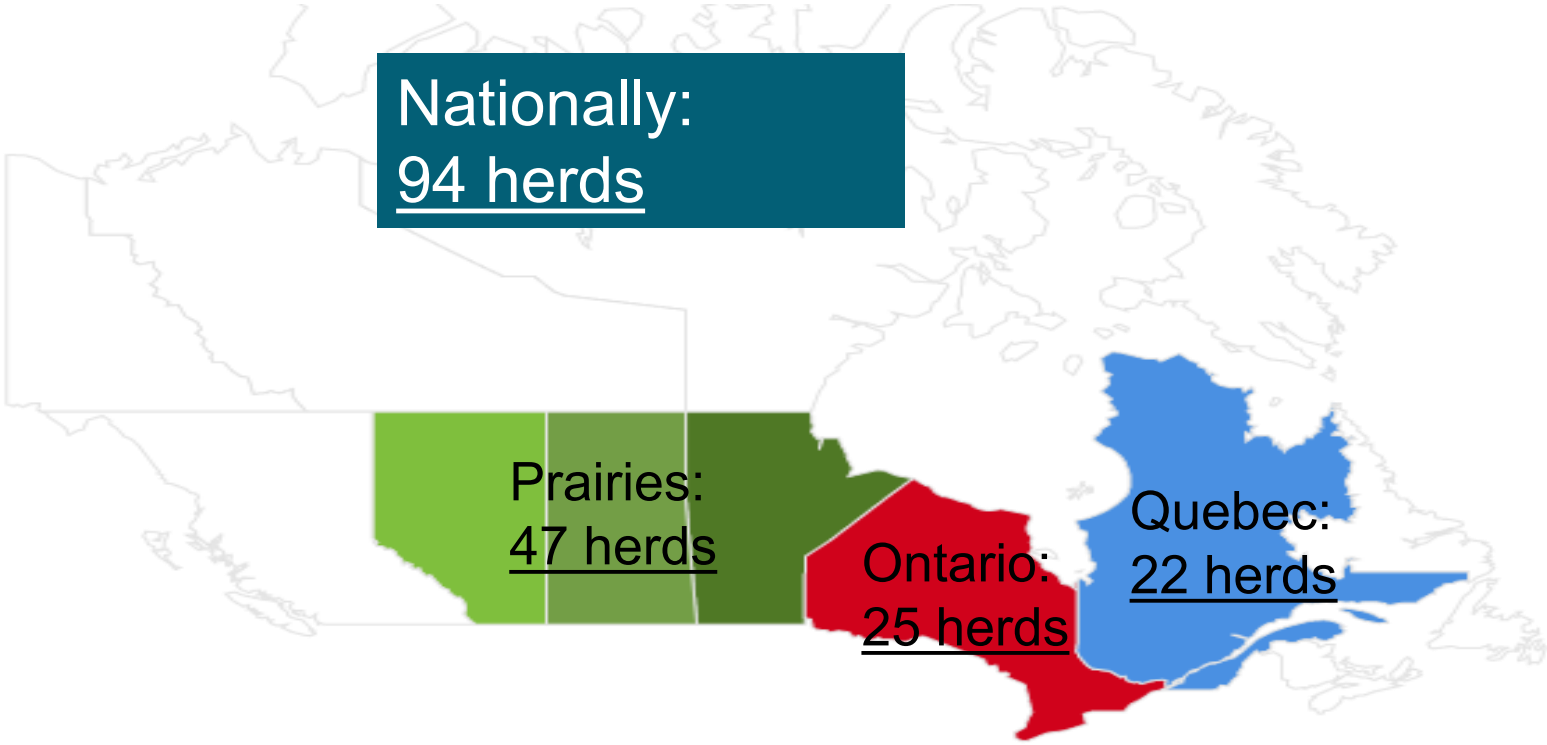
CIPARS Farm Swine Surveillance component

Distribution of herds 2024

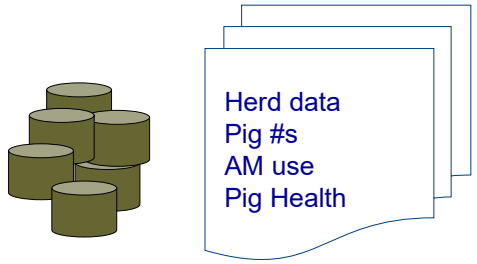
Proportional allocation of herds to provinces

Herd Veterinarians (contracted)

- Recruit/enroll herds to program
- Inclusion/exclusion criteria – representativeness
- Conduct sample and data collection visits



Data collection



Sampling Seasons

WINTER	SUMMER	FALL

- Production phase of interest: **grower-finisher pigs,** sample from pigs that are close-to-market (95-110 kg)
- One sampling/data collection visit per herd per year
- Veterinarians distribute sampling of herds over the calendar year

Composite fecal samples from pens collected & submitted by the herd veterinarian

Questionnaire:
- Herd/site demographic data
- **Antimicrobial use** data (feed, water, injection)
- Animal health data

Antimicrobial Categorization

- Antimicrobials are categorized according to their importance to human medicine by Health Canada's Veterinary Drugs Directorate (VDD)
- Included: List A antimicrobials
- List A antimicrobials not currently categorized are included and are grouped as Uncategorized medically important (e.g., orthosomycins and pleuromutilins)
- Excluded: antifungals, antiparasitics, antivirals, Category IV antimicrobials, and uncategorized not-medically important antimicrobials

Medically important antimicrobials

Category I: Very high importance

E.g. 3rd generation cephalosporins, fluoroquinolones

Category II: High importance

E.g., aminoglycosides, macrolides

Category III: Medium importance

E.g., tetracyclines, sulfonamides

Category IV: Low importance

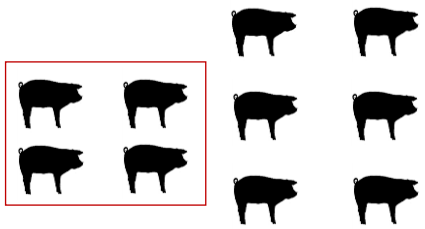
E.g., ionophores, flavophospholipids

Measures and indicators of AMU

FREQUENCY MEASURES

1. Tells us **how extensive** the use practice is across Canada
   - Number (%) of farms/**herds**
   - Number (%) of medicated **rations**

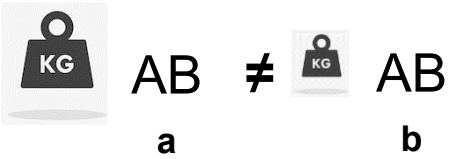
2. Tells us **how intensive** a drug may be used on farm
   - Number (%) of **pigs** exposed



Measures and indicators of AMU

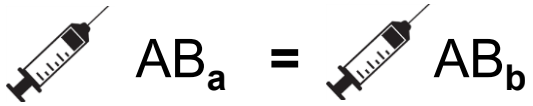
MEASURES OF QUANTITY

3. Weight-based measures - tells us the **raw quantity** used



- Unadjusted: kilograms
- Adjusted for the number and weight (biomass) of pigs (indicators)
  - ❖ Mg/population correction unit (PCU)
  - ❖ Mg/kg biomass

4. Dose-based measures - tells us the **number of standard doses** used



- Dose-based indicators of AMU
  - ❖ DDDvetCA/1,000 pig-days at risk
- Adjusts for <u>differences in doses</u> among the antimicrobials used

Biosecurity and Farm Information

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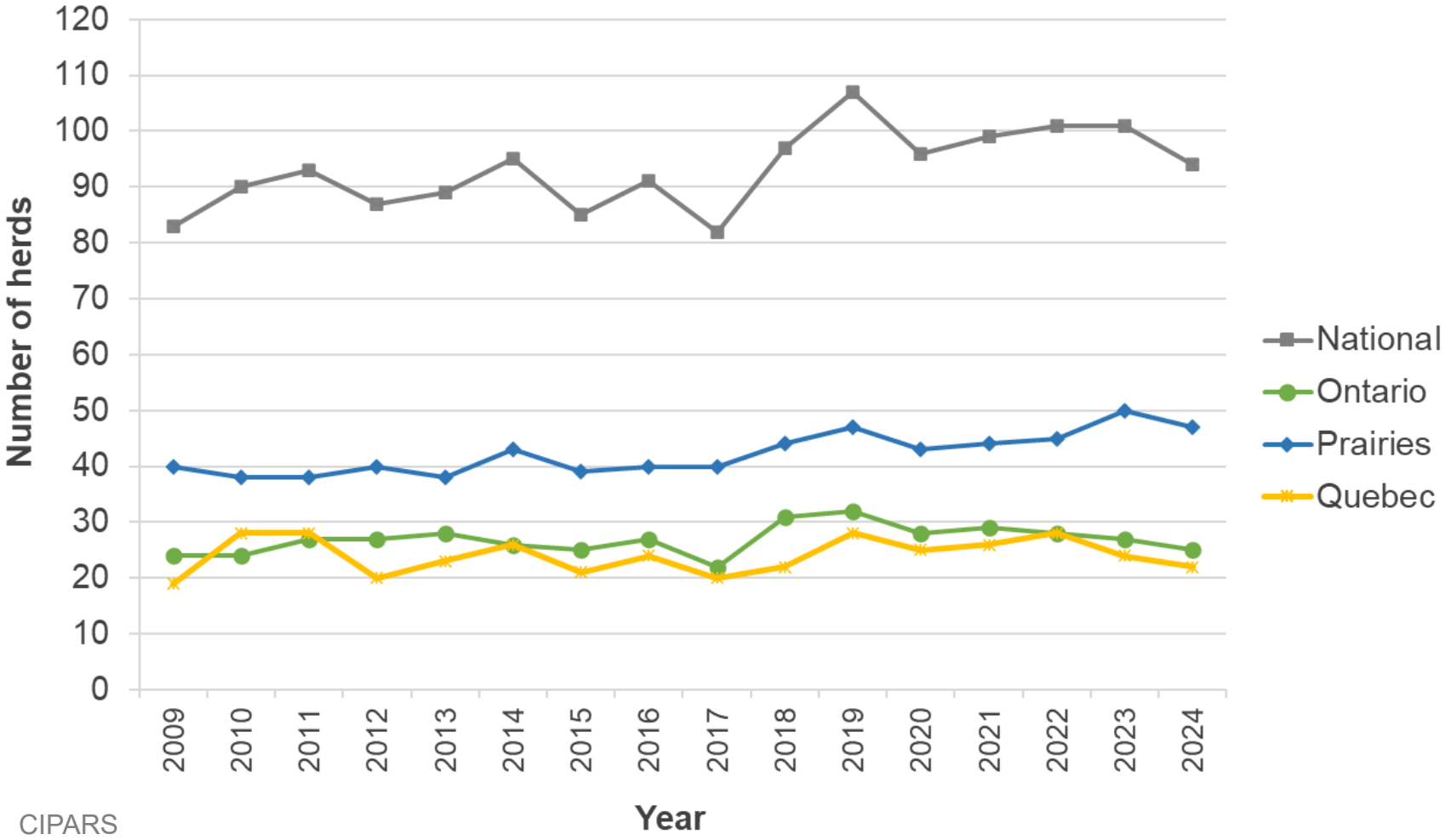
Number of participating herds



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In 2024, there were 94 participating herds (down from 101 in 2023).

There was a decrease in the number of participating herds in all regions.

Biosecurity

Region	biosecurity sign	boot dip	boots	coveralls	danish entry	downtime	locked doors	restrict visitors	shower
Prairies	98%	26%	100%	100%	87%	79%	77%	100%	72%
Ontario	100%	8%	100%	100%	80%	80%	88%	96%	64%
Quebec	73%	9%	82%	55%	77%	14%	55%	82%	5%

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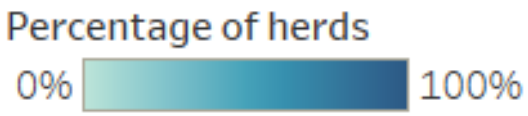
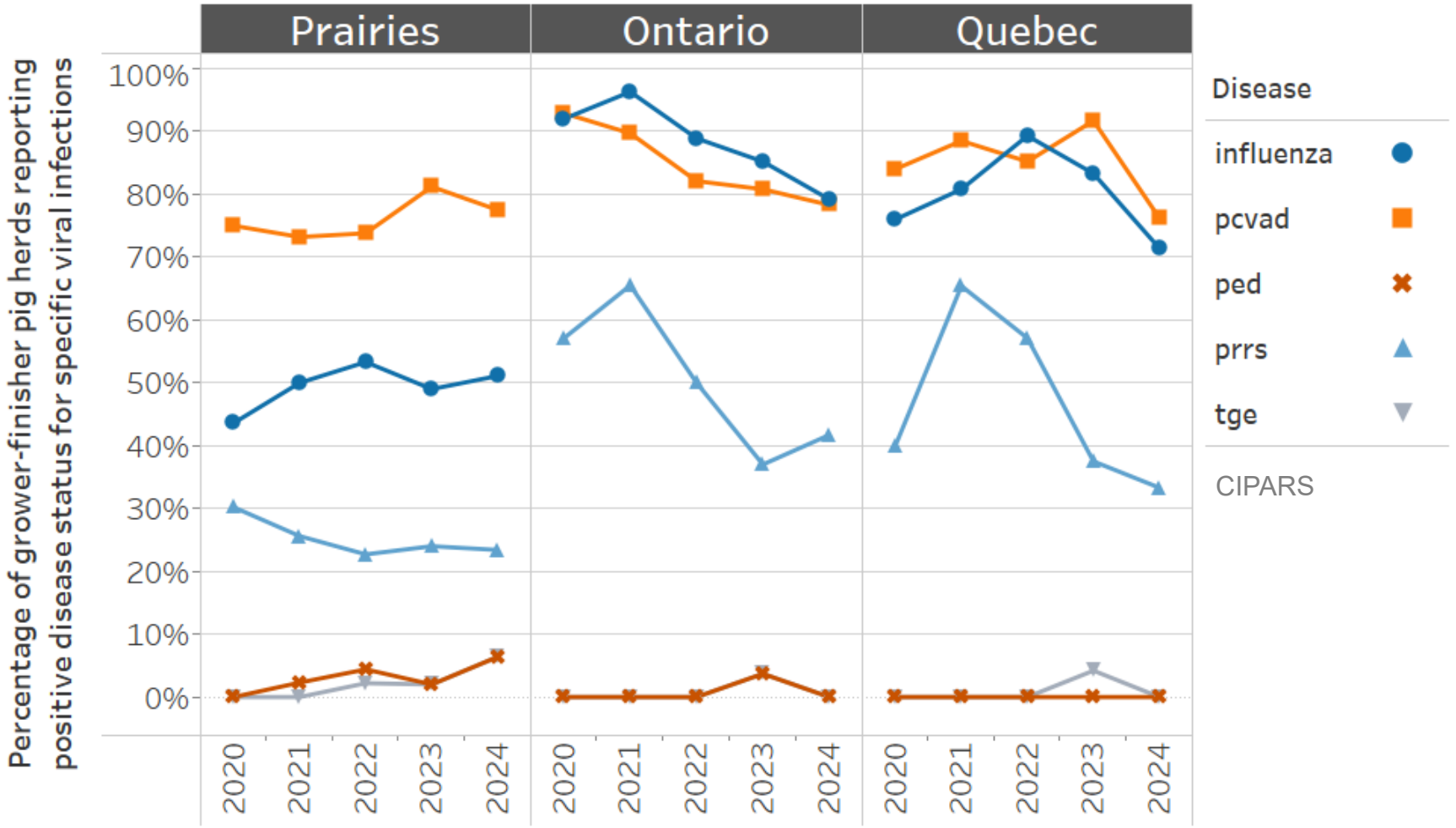


The percentage of herds reporting various biosecurity practices in 2024 continues to be generally high, with the lowest percentages reported for boot dips and showers, and lower rates reported in Quebec, than in Ontario and the Prairies.

Ontario and Quebec continue to report more farms within 2 km than the Prairies. In 2024, 83% of participating farms in the Prairies reported zero farms within 2 km, compared to 14% in Quebec and 12% in Ontario.

Health status – viral infections



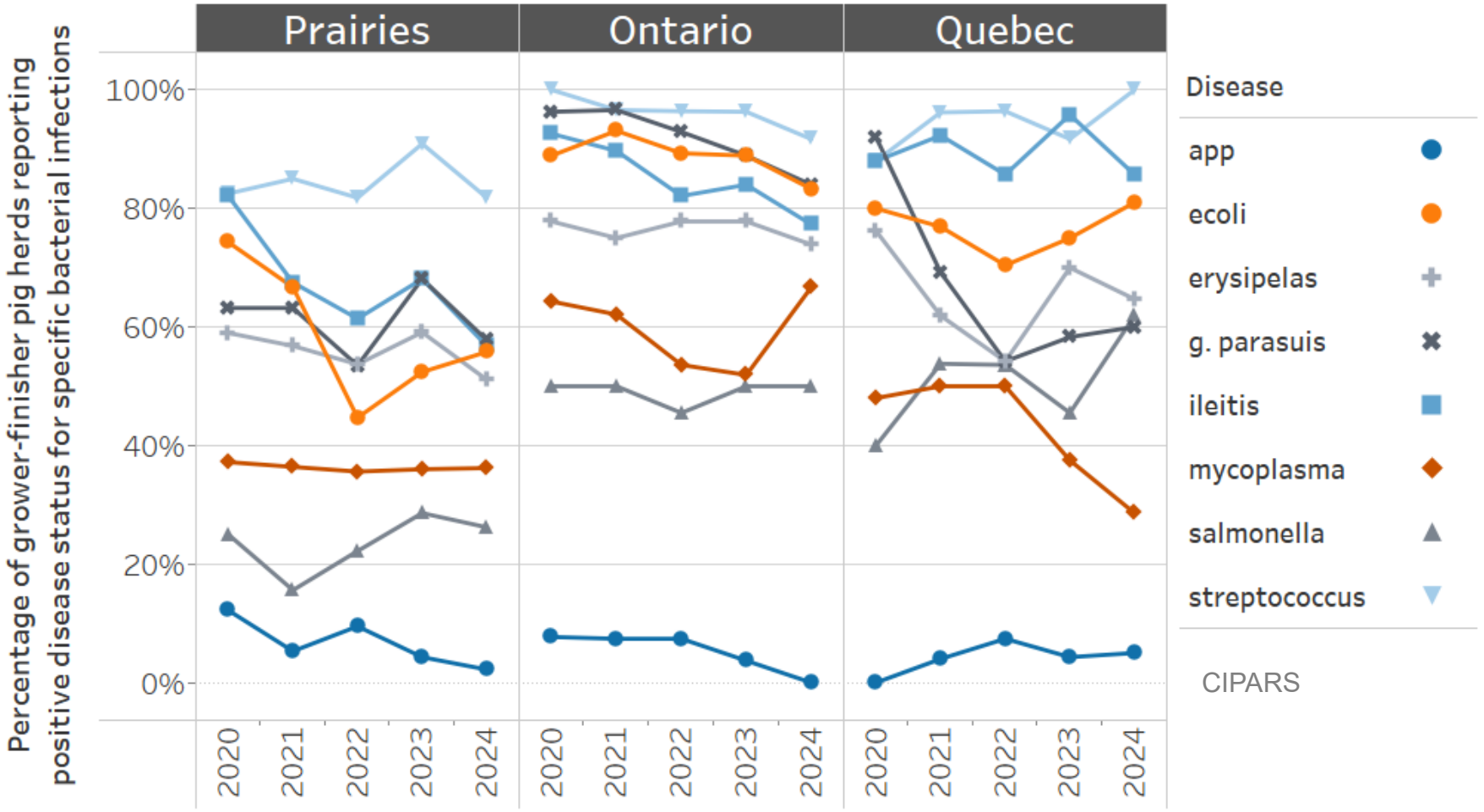
Grower-finisher pigs:

Across all regions, the percentage of herds reporting positive disease status is highest for:

- PCVAD
- influenza

PRRS is more commonly reported in Ontario and Quebec, although reports are decreasing in both regions

Health status – bacterial infections



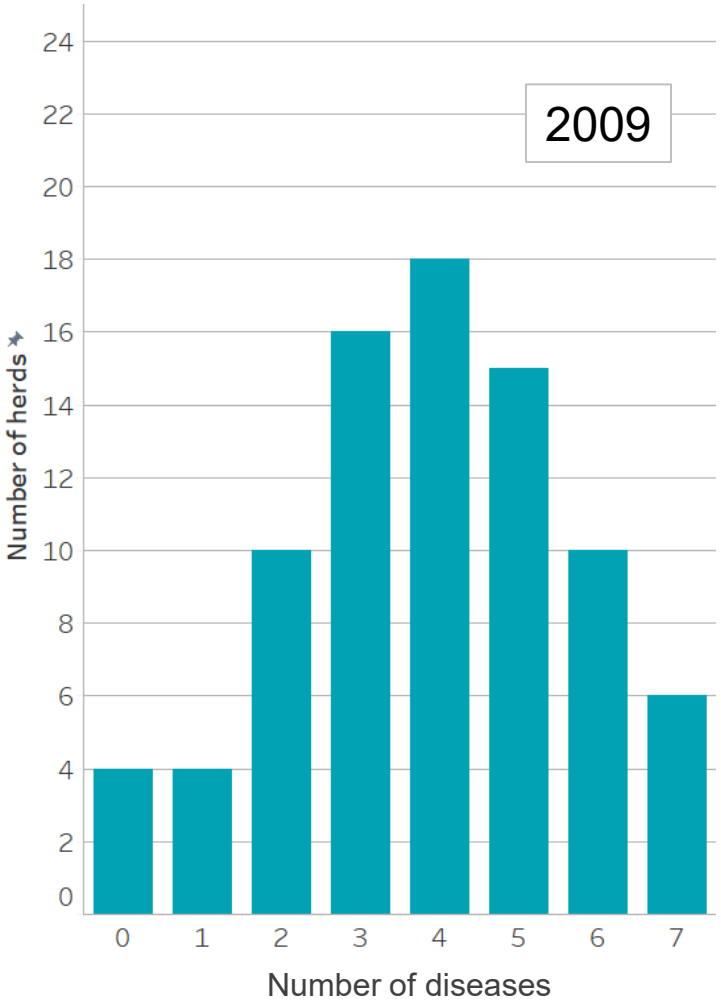
Grower-finisher pigs:

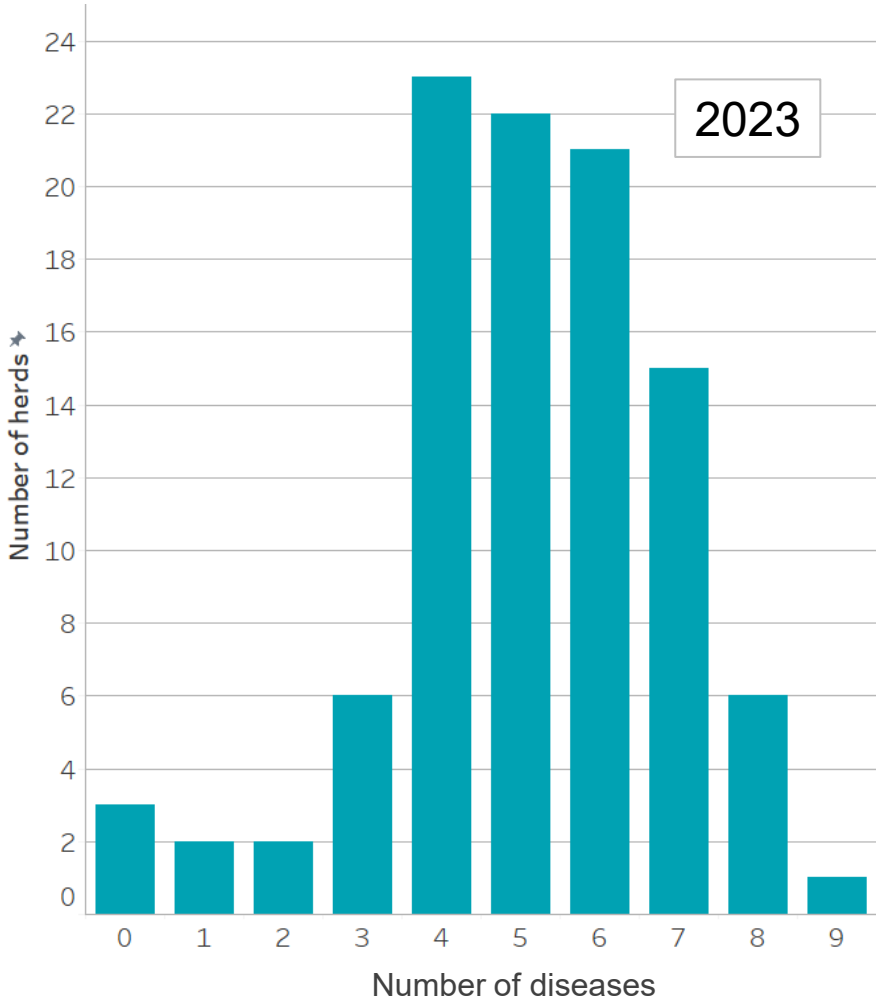
Across all regions, the percentage of herds reporting positive disease status is highest for:

- *Streptococcus*
- ileitis
- *E. coli*
- *G. parasuis*
- erysipelas

In 2024, there was an increase in positive disease status for *Salmonella* in Quebec and *Mycoplasma* in Ontario

Health status – vaccination

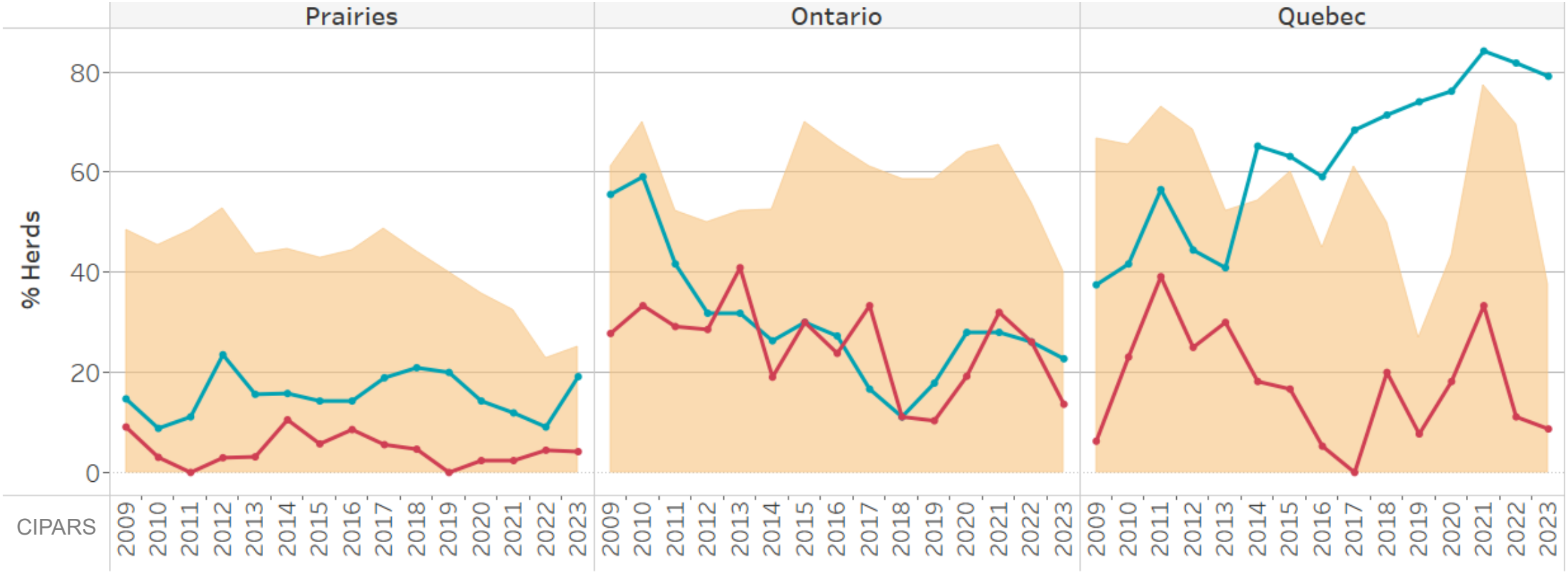




Across all stages:

Examining vaccination in sows, nursery pigs, and grower-finisher pigs, the number of diseases vaccinated against increased between 2009 (average 3.9 diseases) and 2023 (average 5.1 diseases).

Health status – PRRS

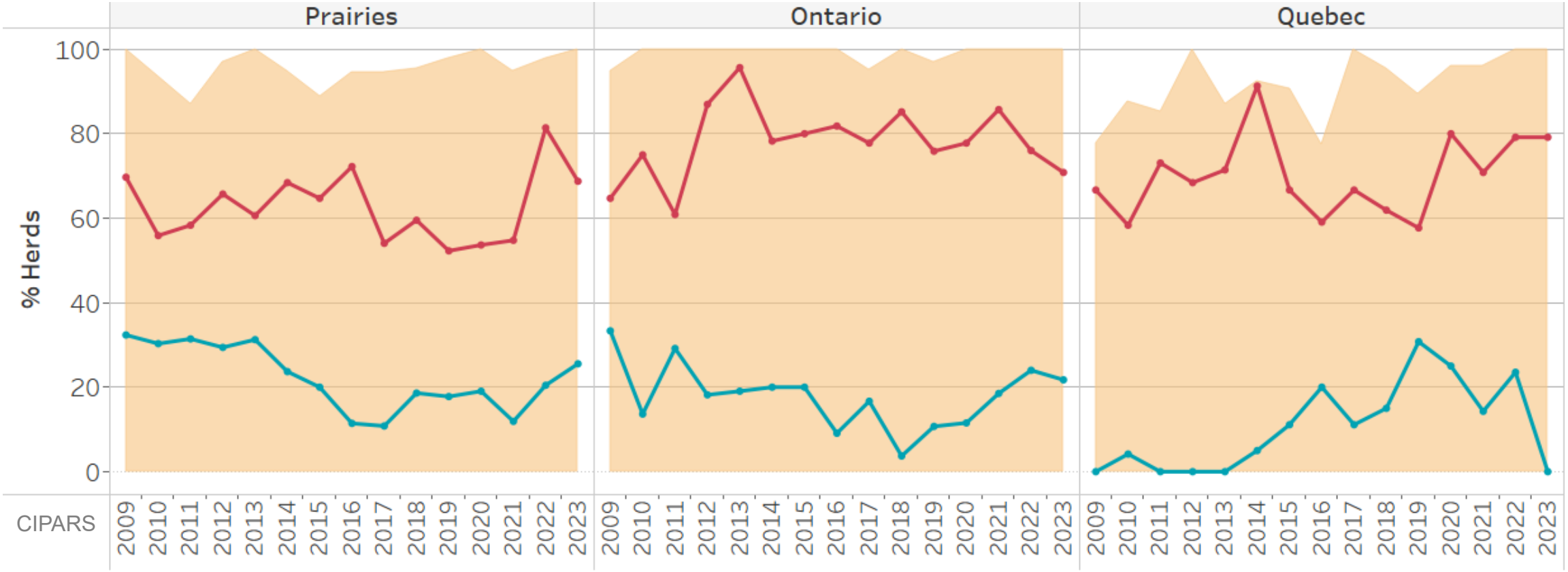


Across all stages, the percentage of herds reporting:

- positive disease status (yellow) is higher in Ontario and Quebec, but decreasing since 2021
- vaccination (blue line) is highest in Quebec (4 commercial vaccines available in Canada in 2023)
- antimicrobial use (red line) varies, and is generally higher in Ontario and Quebec than the Prairies

*Herds were considered positive if the event occurred in at least one stage of production (in sows, nursery pigs, or grower-finisher pigs). When the herd status for the event was unknown, the herd was excluded from the analysis.

Health status – *Streptococcus*



Across all stages, the percentage of herds reporting:

- positive disease status (yellow) is high across all regions
- vaccination (blue line) is low across all regions (no commercial vaccines available)
- antimicrobial use (red line) is similar across all regions

*Herds were considered positive if the event occurred in at least one stage of production (in sows, nursery pigs, or grower-finisher pigs). When the herd status for the event was unknown, the herd was excluded from the analysis.

Antimicrobial Use (Farm) and Sales (VASR)

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Frequency of antimicrobial use (AMU)

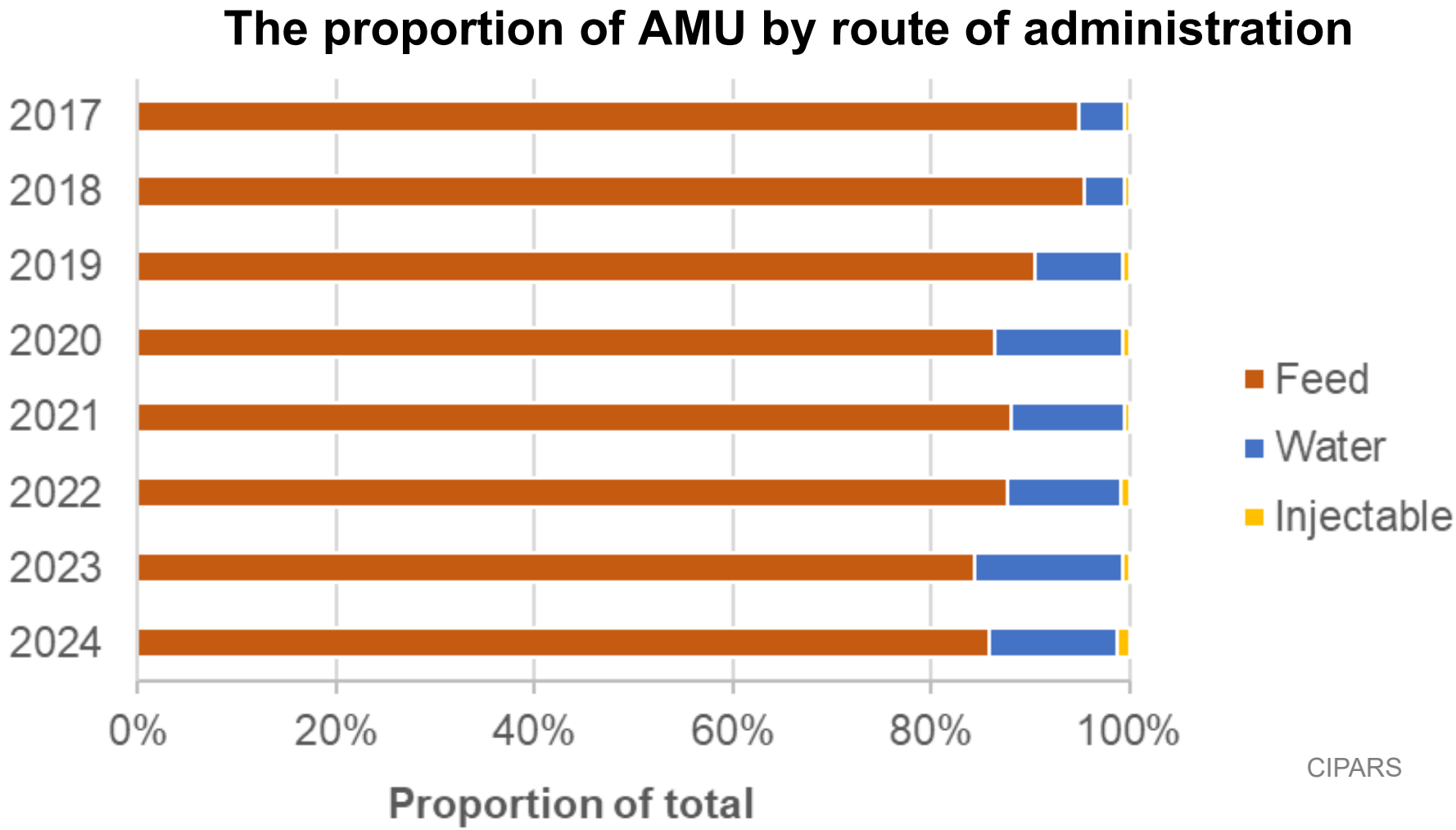
Route of administration

In 2024:

Feed 86%

Water 13%

Injection 1%



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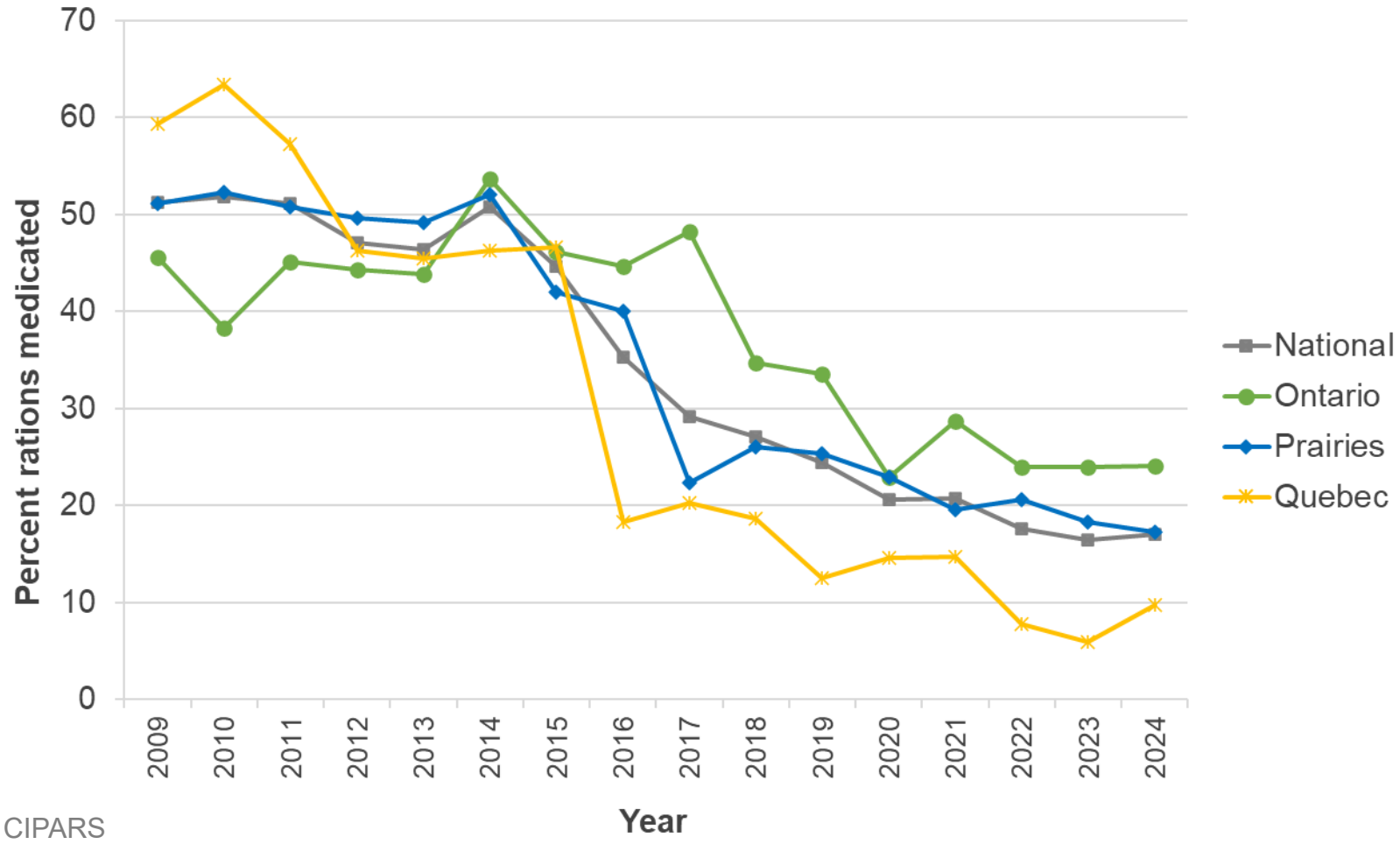
Estimated on a quantitative basis, the proportion of nDDDvetCA/1000 pig-days at risk aggregated over all 3 routes of administration

Frequency of MIA use in feed



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The **percentage of rations** that include medically important antimicrobials (MIAs) has decreased (from 51% to 17% between 2009 and 2024).

In 2024, the percentage of rations medicated with MIAs was lowest in Quebec and highest in Ontario.

Days exposed to MIAs in feed (2024):

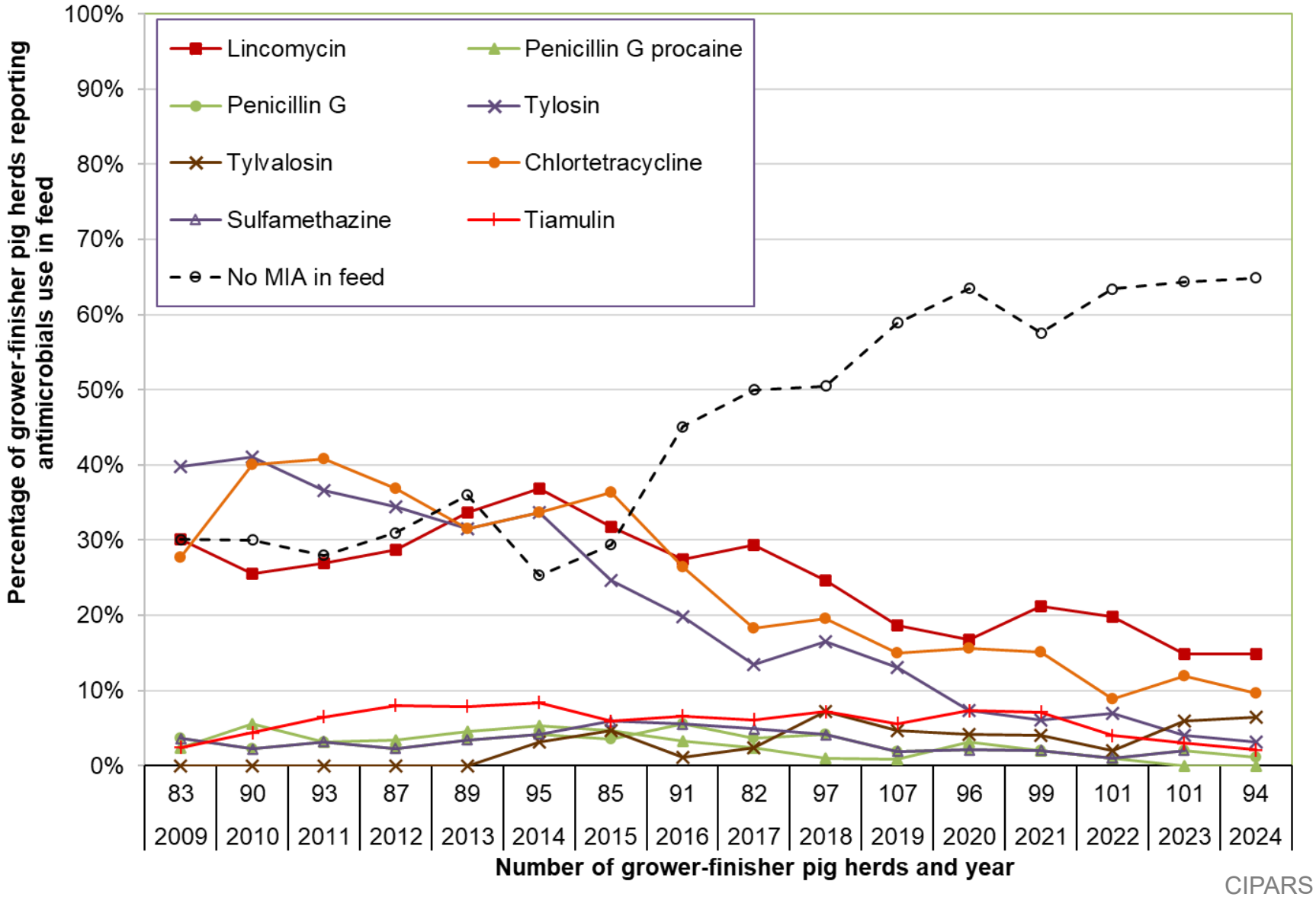
- 0-119 days Ontario
- 0-151 days Prairies
- 0-84 days Quebec

*Category IV antimicrobials including ionophores and flavophospholipols excluded from this analysis

Frequency of use in feed

The **percentage of herds** not using any MIAs in feed increased between 2014 and 2020 and has plateaued since.

Lincomycins, tetracyclines, and macrolides remain the most common antimicrobials used in feed.



Medically important antimicrobials used by fewer than 5% of herds were excluded from the figure.

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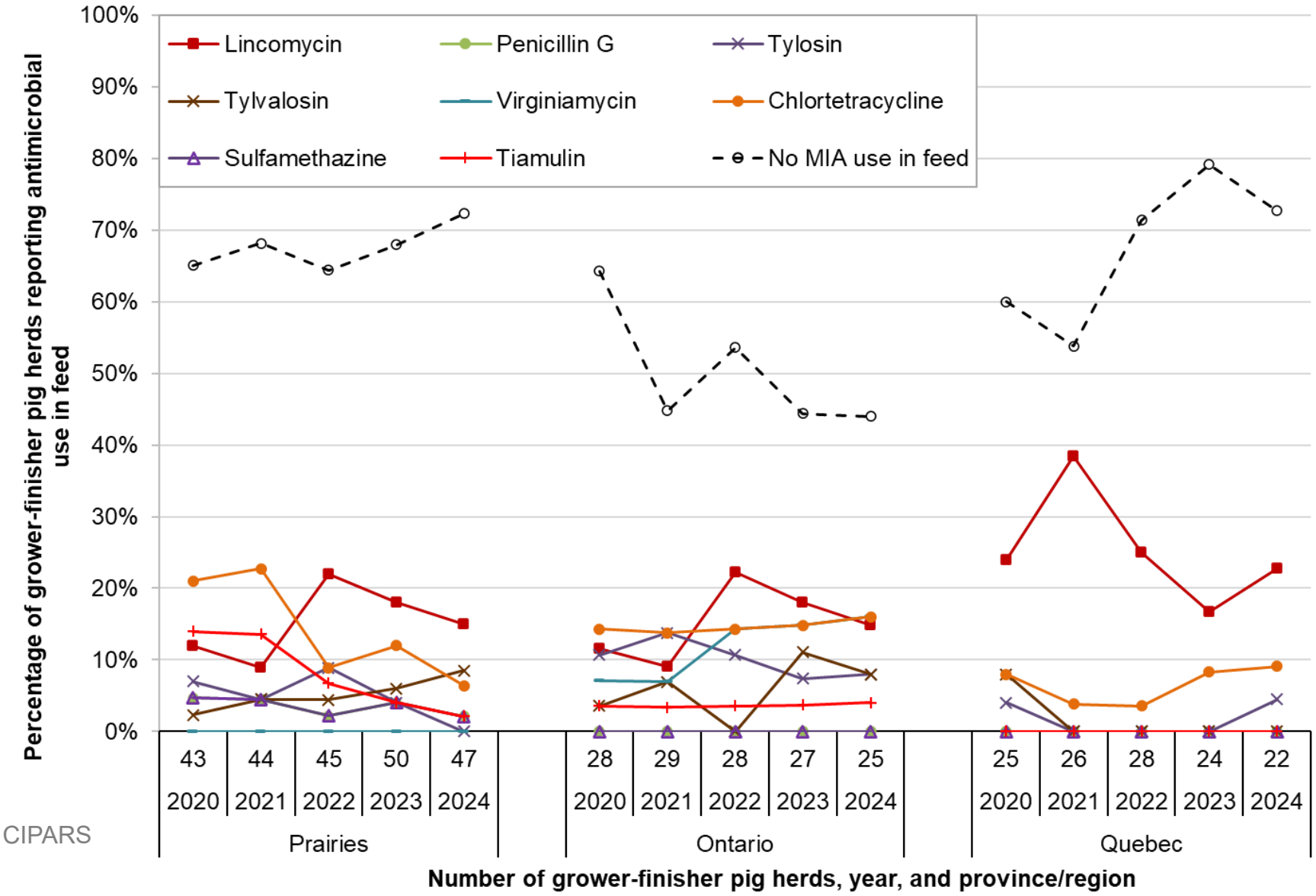
Frequency of use in feed



Regionally, the percentage of herds not using MIAs in feed is highest in the Prairies and Quebec.

There is yearly variation in the frequency of active ingredients used, however, the most frequently used antimicrobials across all regions continue to be lincomycin, chlortetracycline, tylvalosin, and tylosin.

In Ontario, virginiamycin is also among the most frequency used antimicrobials.

Medically important antimicrobials used by fewer than 5% of herds were excluded from the figure.

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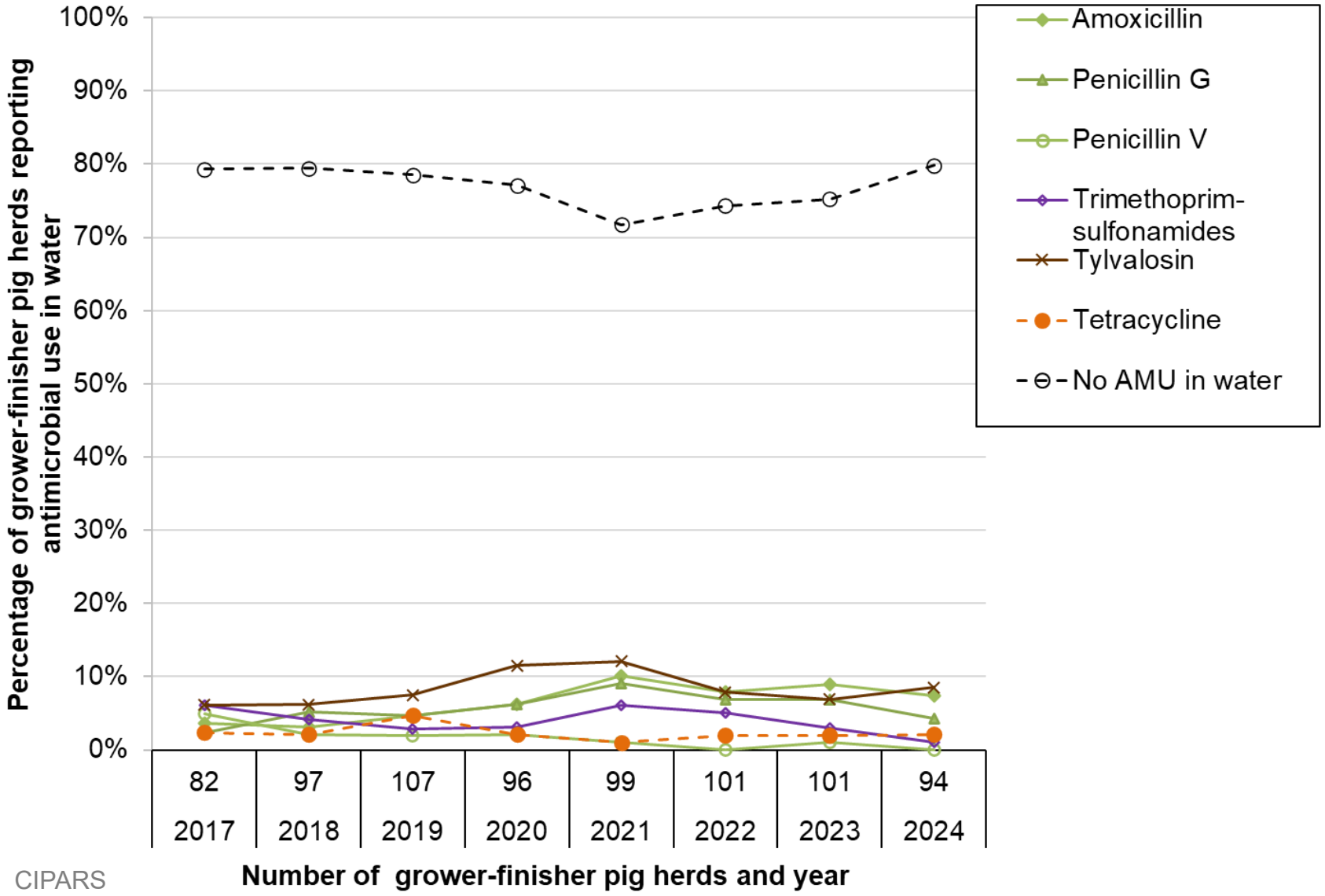
Frequency of use in water



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Nationally, there has been little change in the frequency of antimicrobial use in water since 2017.

The **percentage of herds** not using any antimicrobials in water has ranged from 72 to 80%.

In 2024, the most frequently used antimicrobials in water were tylvalosin, amoxicillin, and penicillin G (all Category II antimicrobials).

Medically important antimicrobials used by fewer than 5% of herds were excluded from the figure.

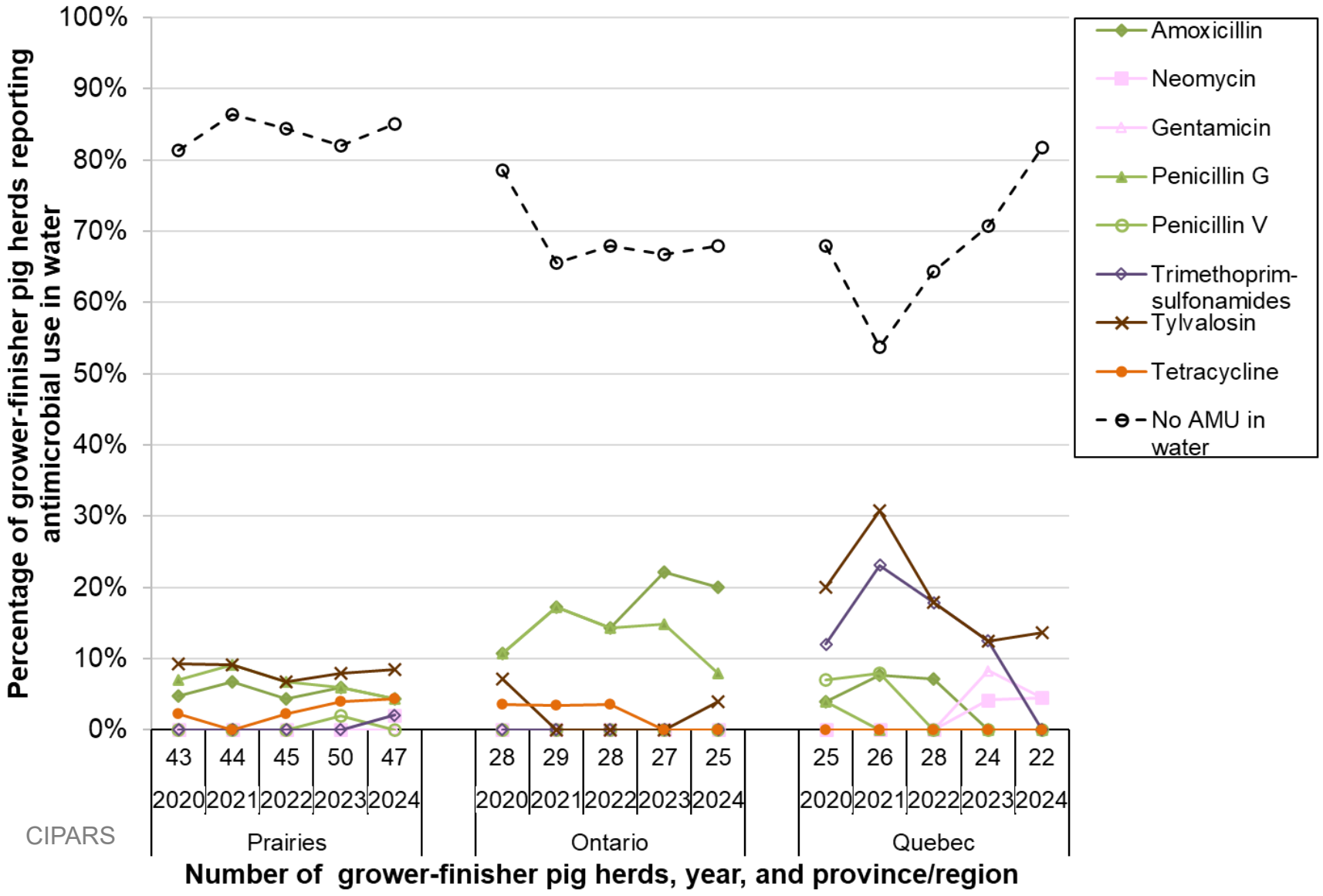
Frequency of use in water

The overall trend in the **percentage of herds** not using any antimicrobials is increasing in Québec.

In 2024, penicillins were the most frequently used antimicrobials in Ontario.

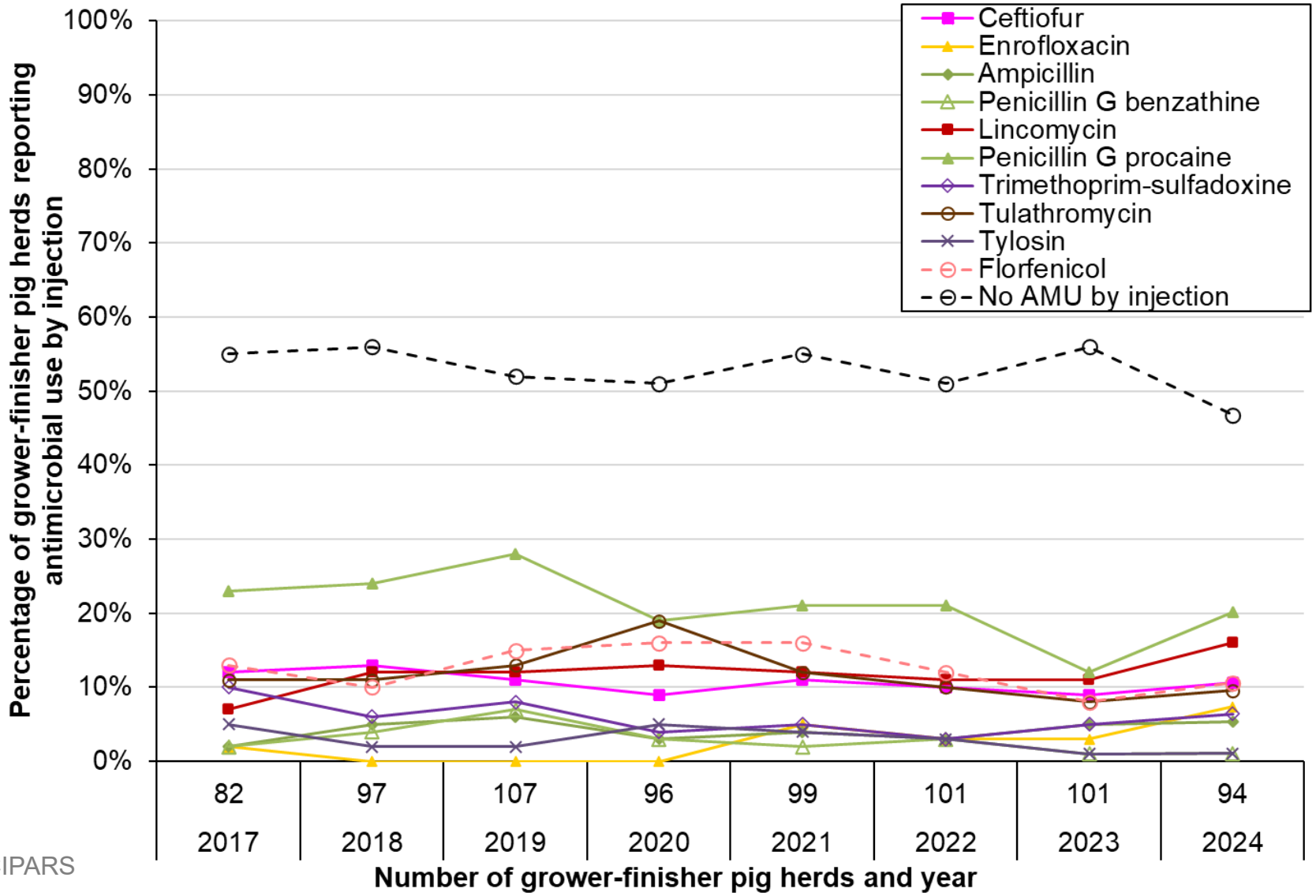
In 2024, there was reported use of gentamicin and neomycin in Quebec, and neomycin in Prairies.

In 2024, there was reported use of TMS in the Prairies and none in Quebec.



Medically important antimicrobials used by fewer than 5% of herds were excluded from the figure.

Frequency of use by injection



Nationally, the percentage of herds not using any antimicrobials by injection decreased in 2024.

The **percentage of herds** not using any antimicrobials by injection varied between 47 and 56% since 2017.

In 2024, the most frequently used antimicrobials by injection were procaine penicillin G, lincomycin, florfenicol, tulathromycin and ceftiofur.

Medically important antimicrobials used by fewer than 5% of herds were excluded from the figure.

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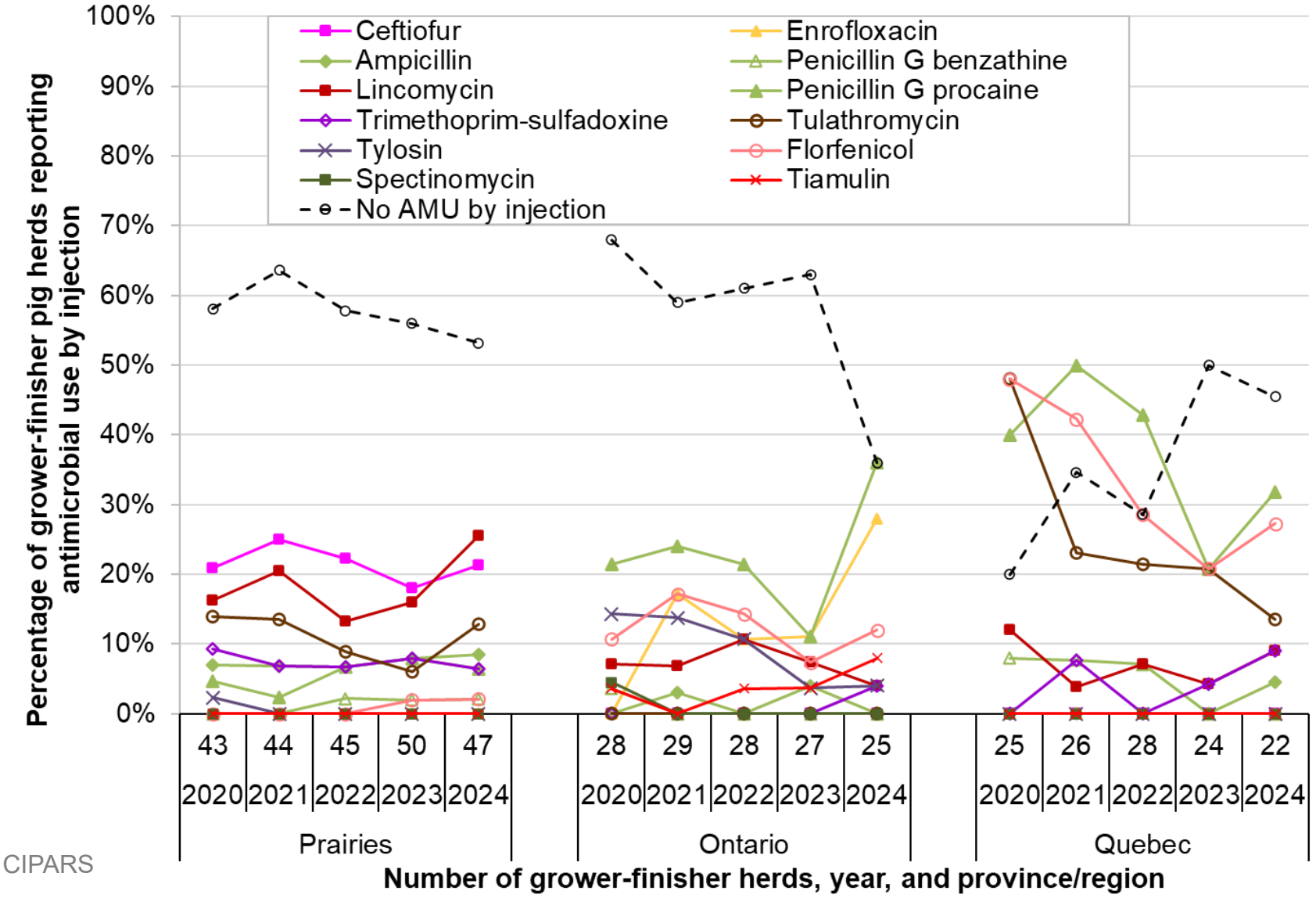
Frequency of use by injection



Regionally, since 2020, the **percentage of herds** not using antimicrobials by injection has decreased in Ontario (from 68% to 36%) and the Prairies and increased in Quebec.

Quebec:
Decreasing frequency of tulathromycin use

Ontario:
Increased frequency of procaine penicillin G and enrofloxacin use.

Prairies:
Increased frequency of lincomycin use.

Medically important antimicrobials used by fewer than 5% of herds were excluded from the figure.

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Quantity of antimicrobial use

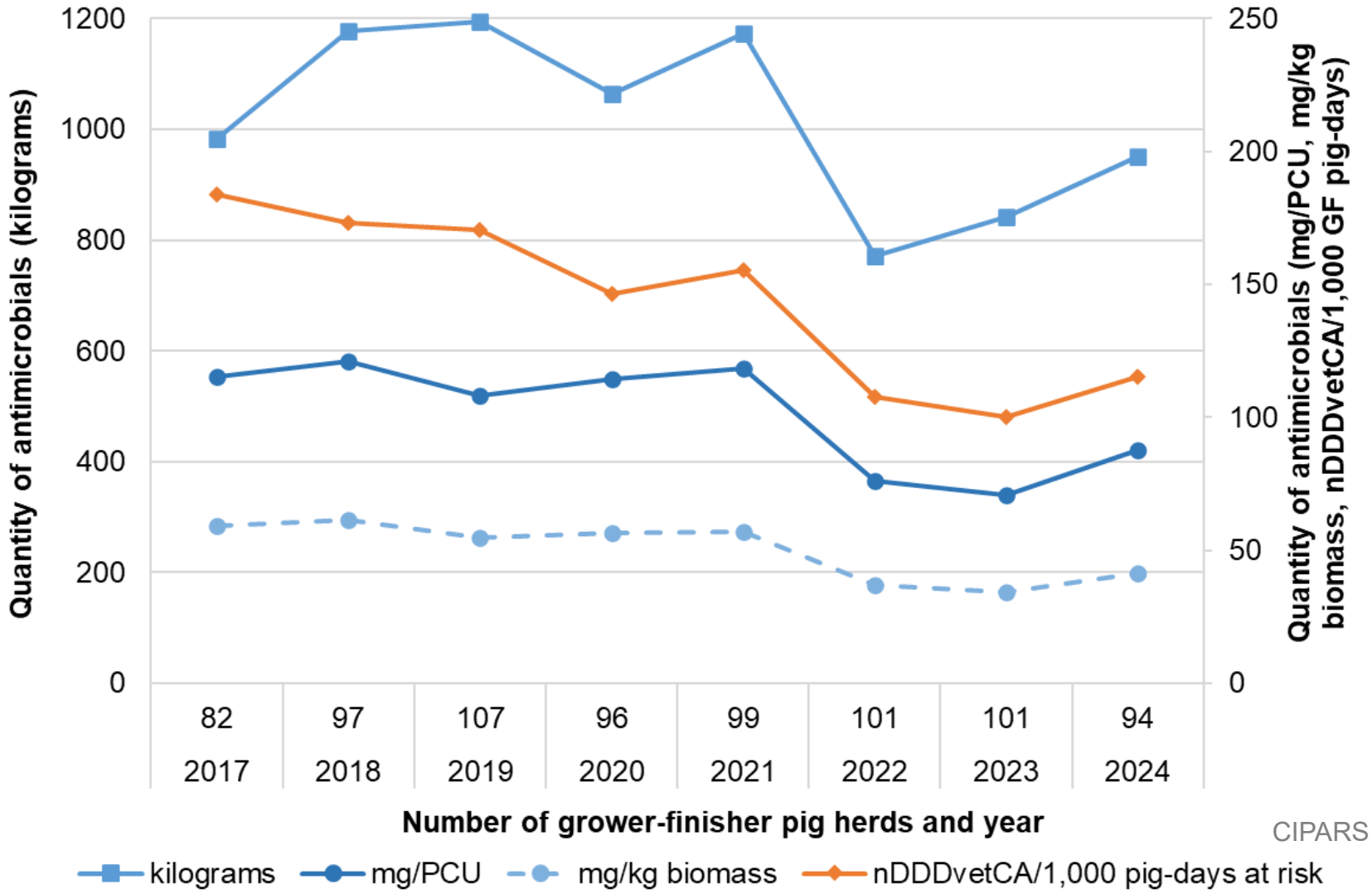
All routes summary

Since 2023:

- 13% **increase** in kg used
- 21% **increase** in mg/kg biomass
- 15% **increase** in defined daily doses

Since 2017:

- 11% **decrease** in kg used
- 27% **decrease** in mg/kg biomass
- 21% **decrease** in defined daily doses



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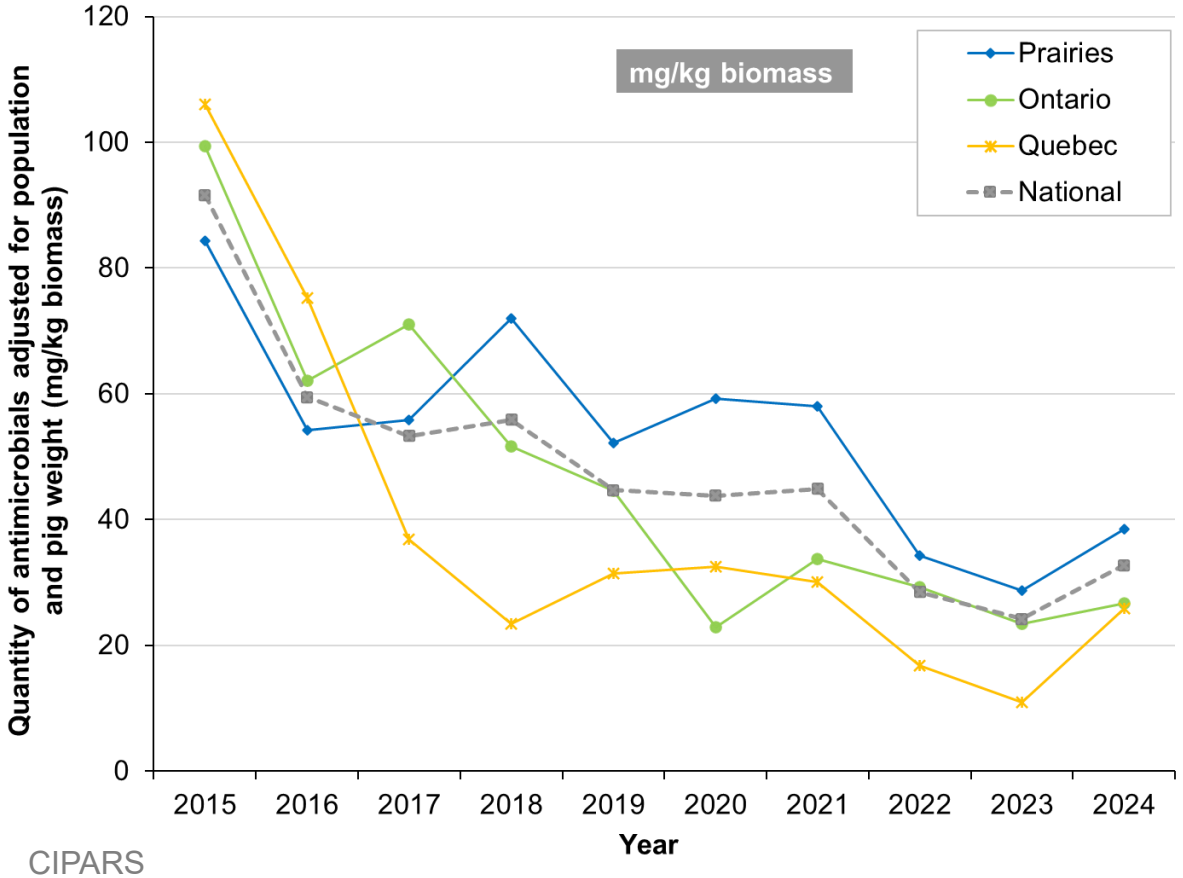
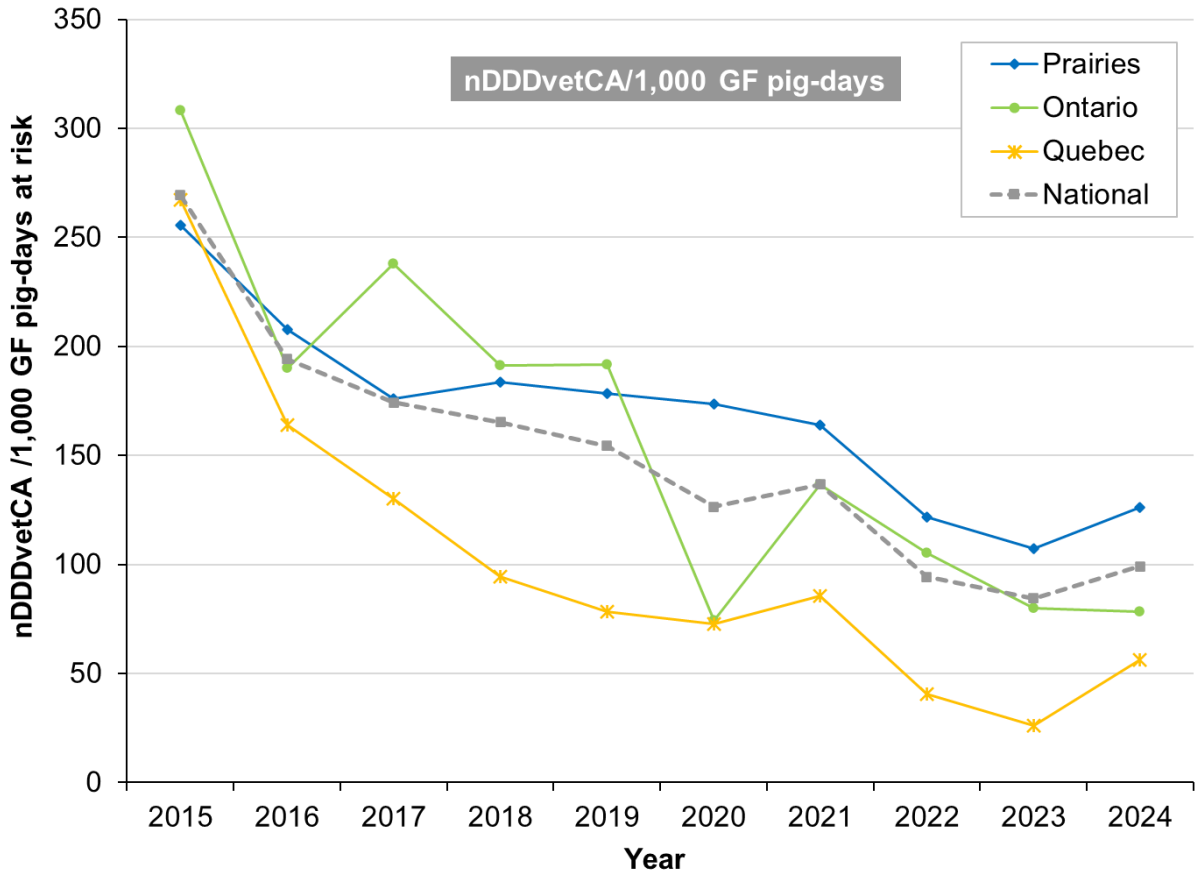
*Category IV antimicrobials not included

Quantity of use in feed





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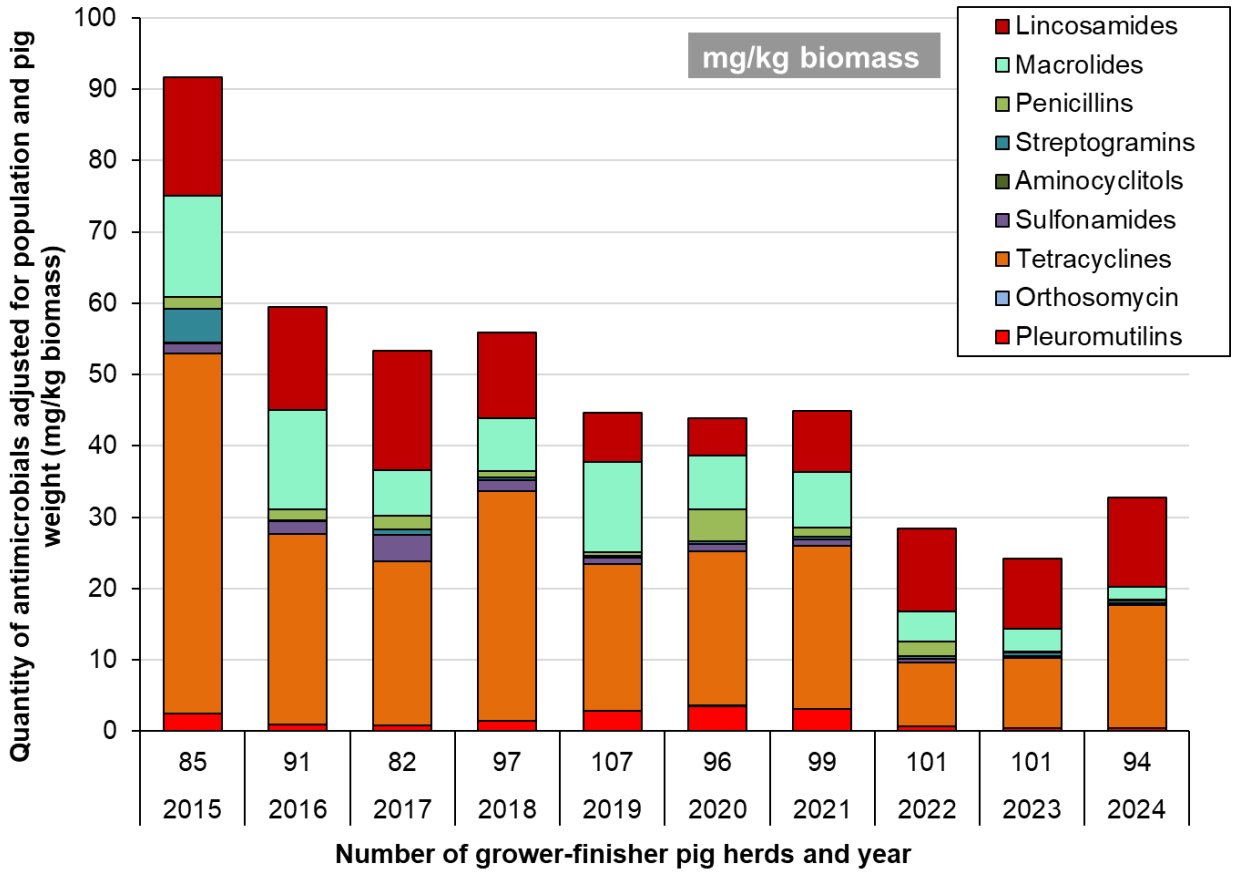
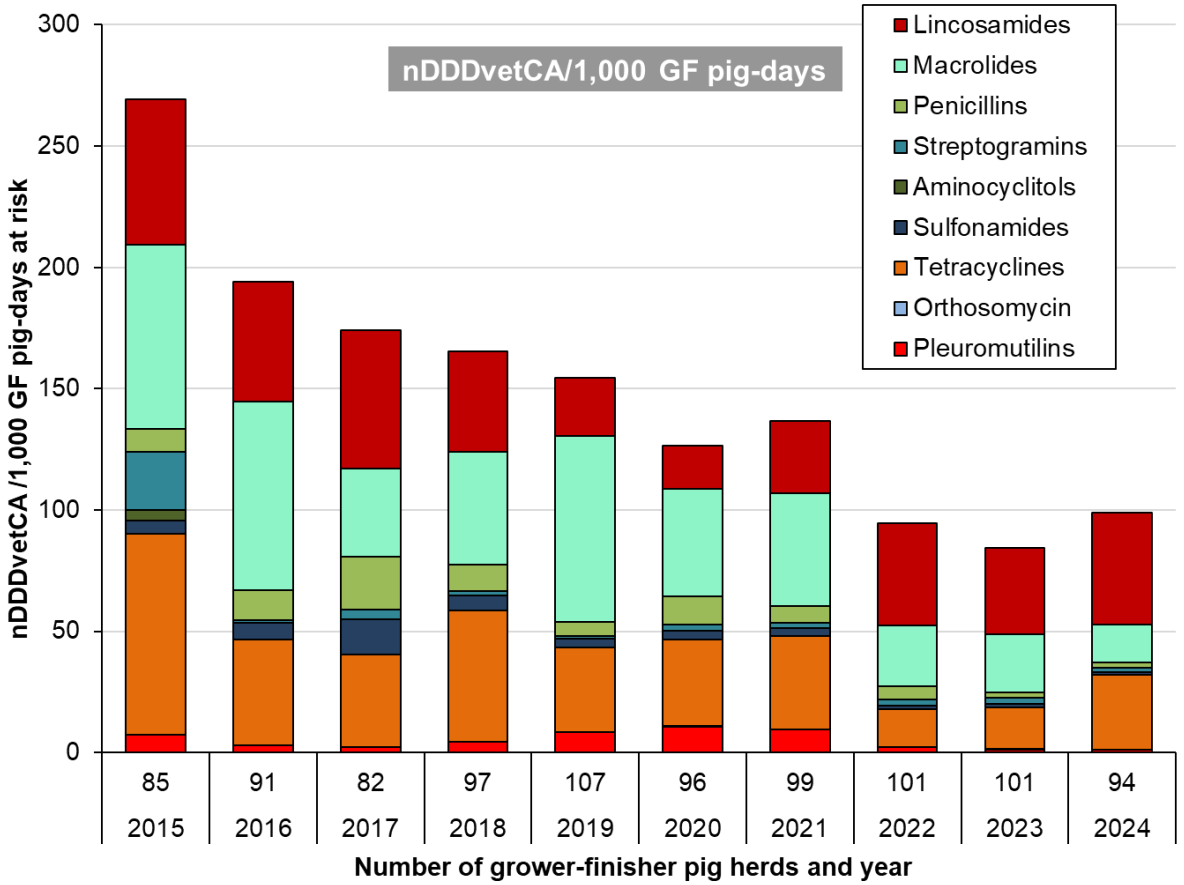
Between 2023 and 2024, trends in use differed by region and measure. Use increased in mg/kg biomass in all regions, and in defined daily doses use increase in the Prairies and Quebec and decreased in Ontario.

Overall decreasing trend in use since 2015 (-61% nDDDvetCA/1000 GF pig-days, -64% mg/kg biomass)

Use is highest in the Prairies, followed by Ontario, and lowest in Quebec.

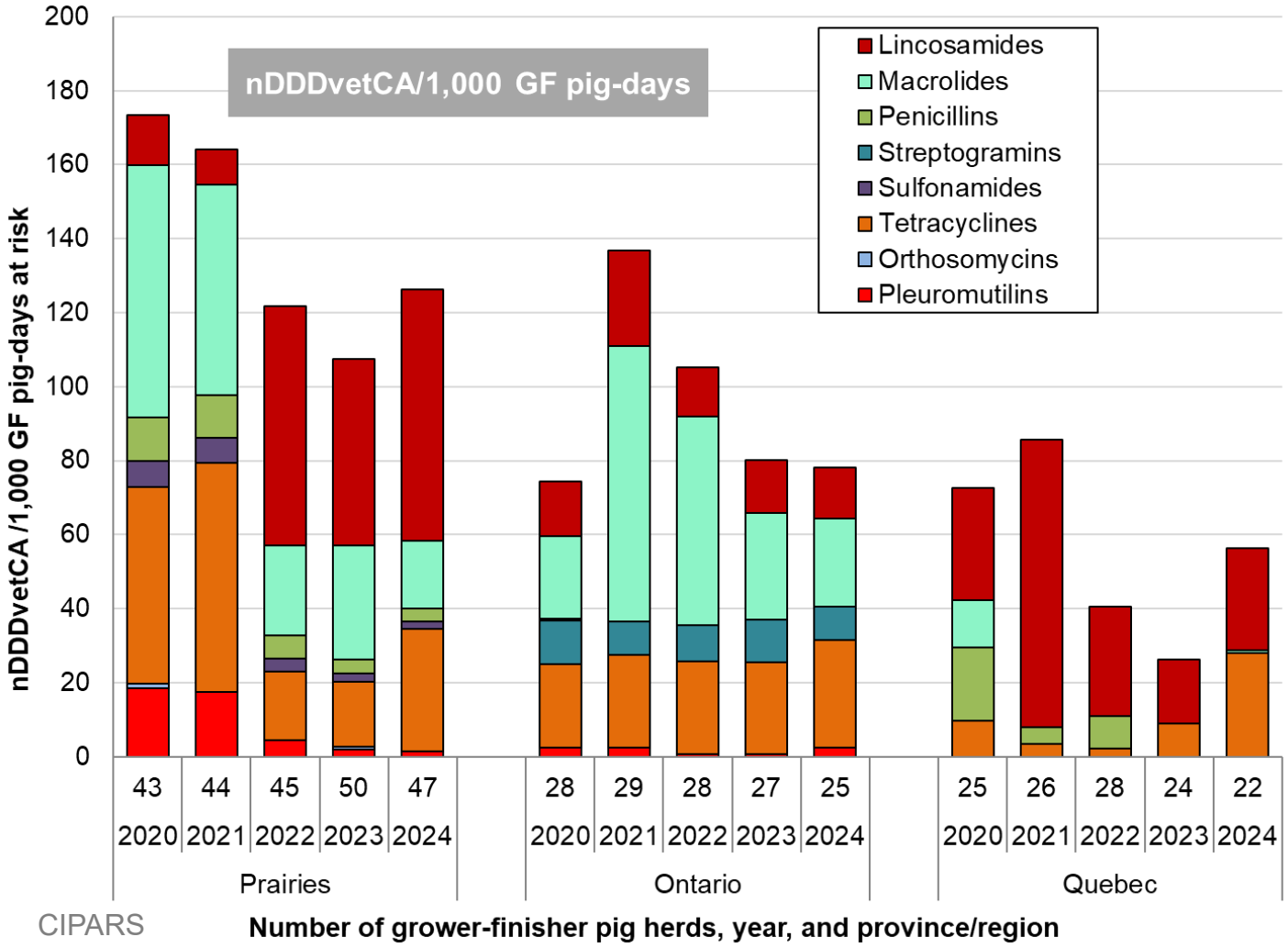
Quantity of use in feed





In defined daily doses:
MIAs: decreased by 63% since 2015**, increased** by 17% since 2023
Tetracyclines: **decreased** by 63% since 2015, **increased** by 80% since 2023
Macrolides: decreased by 79% since 2015, **decreased** by 34% since 2023
Lincosamides: decreased by 23% since 2015, **increased** by 30% since 2023

Quantity of use in feed



Prairies

- Decrease of 27% in MIA use in feed relative to 2020, due to decreases in tetracycline and macrolide use
- Notable 398% increase in use of lincosamides
- Sulfonamides only used in the Prairies
- Increase of 35% in use relative to 2023

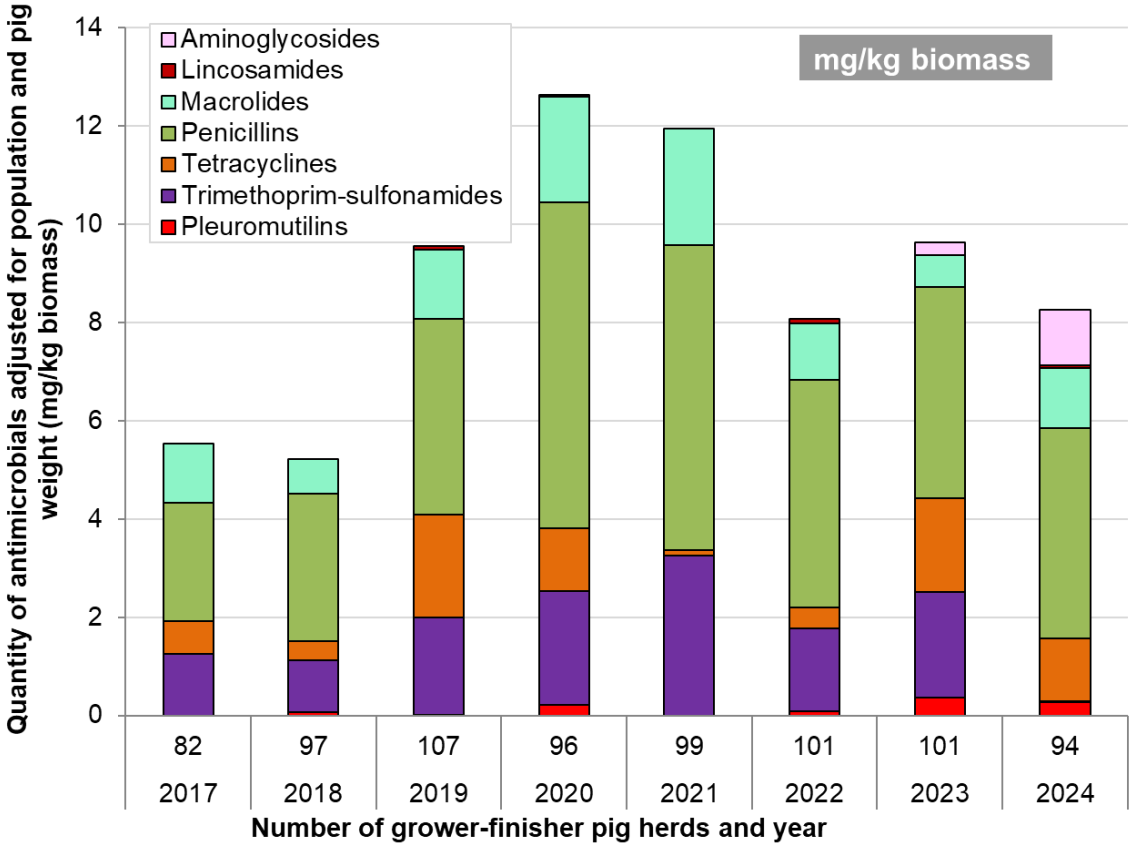
Ontario

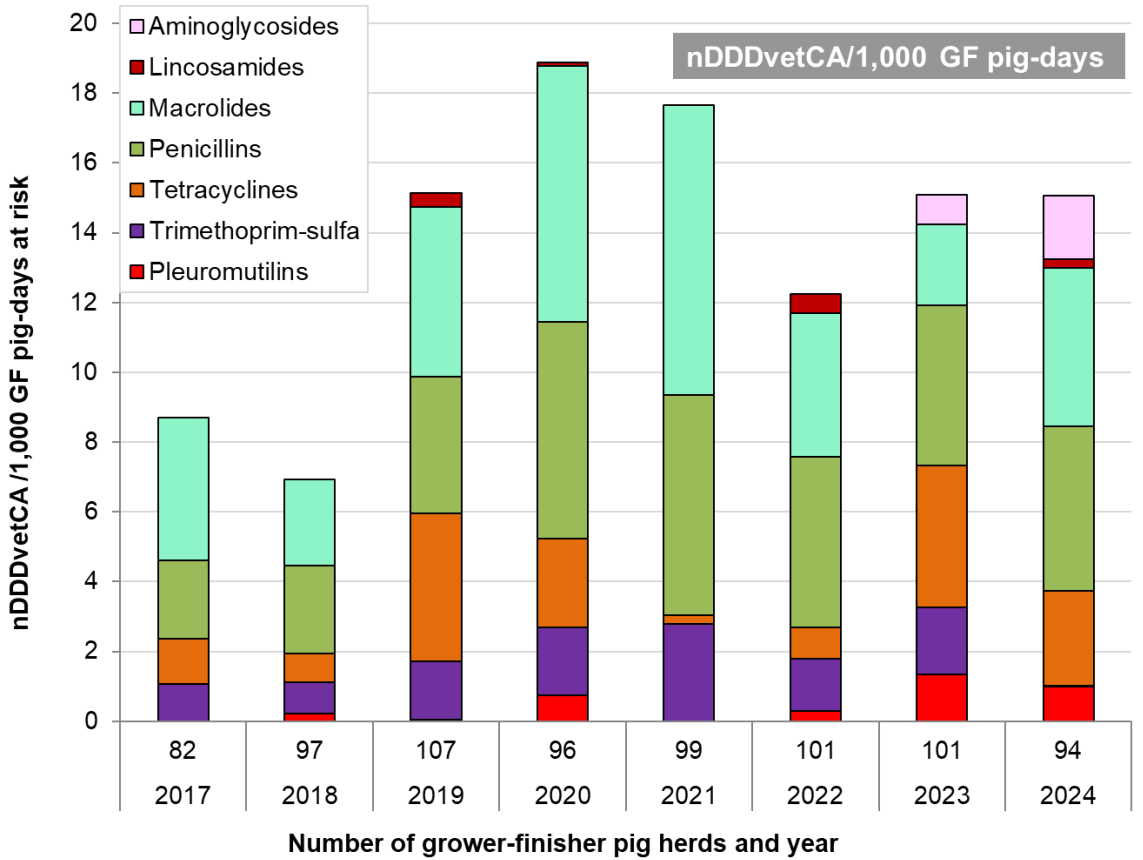
- Increase of 5% in MIA use in feed since 2020, due to increases in tetracycline and macrolide use
- Streptogramins only used in Ontario
- Small (2%) decrease in use relative to 2023

Quebec

- Decrease of 22% in MIA use in feed relative to 2020 due to decreases in macrolide and penicillin use
- Increase between 2023-2024 due to increases in tetracycline and lincosamide use

Quantity of use in water





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In defined daily doses:

MIAs: increased by 73% since 2017**, decreased** by <1% since 2023

Penicillins: **increased** by 109% since 2017, **increased** by 2% since 2023

Macrolides: increased by 12%% since 2017, **increased** by 95% since 2023

TMS: decreased by 97% since 2017, **decreased** by 98% since 2023

Tetracyclines: increased by 108% since 2017, **decreased** by 33% since 2023

Quantity of use in water

Prairies

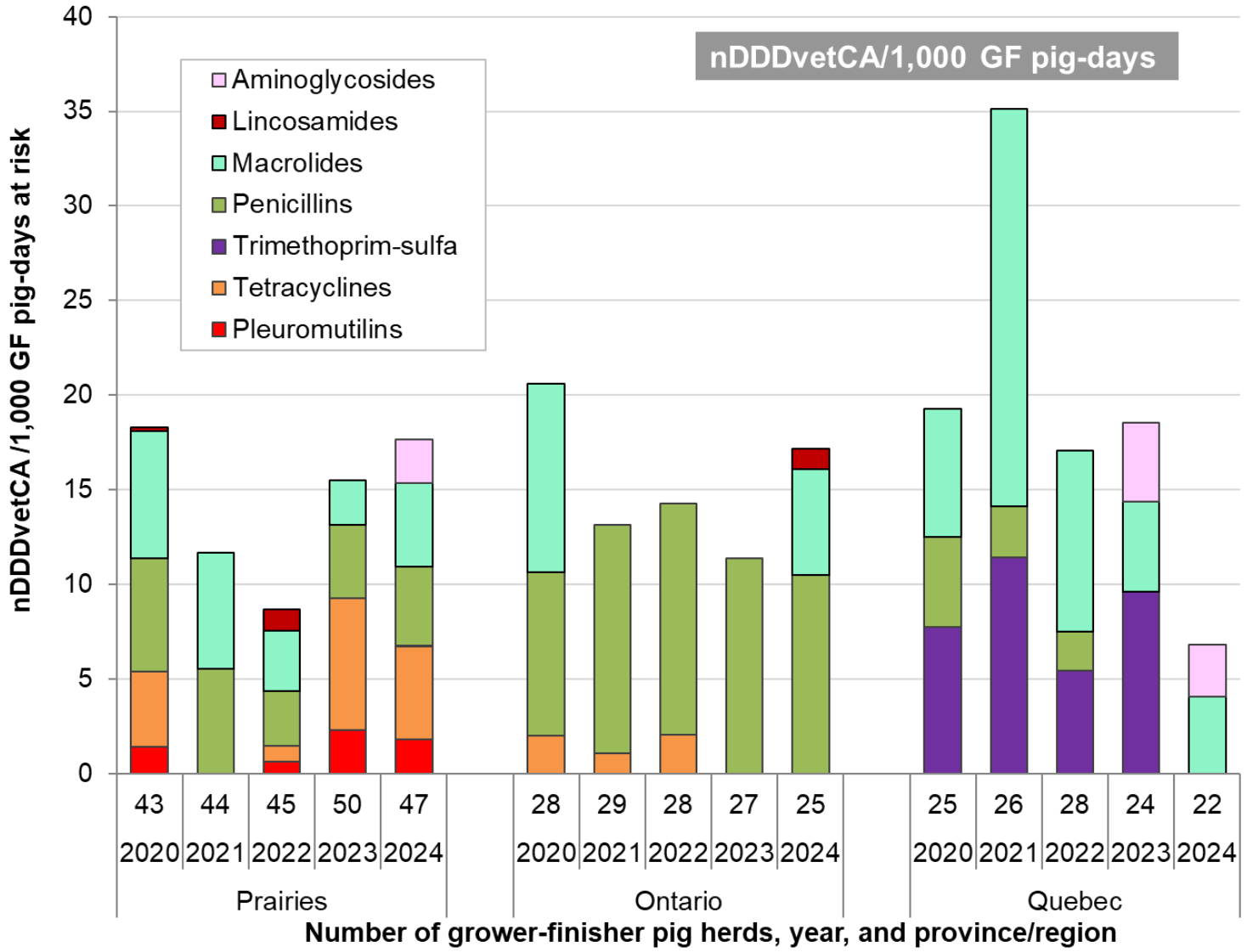
- Decrease of 3% in MIA use relative to 2020, due to decrease in macrolide and penicillin use
- Increase of 14% in MIA use in water since 2023, due to increase in macrolide use

Ontario

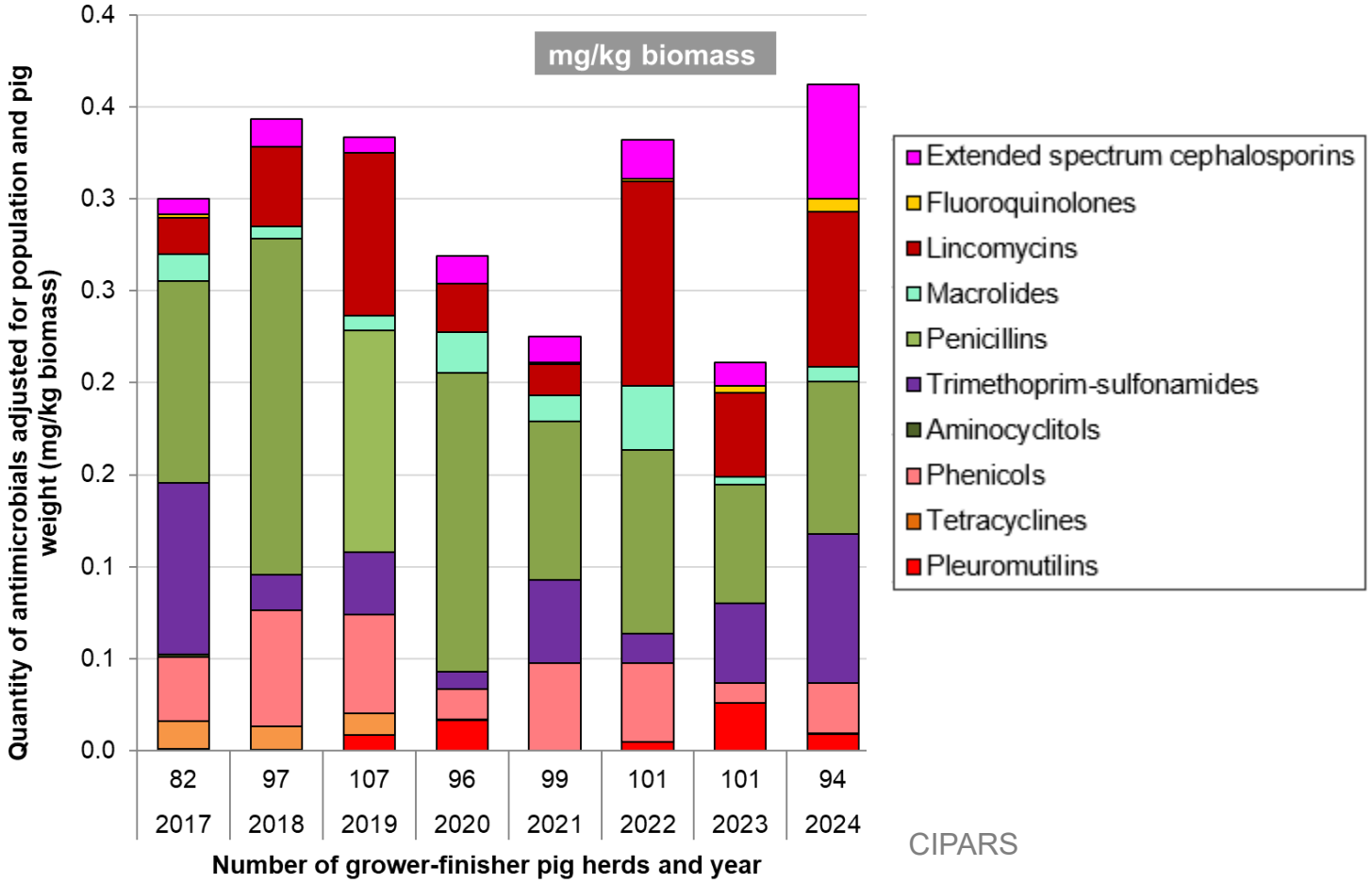
- Decrease of 16% in MIA use relative to 2020, due to decrease in macrolide use
- Increase of 51% in MIA use since 2023 due to increase in macrolide and lincosmaide use

Québec

- Decrease of 65% in MIA use relative to 2020, due to decreased TMS and penicillin use
- Decrease of 63% in MIA use relative to 2023, due to decreased TMS use



Quantity of use by injection



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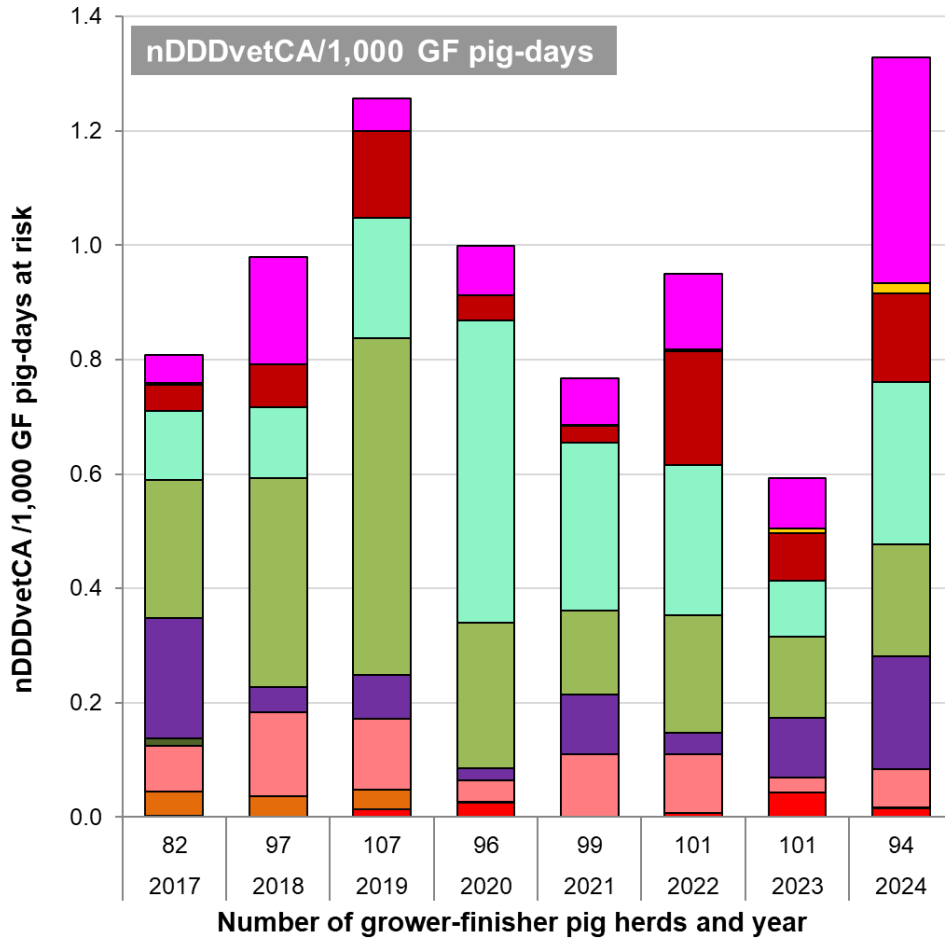


In defined daily doses:

MIAs: increased by 64% since 2017, **increased** by 124% since 2023

Penicillins: decreased by 18% since 2017, **increased** by 39% since 2023

Macrolides: increased by 133% since 2017, **increased** by 190% since 2023

Lincosamides: increased by 243% since 2017, **increased** by 87% since 2023

3rd gen cephalosporins: increased by 711% since 2017, **increased** by 349% since 2023

Quantity of use by injection

Prairies

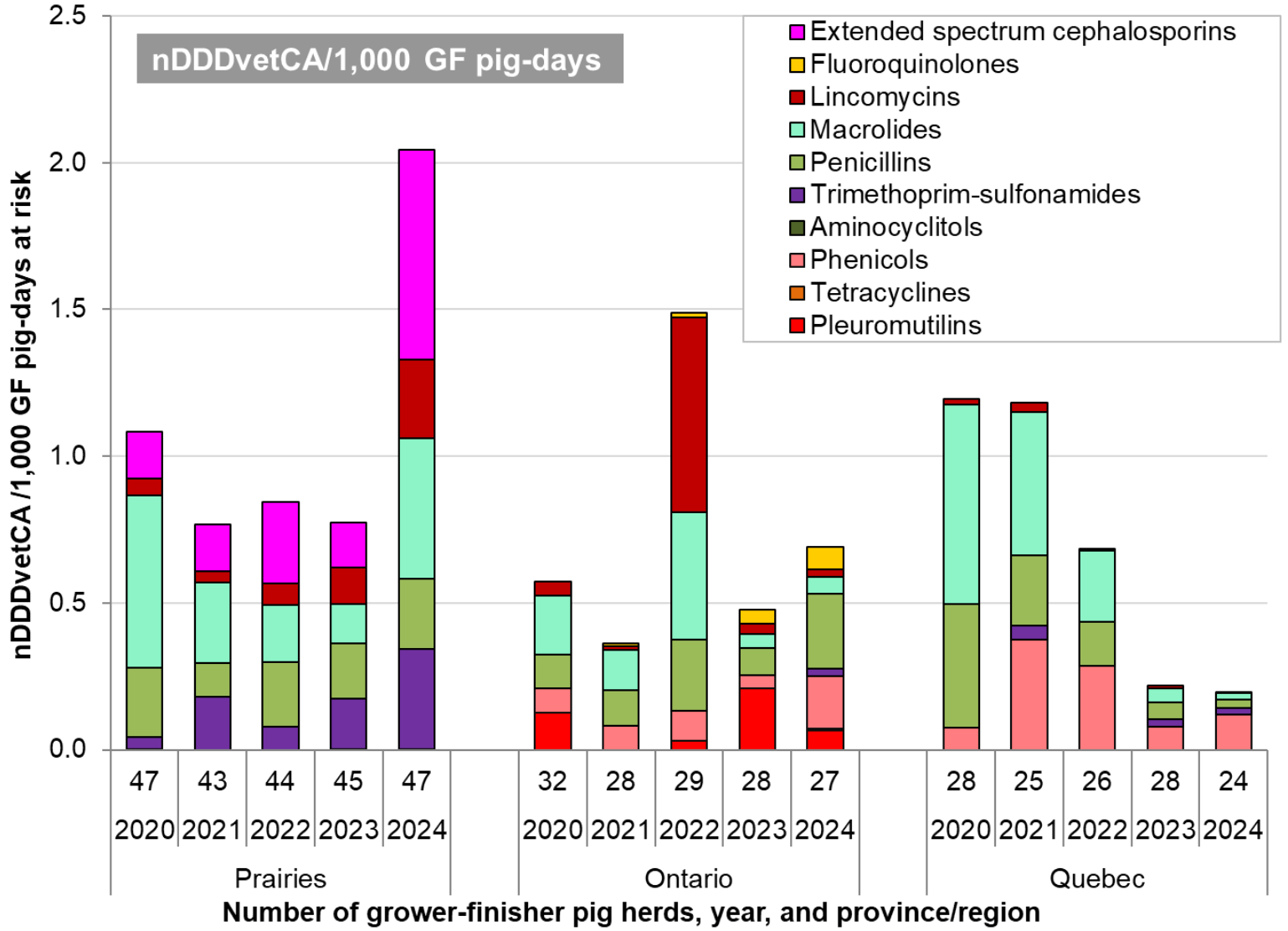
- Increase of 345% in MIA use relative to 2020, due to increased 3rd gen cephalosporin, lincosamide, and TMS use
- Increase of 375% in MIA use relative to 2023

Ontario

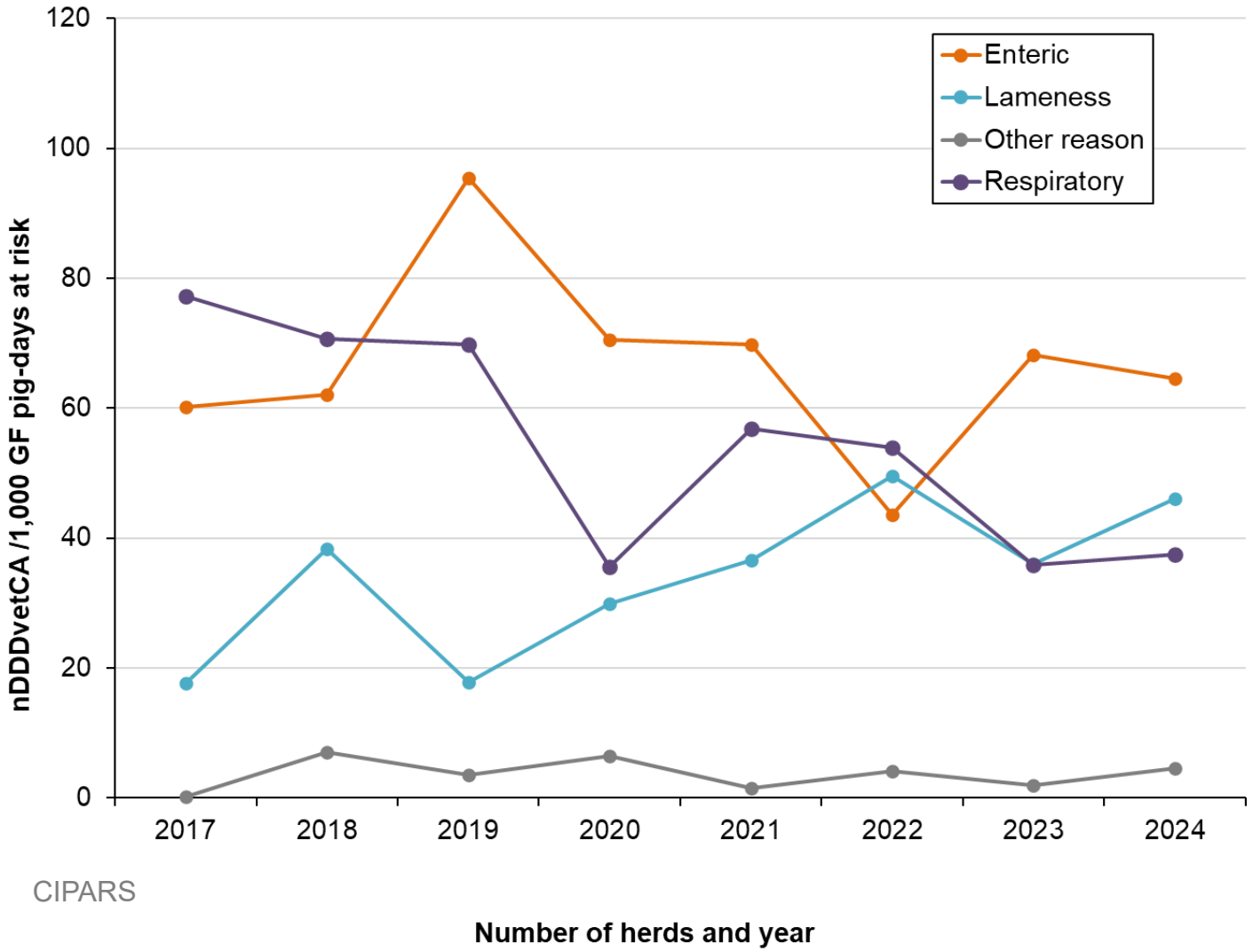
- Increase of 21% in MIA use relative to 2020 due to increased penicillin, phenicol, and fluoroquinolone use
- Increase of 45% in MIA use relative to 2023
- Increase of 63% in fluoroquinolone use since 2023

Quebec

- Decrease of 83% in MIA use relative to 2020 due to decreases in macrolide and penicillin use
- Decrease of 10% in MIA use relative to 2023
- No Category I use



Reasons for use



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Since 2017:

- Respiratory disease – 51% decrease
- Enteric disease – 7% increase
- Lameness – 160% increase

Since 2023:

- Respiratory disease – 4% increase
- Enteric disease – 5% decrease
- Lameness – 28% increase

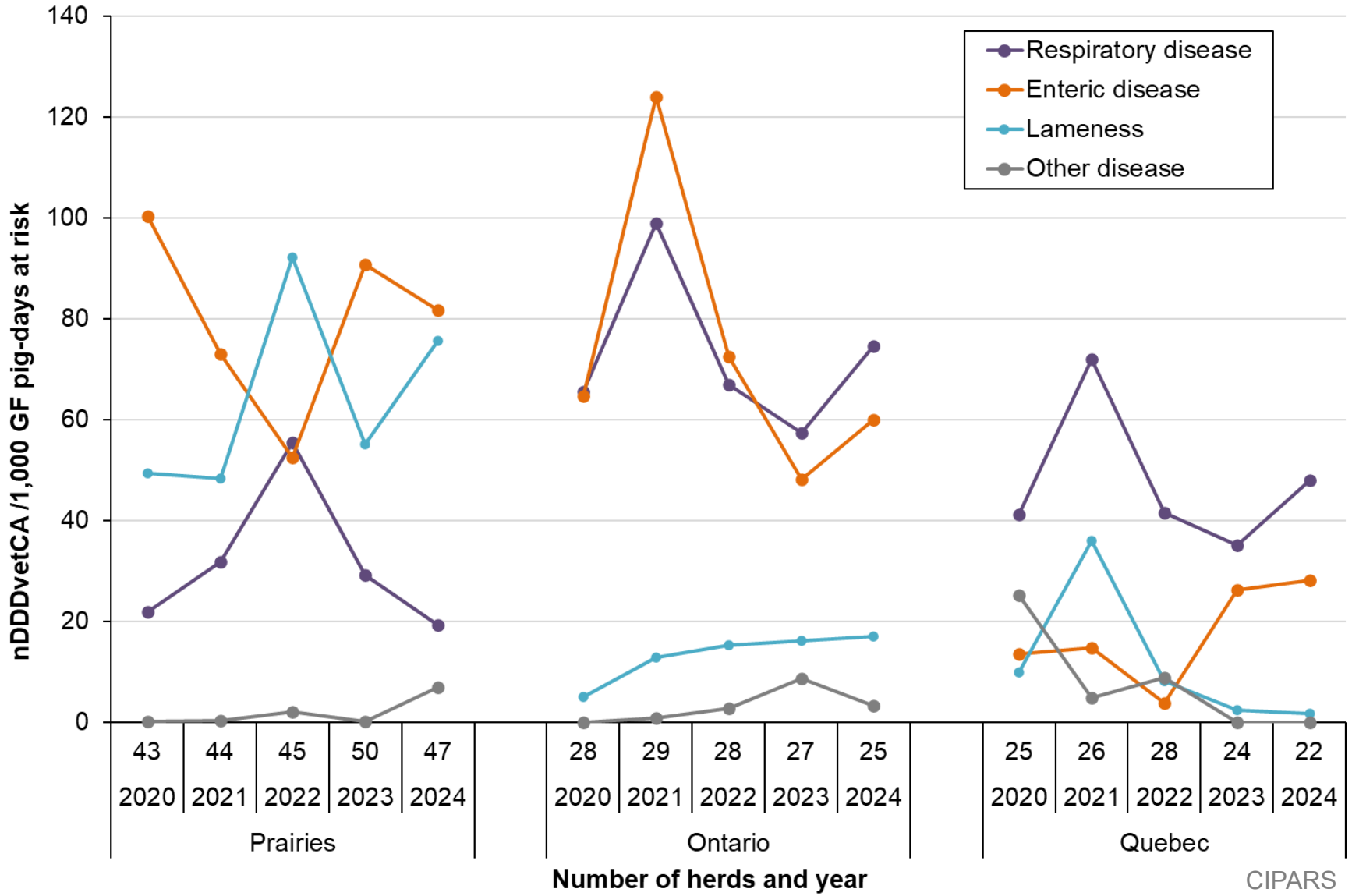
The quantity of use for lameness is now higher than the quantity of use for respiratory disease.

Reasons for use

Prairies:
- Use for lameness is similar to use for enteric disease

Ontario:
- Most use is for enteric and/or respiratory disease

Quebec:
- Most use is for respiratory disease
- Use for enteric disease is increasing



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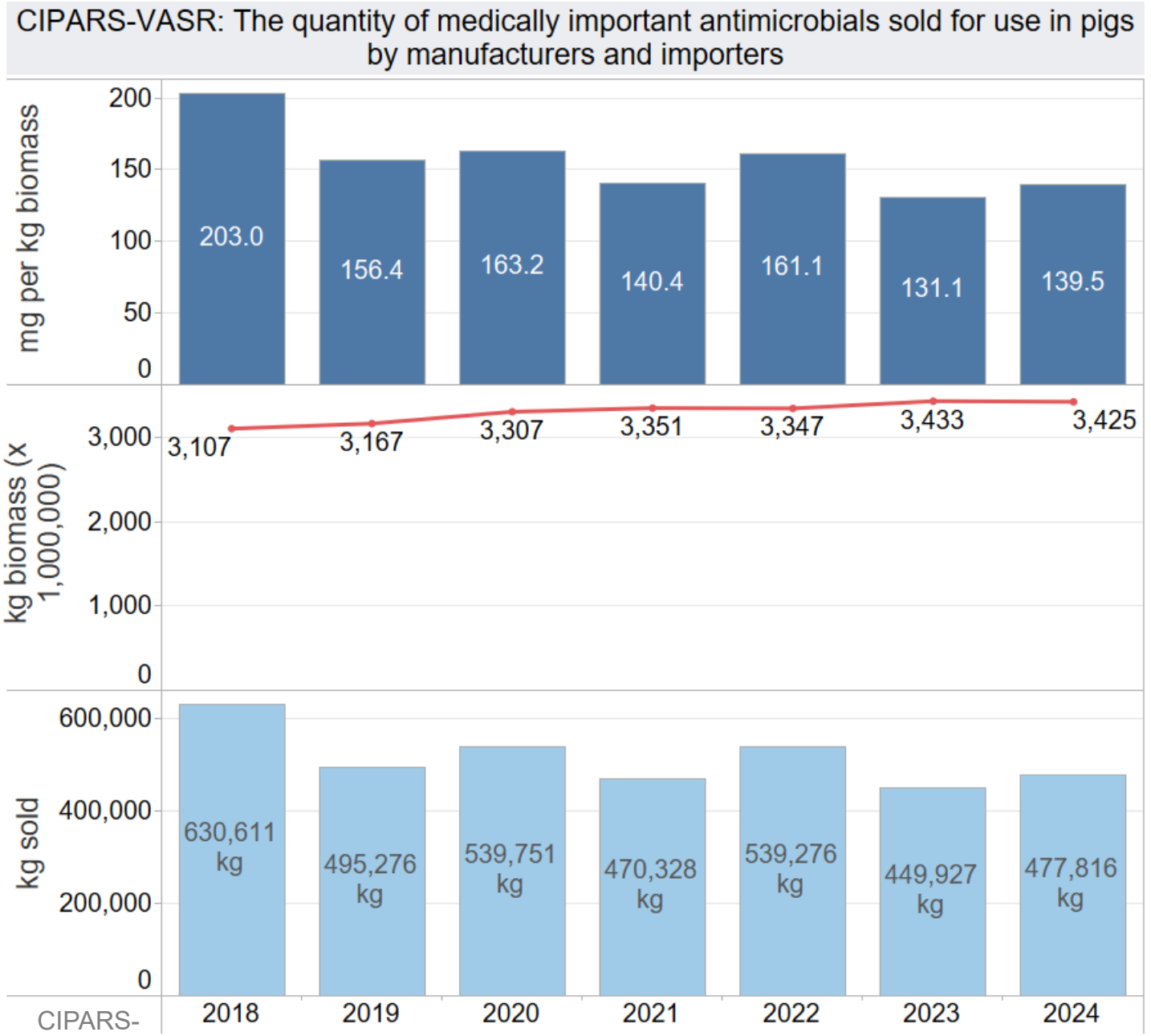
Sales data (VASR)

Manufacturers and importers

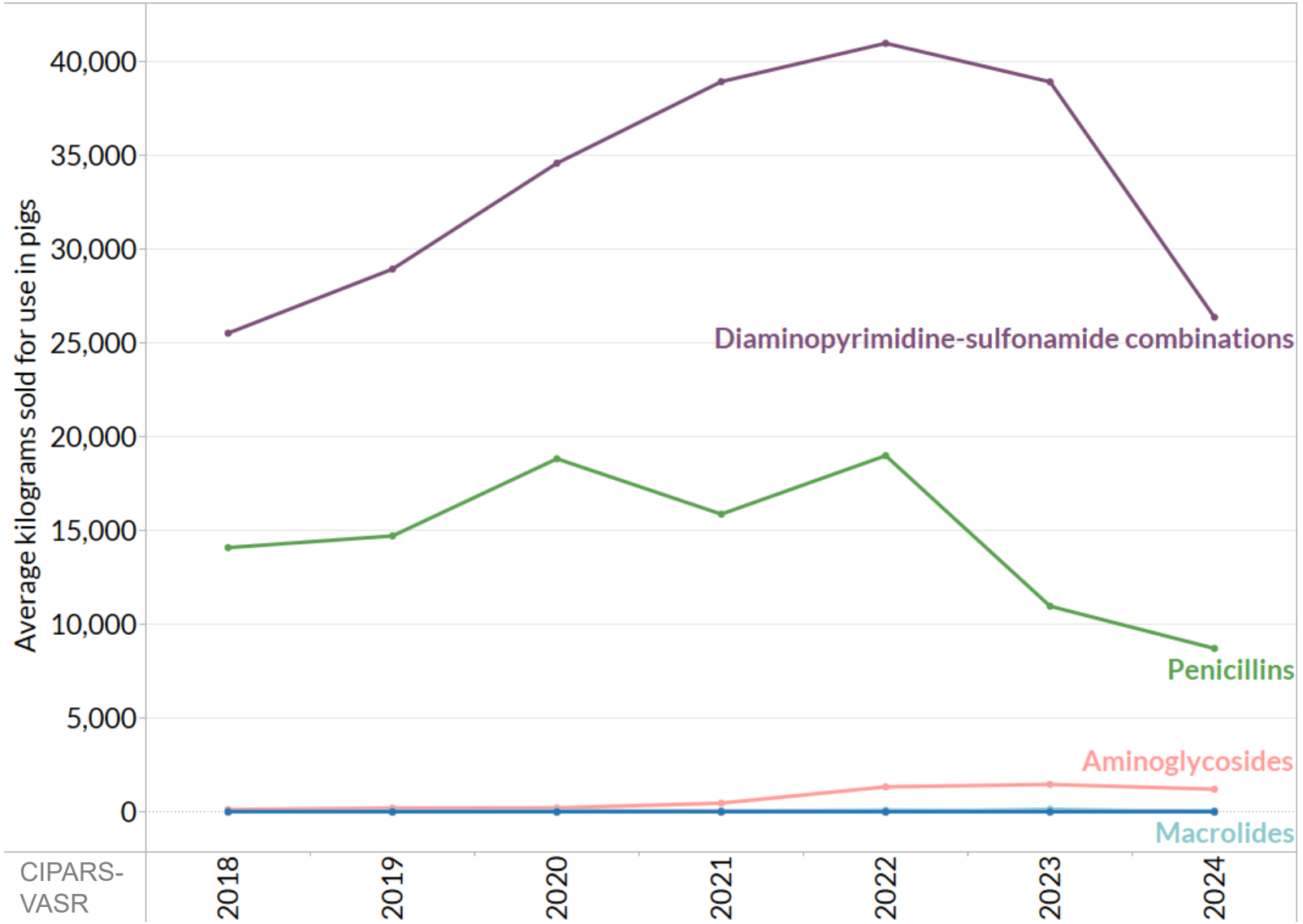
In 2024, the quantity of antimicrobials sold for use in pigs increased (in both kg and mg/kg biomass).

- pigs had the second highest quantity of antimicrobials sold, compared to other species groups
- approximately 477,816 kg were sold for use in pigs in 2024
- primarily Category II and III antimicrobials (53% of sales for pigs are tetracyclines)
- primarily for use in feed

There has been a small increase in the biomass of pigs produced since 2018.



Sales data (VASR)



Compounders

Approximately **82%** of medically important antimicrobials reported by compounders were intended for use in pigs.

- ~ 36,000 kgs sold for use in pigs in 2024 (down from ~ 52,000 kg in 2023)
- primarily for use in water
- primarily sold in Quebec, followed by Ontario

Antimicrobial resistance

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Canada

AMR (Farm)

Recovery

E. coli

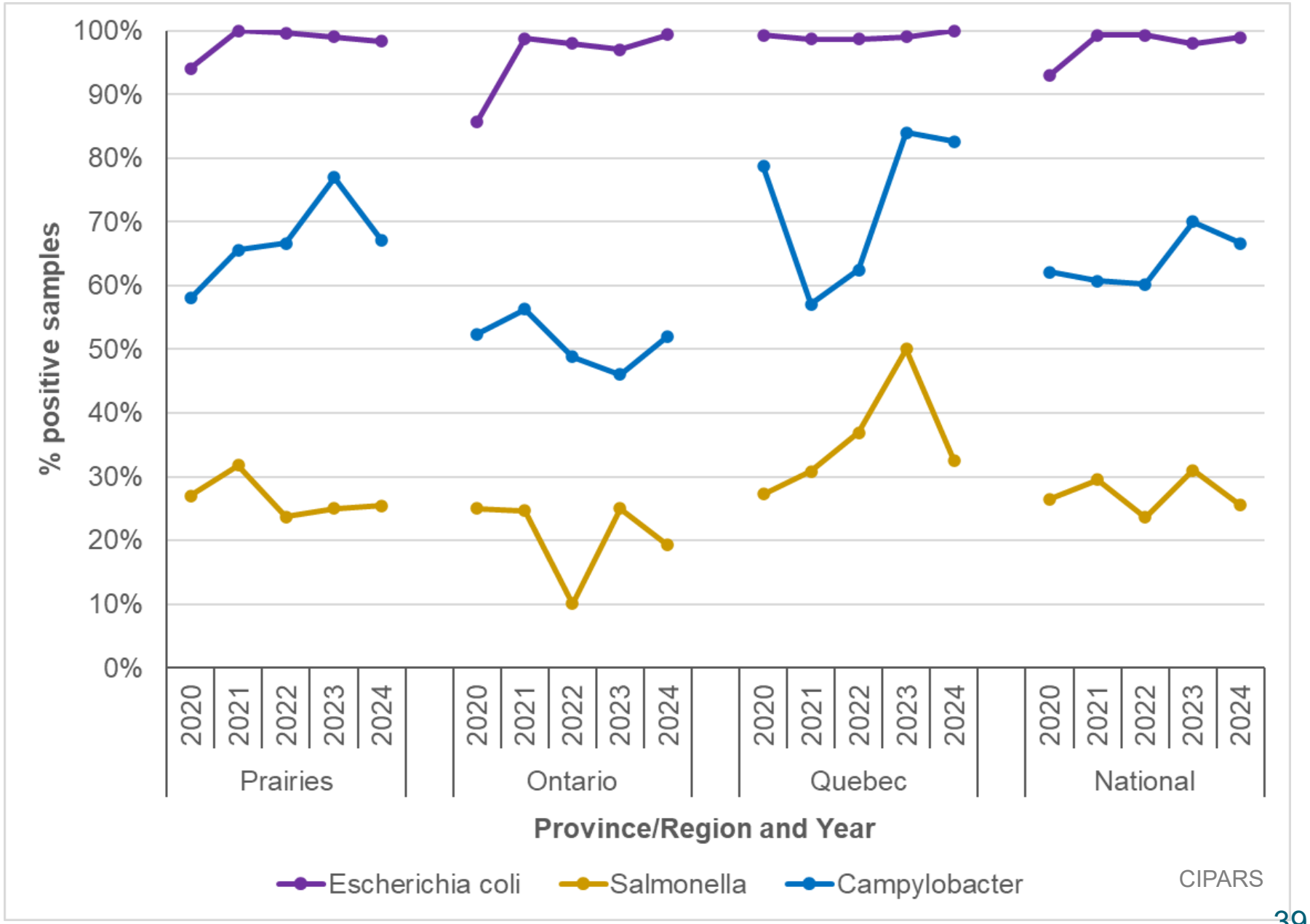
- stable across all regions

Salmonella

- decrease in Quebec in 2024 after increasing trend
- one year decrease in Ontario in 2022

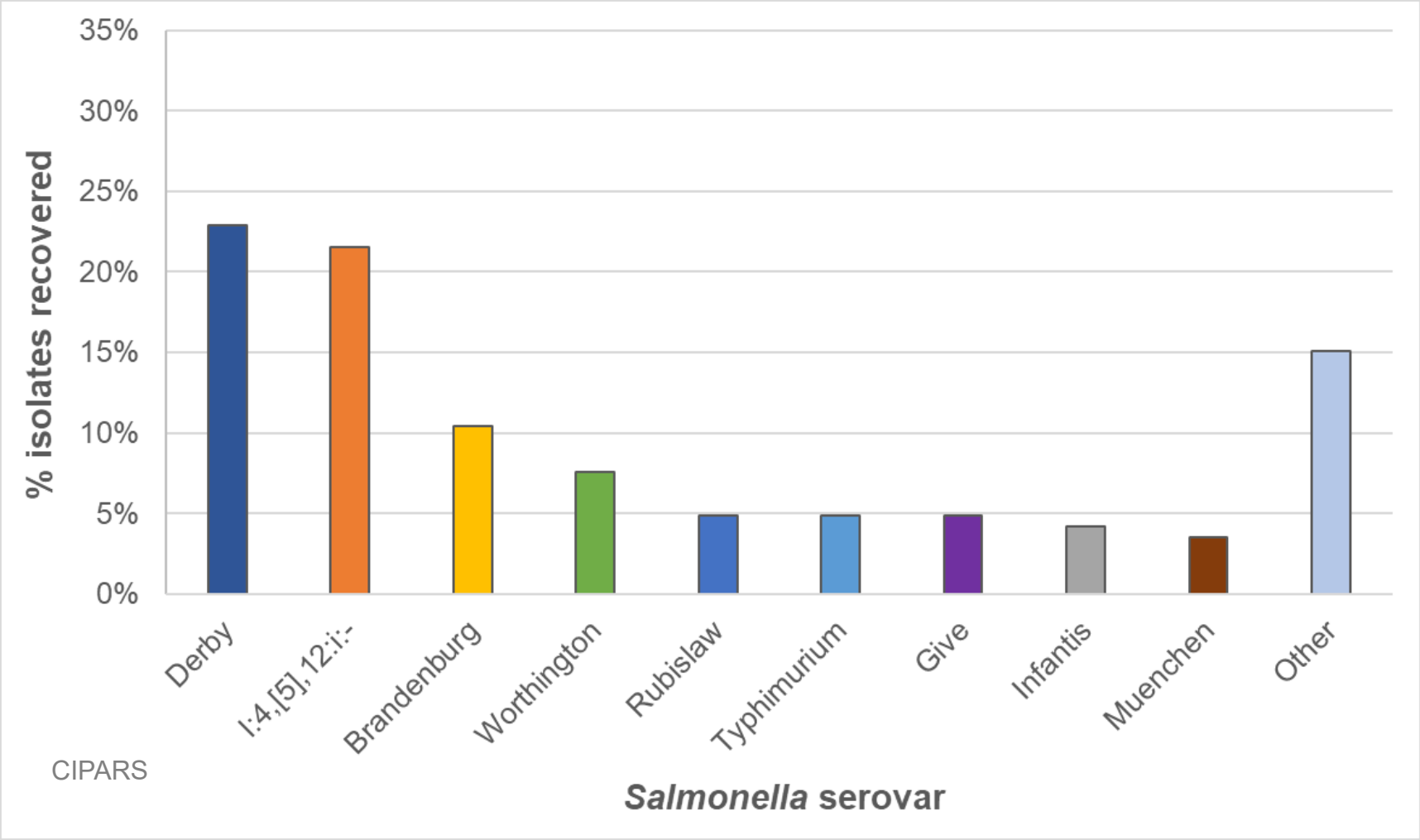
Campylobacter

- decrease in Prairies in 2024 after increasing trend



AMR (Farm) – *Salmonella*

Serovar distribution



In 2024, the majority of the isolates recovered were Derby and I 4,[5],12:i:-.

The frequency of recovery of Typhimurium has been decreasing each year since 2019.

There are regional differences in the spectrum of serovars recovered.

AMR (Farm) – *Salmonella*

While tetracycline resistance remains very high, it has decreased since 2015.

Significant increase in resistance to TMS in 2024 since 2020.

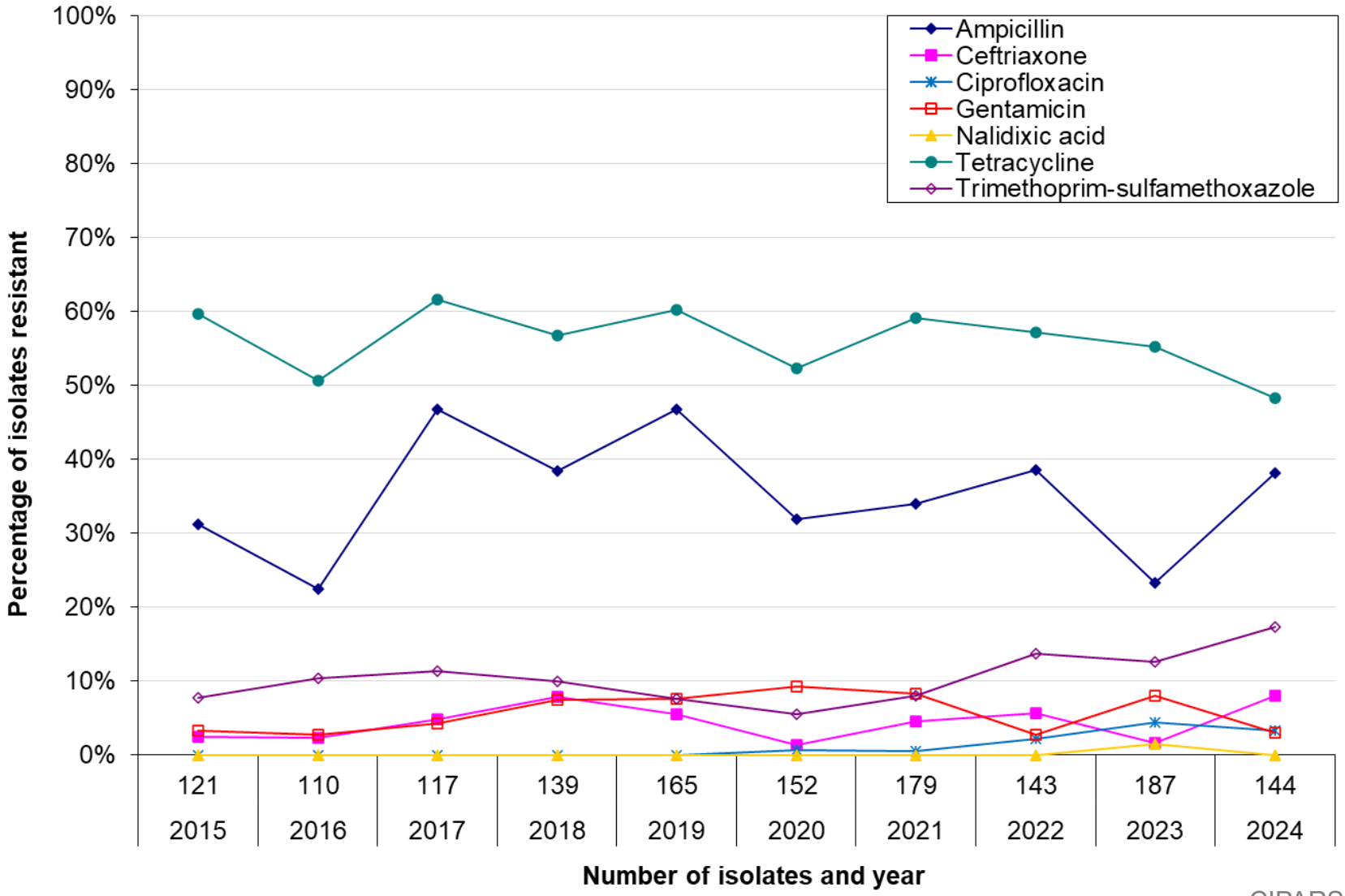
Significant increase in ciprofloxacin resistance from 1% in 2020 to 3% in 2024.

One isolate was resistant to 9 antimicrobials.

41% were susceptible to all tested antimicrobials.

35% resistant to 3 or more antimicrobial classes (similar to 2023).

No resistance to meropenem or colistin.



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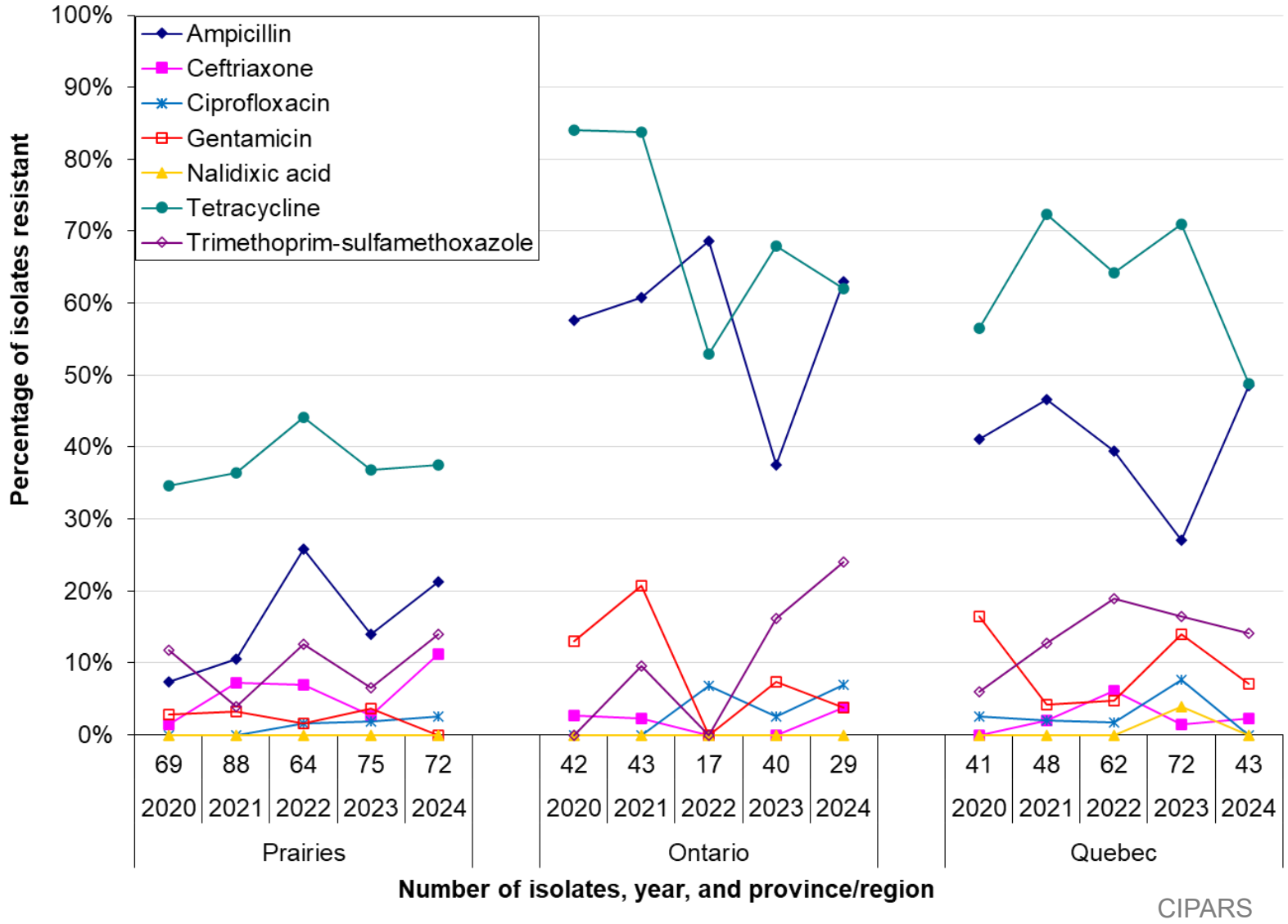
AMR (farm) - *Salmonella*

Prairies
- significant increase in ceftriaxone and TMS resistance since 2020

Ontario
- significant increase in ampicillin resistance since 2023
- significant decrease in tetracycline resistance since 2020

Quebec
- significant increase in ampicillin resistance since 2023
- significant decrease in tetracycline resistance since 2023

Ciprofloxacin resistance increased in Ontario and the Prairies starting in 2022 and decreased in Quebec from 8% in 2023 to 0% in 2024.



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AMR (Farm) – *E. coli*

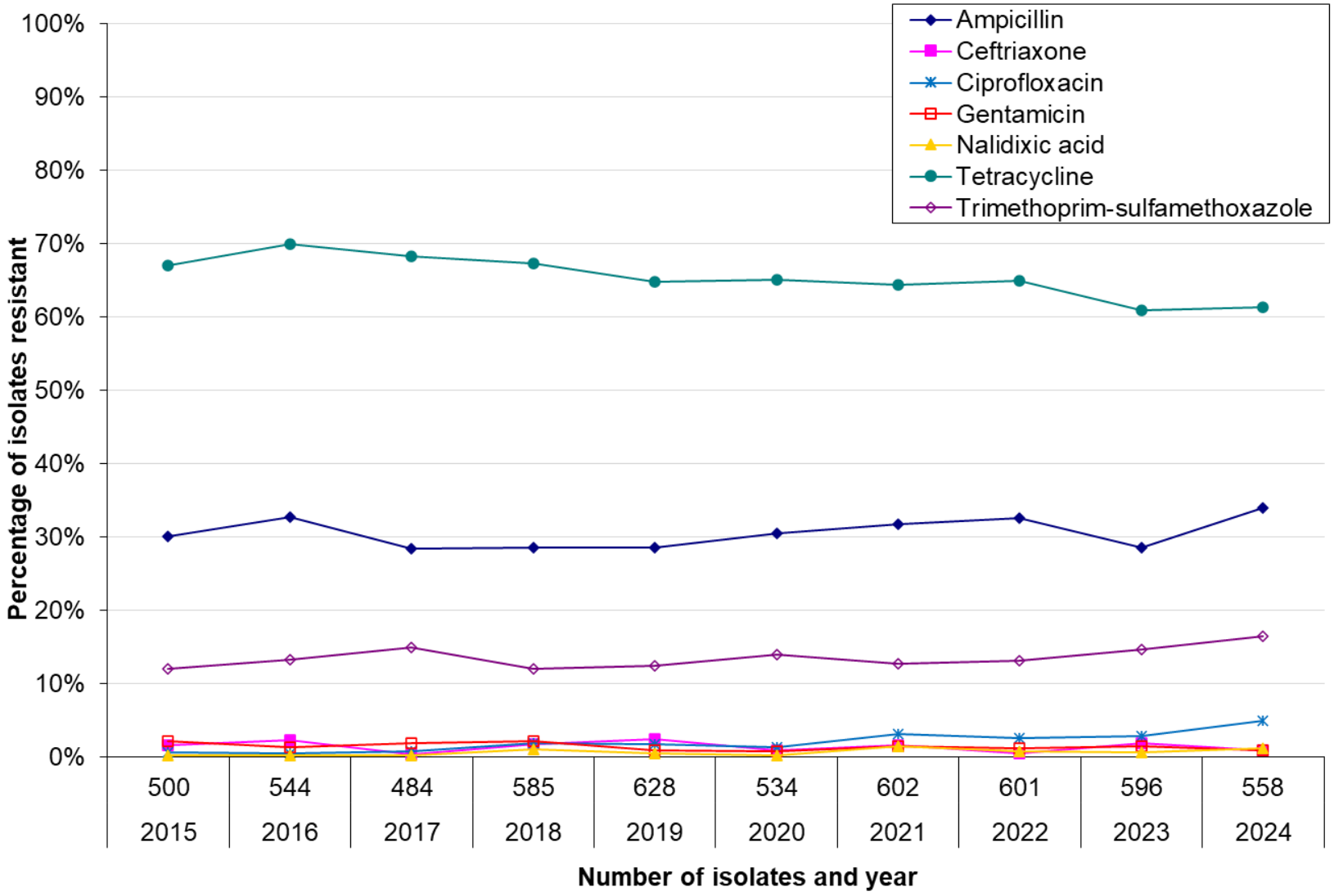
Significant decrease in tetracycline resistance since 2015.

Significant increase in ciprofloxacin resistance since 2015 (from 1% to 5%).

30% isolates susceptible to all tested antimicrobials.

20% resistant to 3 or more antimicrobial classes (similar to 2023).

No resistance to meropenem or colistin in 2024.



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AMR (Farm) – *E. coli*

Prairies

- No significant changes in resistance since 2020 or since 2023.

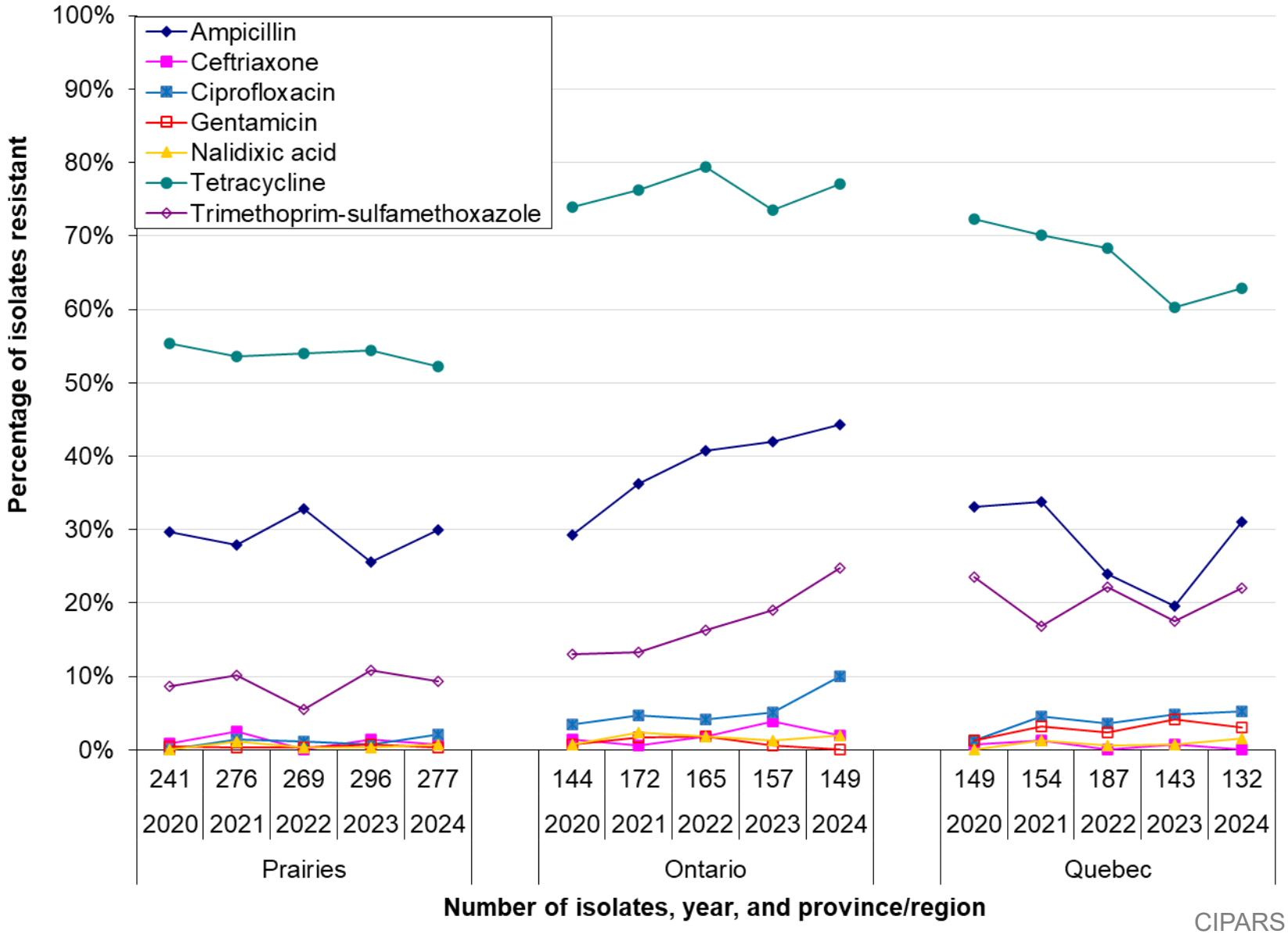
Ontario

- Significant increase in ciprofloxacin, ampicillin and TMS resistance since 2020

Quebec

- Significant decrease in tetracycline resistance since 2020
- Significant increase in ampicillin resistance since 2023

Ciprofloxacin resistance up 10% in Ontario, 5% in Quebec, 2% in the Prairies in 2024.



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AMR (farm) - *Campylobacter*

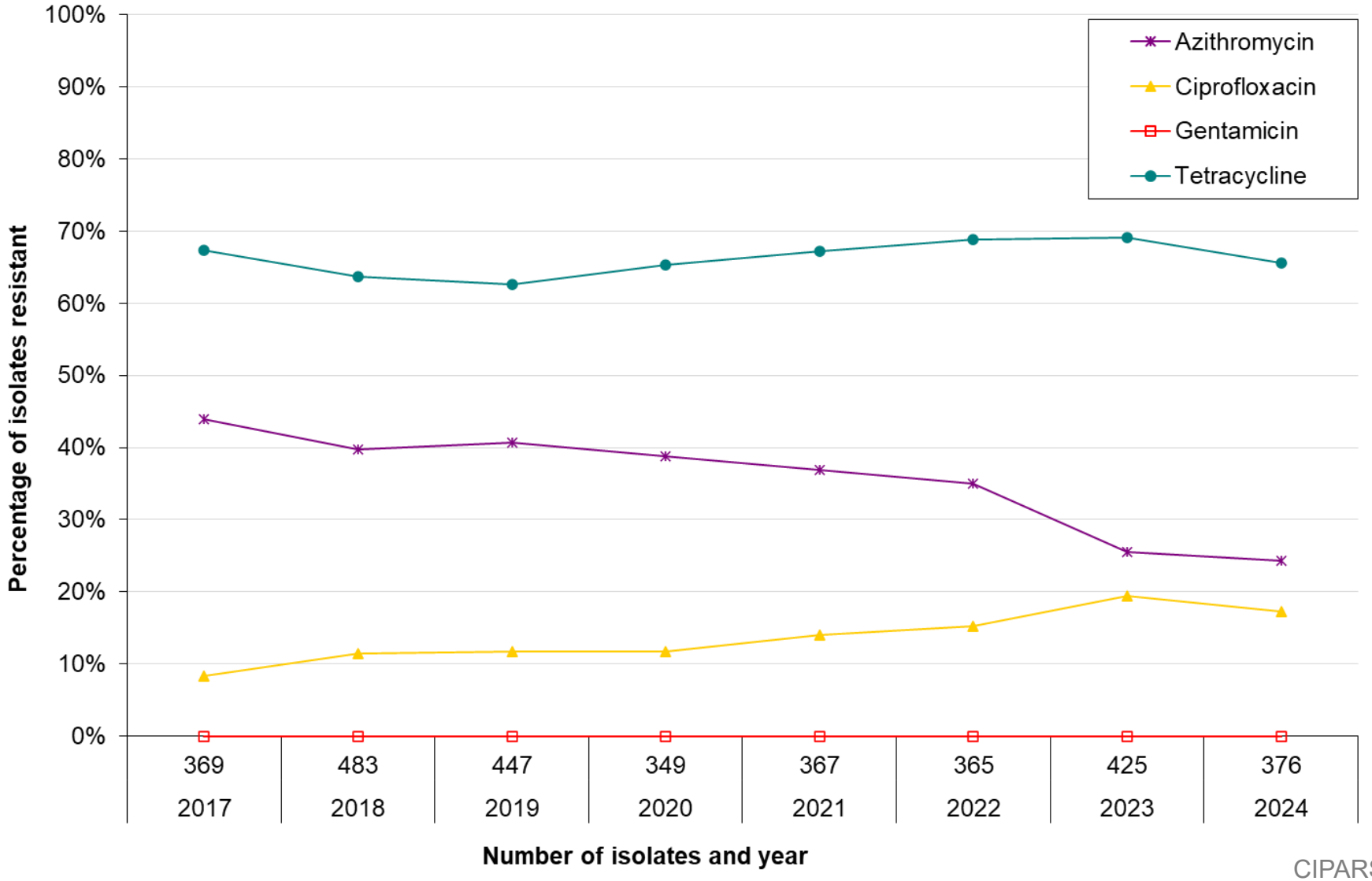
99% isolates were *C. coli*

Significant decrease in azithromycin resistance since 2017.

Significant increase in ciprofloxacin resistance since 2017 (from 8% to 17%).

27% of isolates were susceptible to all tested antimicrobials.

19% were resistant to 3 or more antimicrobial classes.



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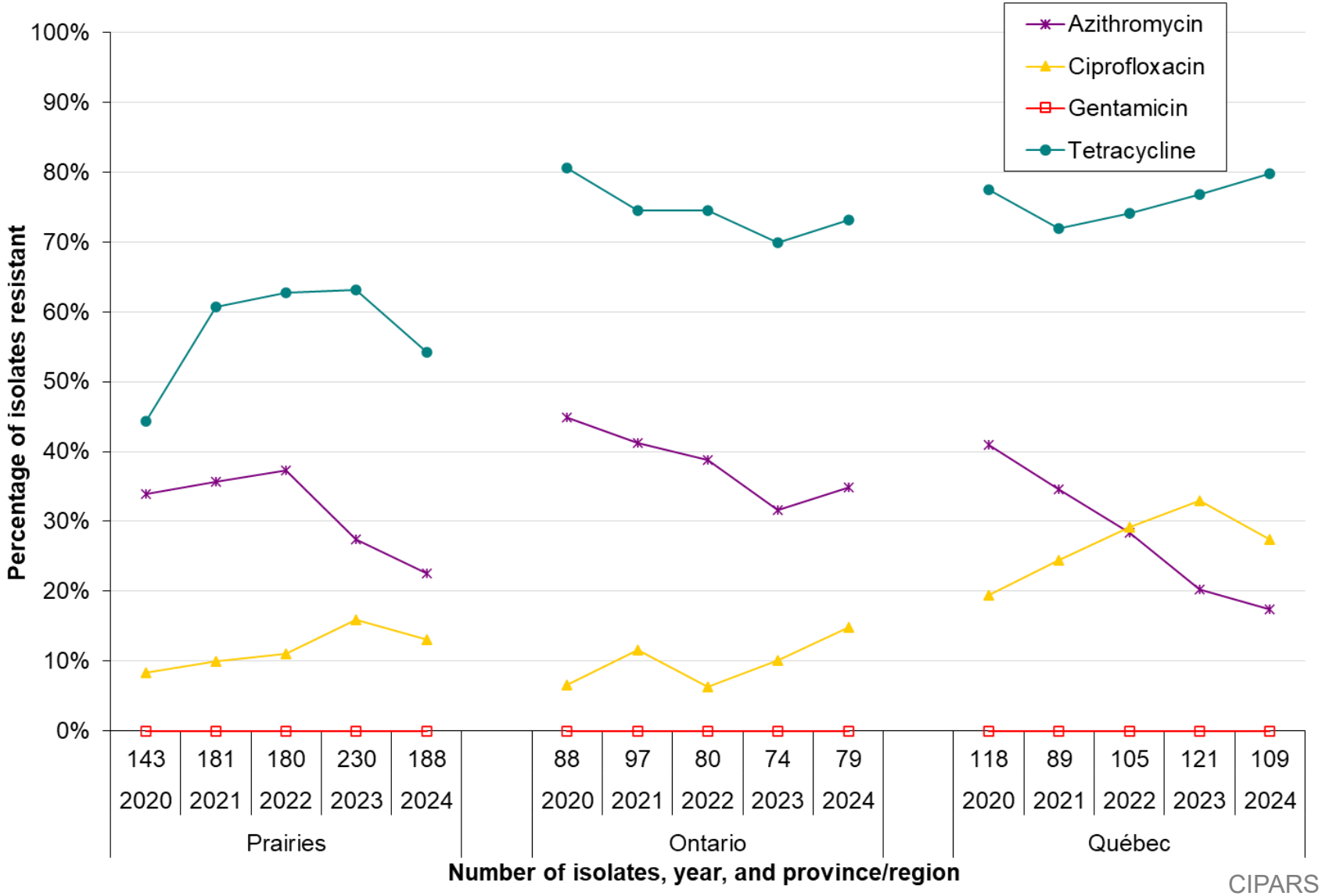
AMR (farm) - *Campylobacter*

Prairies
- Significant decrease in azithromycin resistance since 2020 and 2023
- Significant decrease in tetracycline resistance since 2023
- Ciprofloxacin resistance at 13% in 2024

Ontario
- No significant changes since 2020 or 2023
- Ciprofloxacin resistance at 15% in 2024

Quebec
- Significant decrease in azithromycin resistance since 2020
- Ciprofloxacin resistance at 27% in 2024



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AMR (Abattoir) – 2024 findings

Salmonella (n=121 pig isolates)

- Most common serovars: *Salmonella* Derby (n=33), I 4,[5],12:i:- (n=15), Uganda (n=14), Brandenburg (n=10).
- Resistance to tetracycline, ampicillin, and sulfisoxazole remains high
- Ciprofloxacin resistance increased from 0.6% in 2023 to 5% in 2024
- Two isolates from Manitoba, Senftenberg (n=1) and Braenderup (n=1) were resistant to 6 classes of antimicrobials.

E. coli (n=216 pig isolates)

- In 2024, 1 isolate was resistant to 7 classes of antimicrobials, and 2 isolates were resistant to 6 classes.
- Resistance to tetracycline remains very high, and resistance to ampicillin and sulfisoxazole remains high.
- Ciprofloxacin resistance remains around 3-4%.

Campylobacter (n=148 pig isolates*)

- Nearly all *Campylobacter* isolates were *Campylobacter coli* (n=140), except for 7 isolates that could not be speciated using PCR methodologies, and one isolate that was speciated as *C. jejuni*.
- Resistance to nalidixic acid increased to high levels in 2024 (21%)
- Ciprofloxacin resistance increased from 14% in 2023 to 19% in 2024.

*Three *Campylobacter* isolates had insufficient growth and were not included in AMR analyses.

Integrated AMU and AMR

Public Health Agency of Canada
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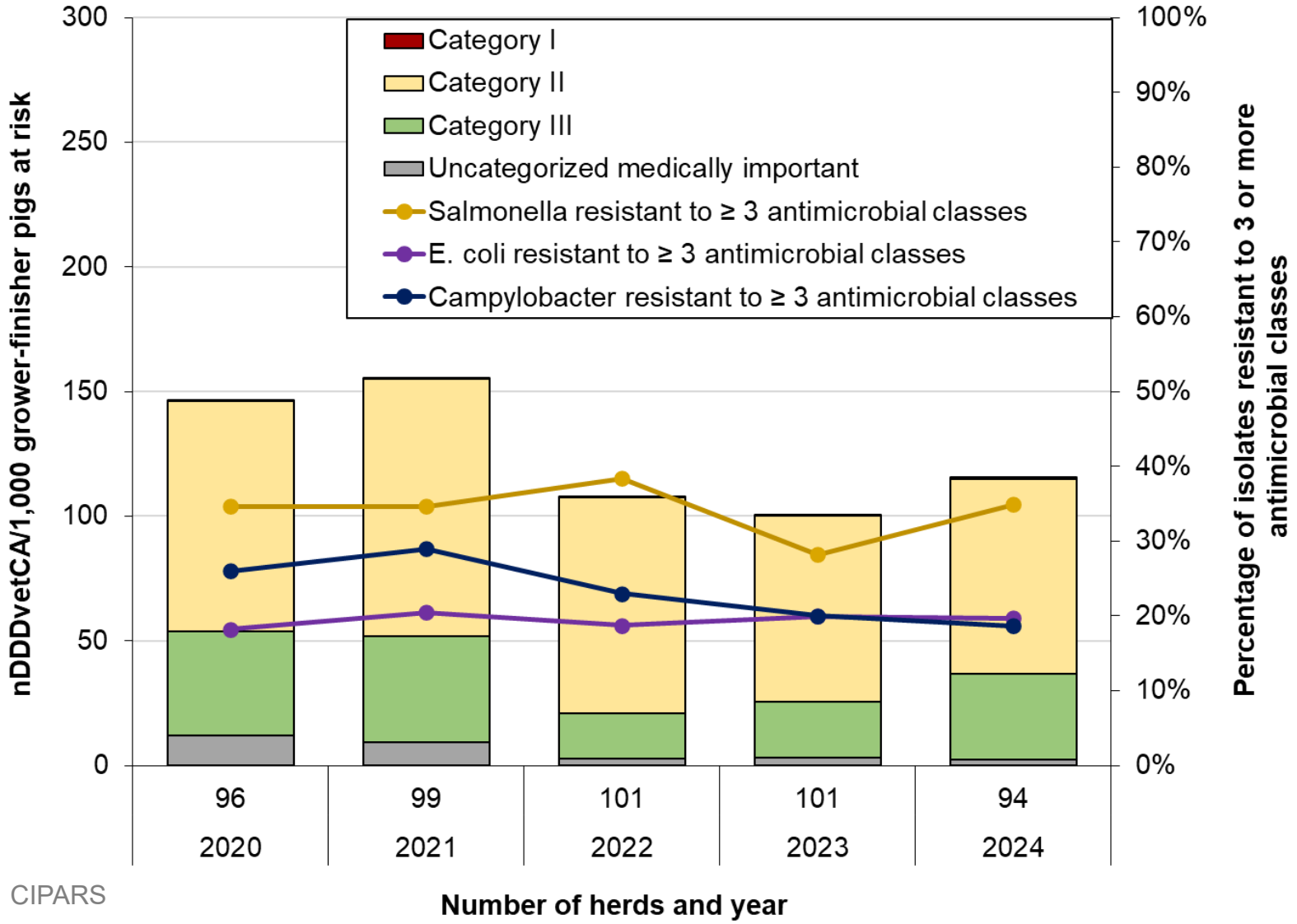
Canada

Integrated AMU and resistance to 3 or more classes



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Since 2020, there has been an overall decrease in the quantity of medically important antimicrobials used, with an increase in use between 2023 and 2024.

Percentage of isolates resistant to 3 or more classes:

- Similar between 2020 and 2024 for *Salmonella*
- Small increase for *E. coli*
- Decreasing trend for *Campylobacter*

Key messages

Key messages

- Since 2009, there has been an increase in the number of diseases herds are vaccinated against
- Since 2023, the quantity of antimicrobials used has increased, mostly due to an increase in the quantity of use in feed
- In 2024, there were large increases in the quantity of 3rd generation cephalosporin (ceftiofur) and fluoroquinolone (enrofloxacin) use by injection
- In 2024, the quantity of antimicrobials used for lameness was higher than the quantity used for respiratory disease

Key messages

- In 2024 the quantity of antimicrobials sold for use in pigs by manufacturers and importers increased (by 6% relative to 2023), and the quantity sold by compounders decreased (by 29% relative to 2023)
- Increases in ciprofloxacin resistance in *Salmonella*, *E. coli*, and *Campylobacter*
- Decreases in tetracycline resistance in *Salmonella* and *E. coli*, and decreases in azithromycin resistance in *Campylobacter*

Where can I find more information?

CIPARS Interactive data visualizations

https://www.canada.ca/en/public-health/services/surveillance/canadian-integrated-program-antimicrobial-resistance-surveillance-cipars/interactive-data.html

CARSS Interactive data visualizations

Farm: https://health-infobase.canada.ca/carss/amu/results.html?ind=06

Sales: https://health-infobase.canada.ca/carss/amu/results.html?ind=05

CIPARS website

https://www.canada.ca/en/public-health/services/surveillance/canadian-integrated-program-antimicrobial-resistance-surveillance-cipars.html

Acknowledgements

We would like to thank all those who contribute to CIPARS:

Human (AMR):

- NML Division of Enteric Diseases and PulseNet Canada
- Provincial Public Health Laboratories
- FoodNet Canada (FNC) and FNC Sentinel Sites (Campylobacter)
- National Enteric Surveillance Program (NESP)

Farm (AMR and AMU):

- Veterinarians, producers and component groups, and academic and federal partners who participate in the farm component
- Saskatchewan Agriculture
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- Dairy Cattle Surveillance: Funding provided by Dairy Farmers of Canada Dairy Research Cluster as part of the Canadian Agricultural Partnership.
- Fisheries and Oceans Canada (DFO)

Abattoir:

Canadian Food Inspection Agency, abattoir operators, samplers and personnel

Retail and Water:

- Health Units and Institutions that participate in FoodNet Canada
- Alberta Irrigation Districts Association
- Alberta Agriculture and Irrigation
- Participating water treatment plants

Clinical Animal Isolates:

- Provincial Animal Health Laboratories

Antimicrobial sales for animals:

- VASR: Health Canada's Veterinary Drugs Directorate and the Public Health Agency of Canada

Antimicrobial Use - humans:

- AMR Task Force and IQVIA

Antimicrobials sold as pesticides for use in Crops:

- Health Canada's Pest Management Regulatory Agency

Feed Ingredients and Mixed Feeds:

- Canadian Food Inspection Agency

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