

Canadian Feedlot Antimicrobial Use and Antimicrobial Resistance Surveillance Program

CANADIAN FEEDLOT AMU/AMR SURVEILLANCE PROGRAM (CFAASP)

WAAW
November 23, 2025

Objectives



Provide representative national estimates of AMU and AMR in Canadian finishing feedlots

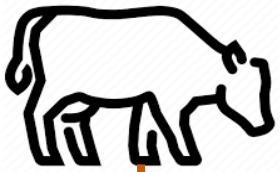


Monitor trends in AMU and AMR in feedlots over time and in the context of changes to veterinary practice



Assess the potential risk arising from AMU in feedlots on the effectiveness of antimicrobials in animals and humans

Data collection framework



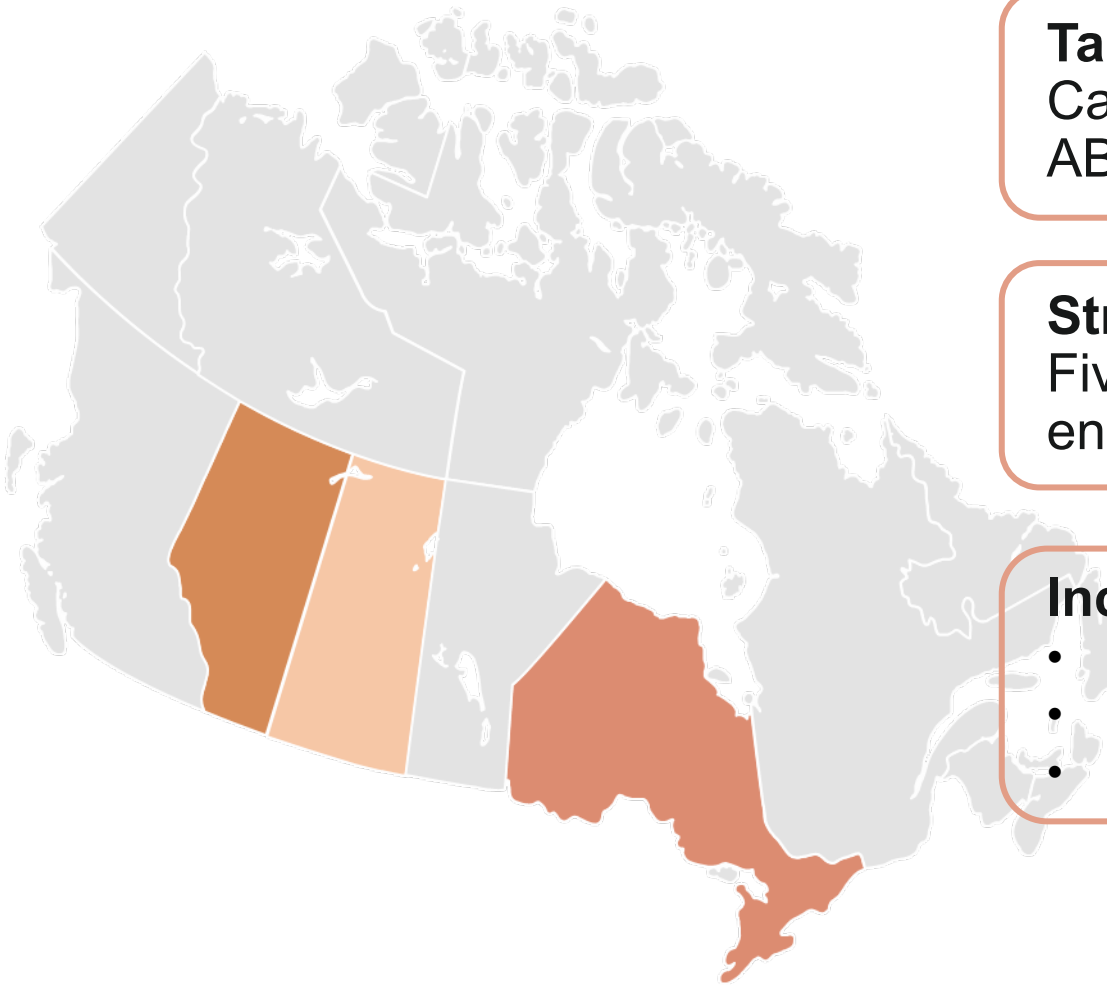
Antimicrobial use (AMU)

- Antimicrobial use data from feedlots
- AMU between arrival and rehandling from the pens of cattle that had nasopharyngeal samples collected

Antimicrobial resistance (AMR)

- Fecal sampling
  - Recovery of enteric organisms
  - Resistance of enteric organisms
- Nasopharyngeal sampling
  - Recovery of respiratory organisms
  - Resistance of respiratory organisms

Target population and sampling frame



Target:
Cattle destined for slaughter in finishing feedlots in AB, SK, ON

Strategy:
Five large feedlot veterinary consulting groups were engaged to recruit participating feedlots

Inclusion criteria:
- Engaged in finishing phase of production
- One-time capacity >1000 animals
- Valid VCP partnership with enrolling veterinarian

AMR: FECAL ORGANISMS

2025 HIGHLIGHTS AND 7-YEAR TEMPORAL TRENDS

Public Health Agency of Canada
Agence de la santé publique du Canada

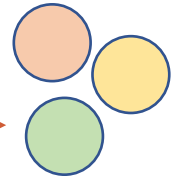
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Sample collection: fecal organisms (2025)



210 fecal samples

NML in Saint-Hyacinthe, QC



Isolation and susceptibility testing:
E. coli, Campylobacter spp., and *Salmonella spp.*

EC

S

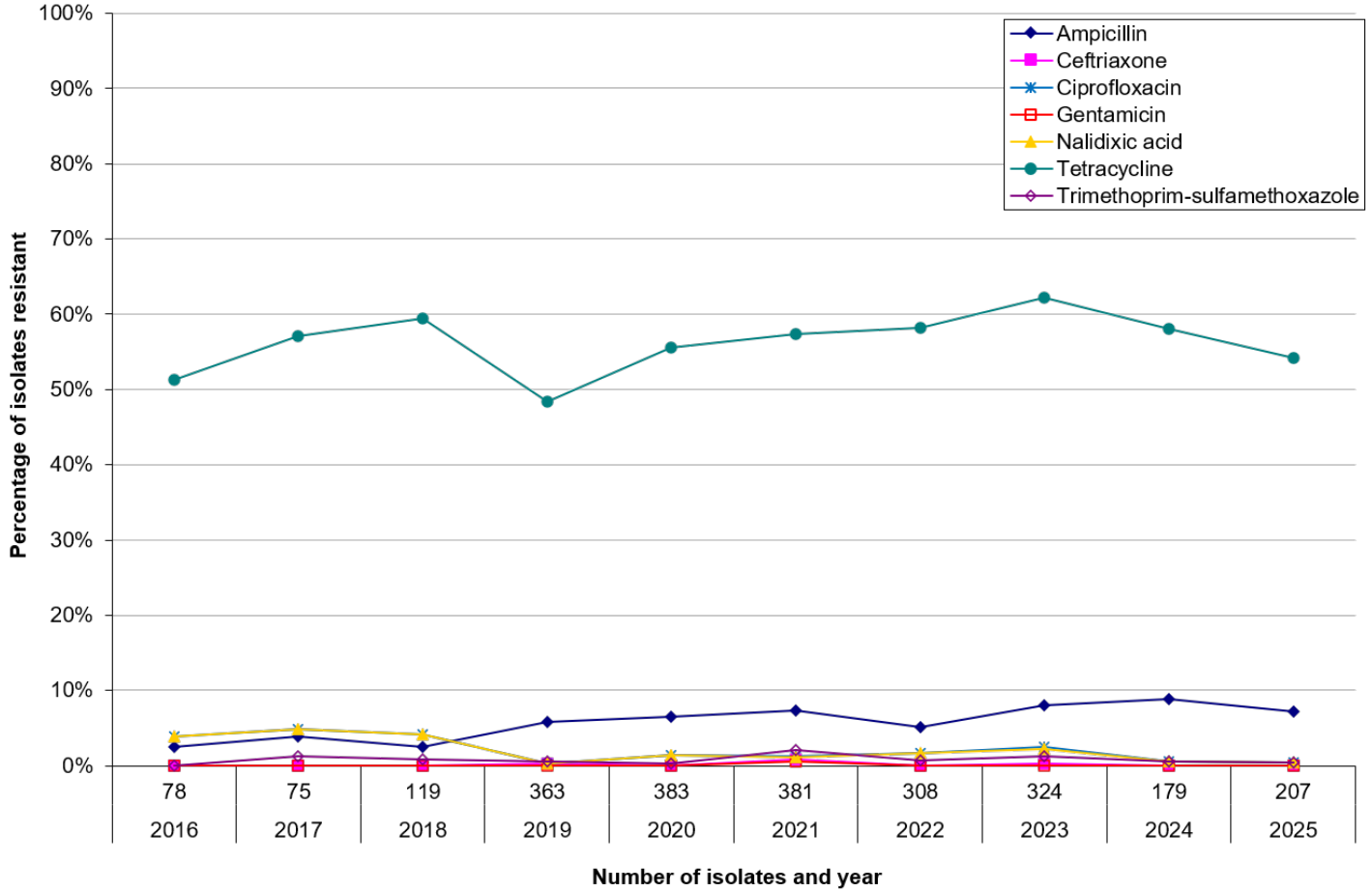
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One isolate of each recovered organism per sample was tested for susceptibility to a panel of antimicrobials

14 antimicrobials (8 classes) for *E. coli* and *Salmonella* spp.

9 antimicrobials (7 classes) for *Campylobacter* spp.

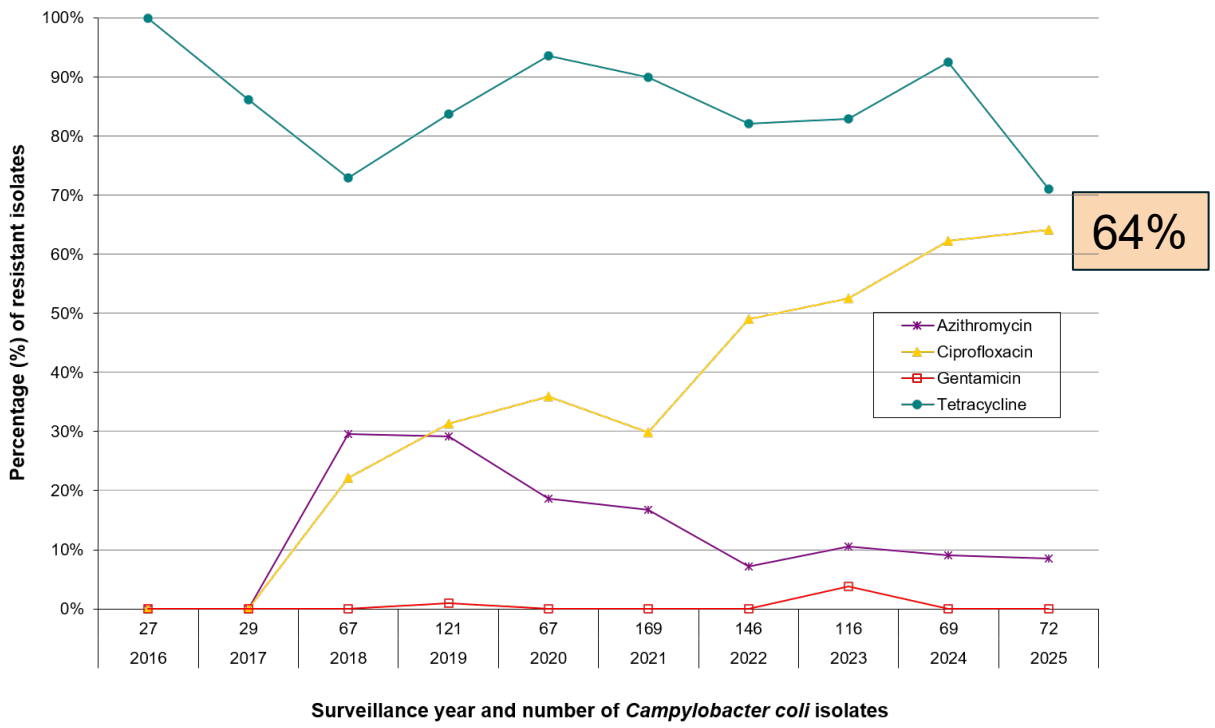
Escherichia coli low (<10%) levels of resistance detected except for tetracycline



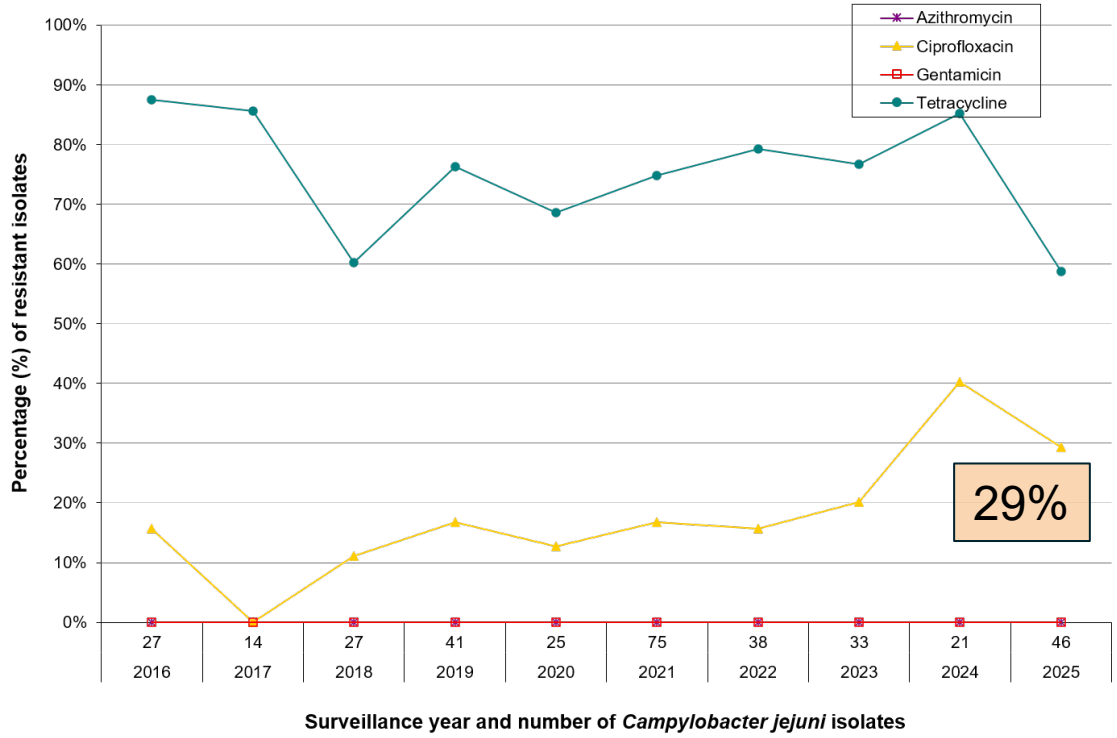
- No statistically significant changes detected for single antimicrobials
- 45% of isolates fully susceptible
- 8% of isolates resistant to ≥ 3 antimicrobial classes

Campylobacter spp.: Ciprofloxacin resistance varies by species

C. coli (n = 72 in 2025)



C. jejuni (n = 46 in 2025)



AMR in fecal organisms, summary stoplight table

Year	2021	2022	2023	2024	2025
Salmonella, number of isolates	**17**	**9**	**16**	**10**	**13**
Ampicillin	7%	22%	38%	0%	7%
Ceftriaxone	0%	22%	38%	0%	0%
Ciprofloxacin, not susceptible	0%	0%	13%	0%	0%
Gentamicin	0%	0%	6%	0%	0%
Nalidixic acid	0%	0%	13%	0%	0%
Tetracycline	65%	50%	65%	80%	69%
Trimethoprim-sulfamethoxazole	0%	0%	0%	0%	0%
E. coli, number of isolates	**381**	**308**	**324**	**179**	**207**
Ampicillin	7%	5%	8%	9%	7%
Ceftriaxone	1%	0%	0%	0%	0%
Ciprofloxacin, not susceptible	1%	2%	2%	1%	1%
Gentamicin	1%	0%	0%	0%	0%
Nalidixic acid	1%	2%	2%	1%	1%
Tetracycline	57%	58%	62%	58%	54%
Trimethoprim-sulfamethoxazole	2%	1%	1%	1%	0.1%
Campylobacter, number of isolates	**247**	**184**	**149**	**93**	**120**
Azithromycin	11%	6%	9%	7%	5%
Ciprofloxacin	29%	42%	46%	59%	51%
Gentamicin	0%	0%	3%	0%	0%
Tetracycline	83%	82%	80%	87%	67%

- Decreases in TET resistance across all organisms from 2024 to 2025, but remains “very” to ”extremely” high
- Nil or rare (<0.1%) Category I resistance in *Salmonella* and *E. coli*
- Significant increase in CIP resistance in *Campylobacter* since 2021, from “high” to “very high”

Key take-home messages, AMR in fecal organisms

- AMR in ***E. coli* stable** over time
- Low recovery of *Salmonella* spp.
  - **Single multiclass resistant *Salmonella*** *spp.* isolate in 2025*(AMP-CHL-SSS-TET)*
- Ciprofloxacin Resistance in *Campylobacter* spp.
  - **Non-significant decrease** in *Campylobacter* spp. ciprofloxacin resistance between 2024 (59%) and 2025 (51%)
  - Higher ciprofloxacin resistance in ***C. coli* (64%)** than ***C. jejuni* (29%)**
  - *C. coli* ciprofloxacin resistance still increasing, decrease in *C. jejuni*

AMR: RESPIRATORY PATHOGENS

2025 HIGHLIGHTS AND 7-YEAR TEMPORAL TRENDS

Public Health Agency of Canada
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Canada

Sample collection: respiratory pathogens (2025)

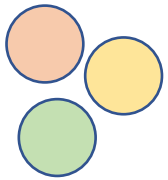
Isolation and susceptibility testing: *Mannheimia haemolytica, Pasteurella multocida* and *Histophilus somni*

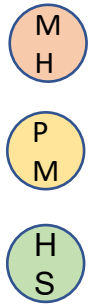
PDS in Saskatoon, SK (n=112)
AAFC in Lethbridge, AB (n = 528)

Time point 1: on **arrival**



320 NP samples



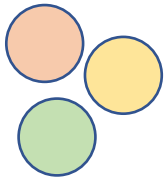


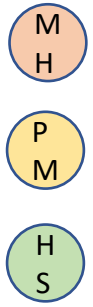
One isolate of each recovered organism per sample was tested for susceptibility to a panel of **19 antimicrobials** (10 classes)

Time point 2: at **re-handling**



320 NP samples



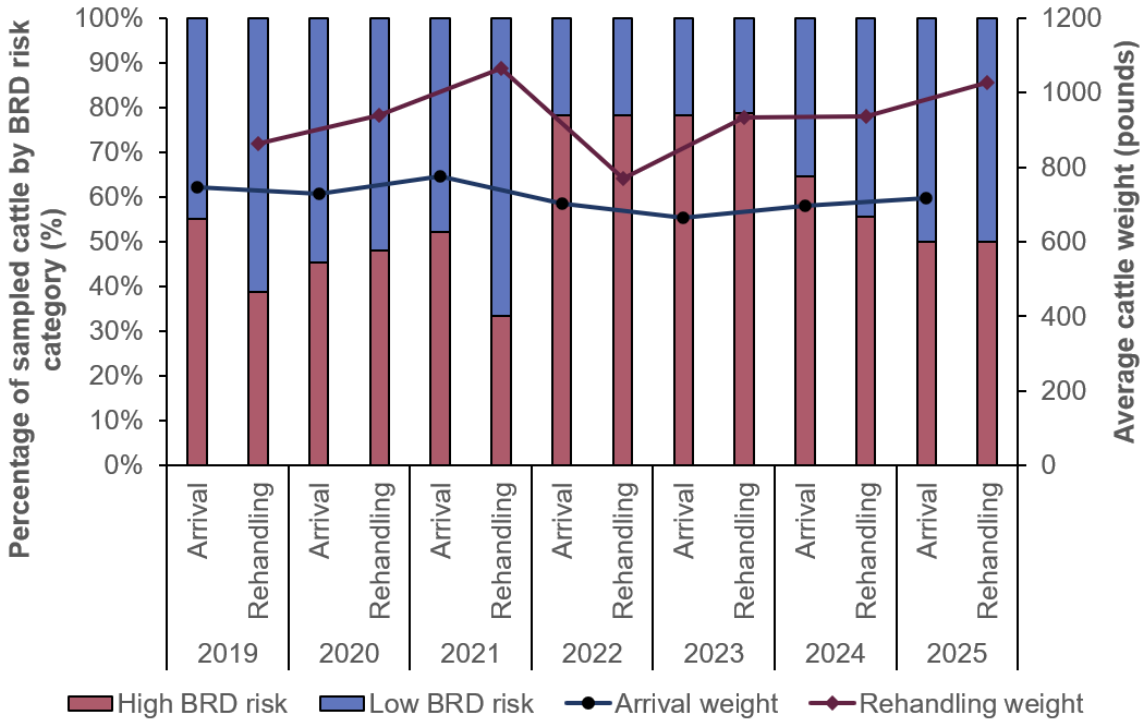


One isolate of each recovered organism per sample was tested for susceptibility to a panel of **19 antimicrobials** (10 classes)

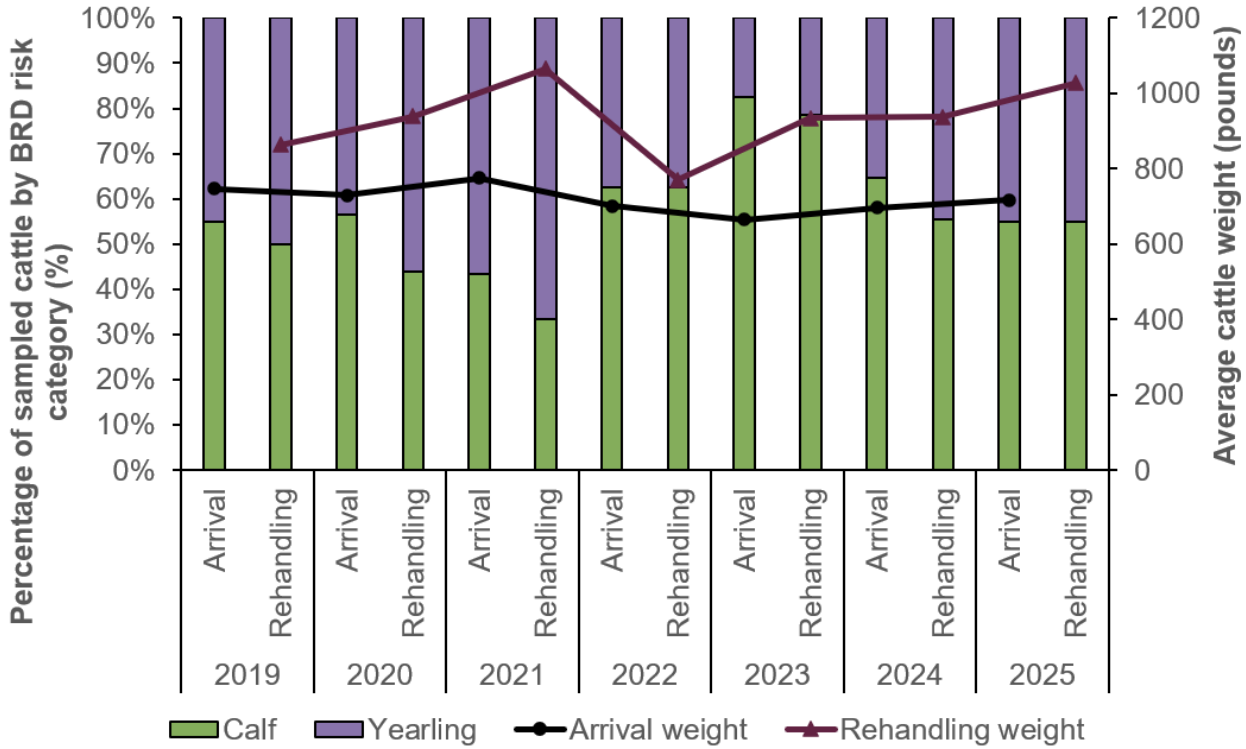
PDS= Prairie Diagnostic Services AAFC= Agticulture and Agri-food Canada NP=nasopharyngeal

Trends in sample characteristics, respiratory pathogens, 2019-2025

Bovine Respiratory Disease (BRD) risk

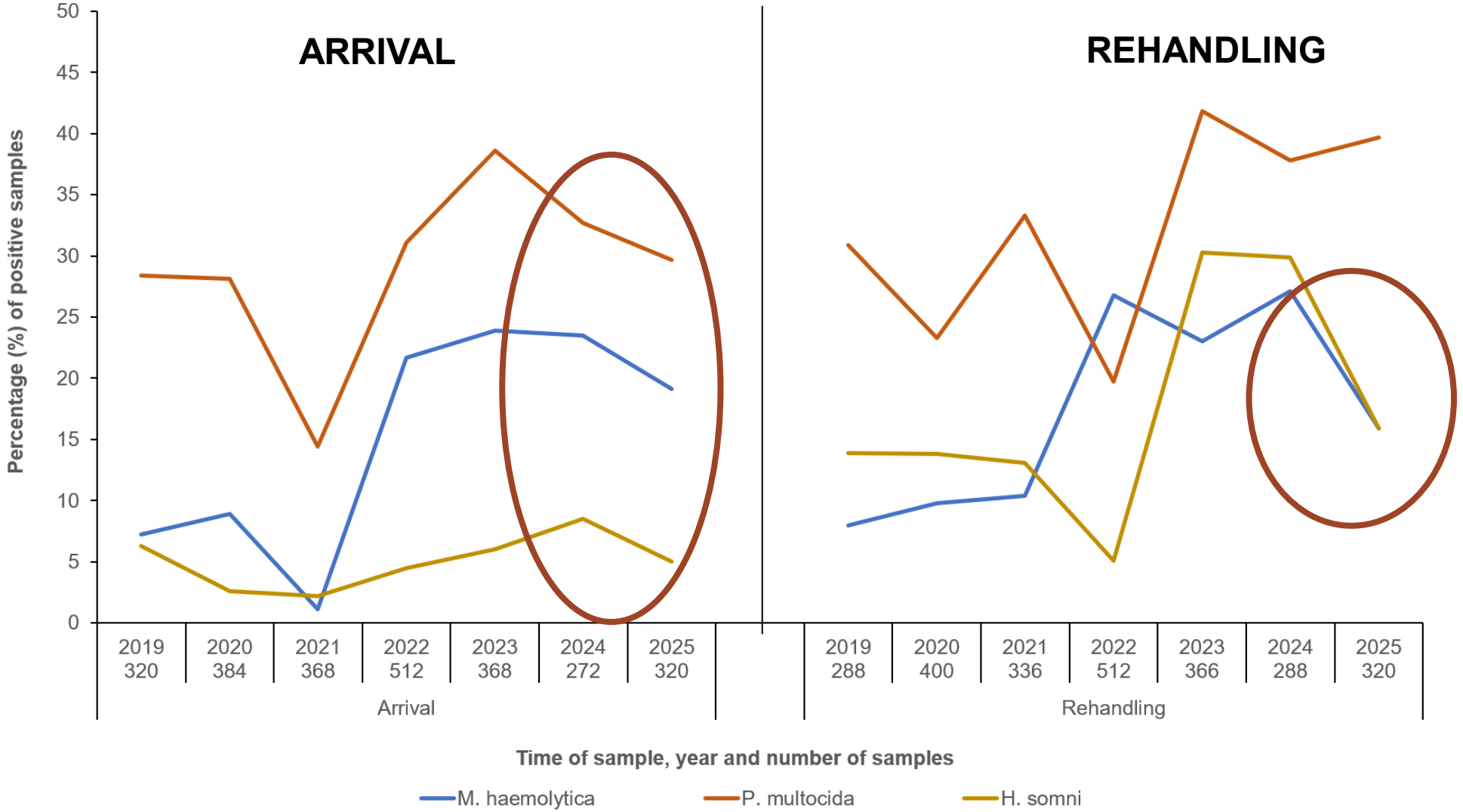


Age Category



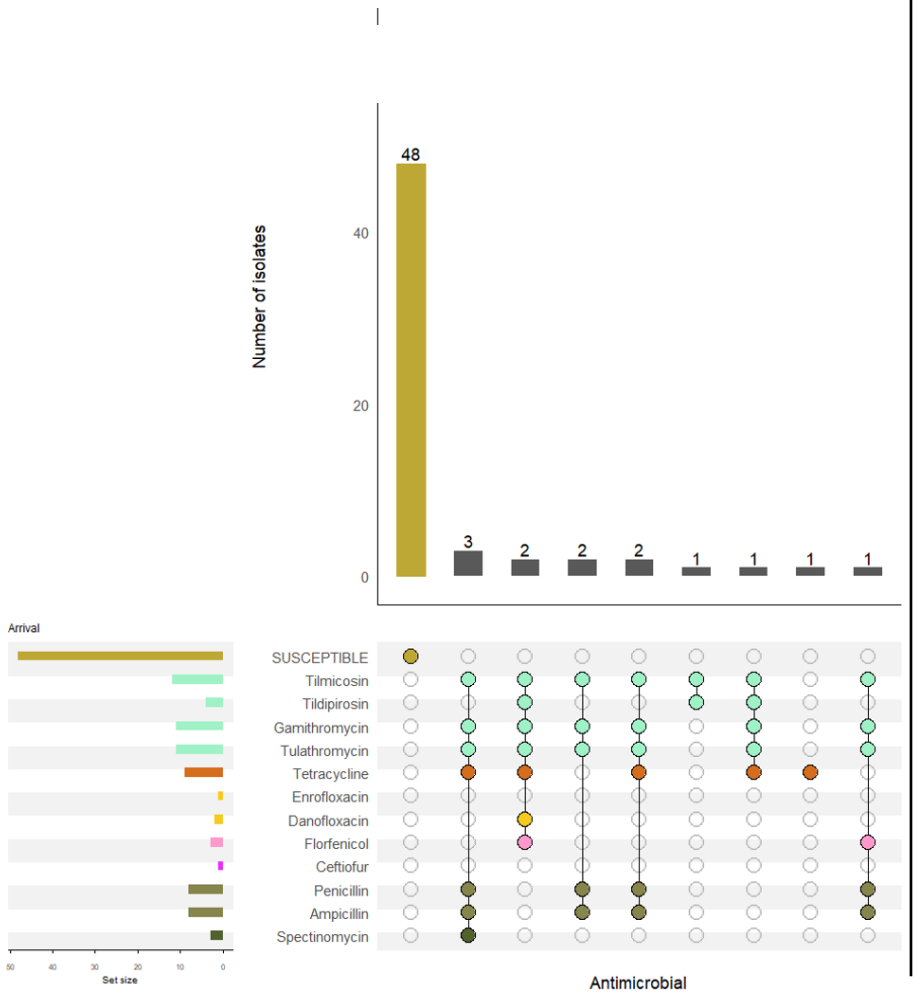
- Variability in the BRD risk, age and weight of sampled cattle over time.

Respiratory pathogen recovery, 2019-2025

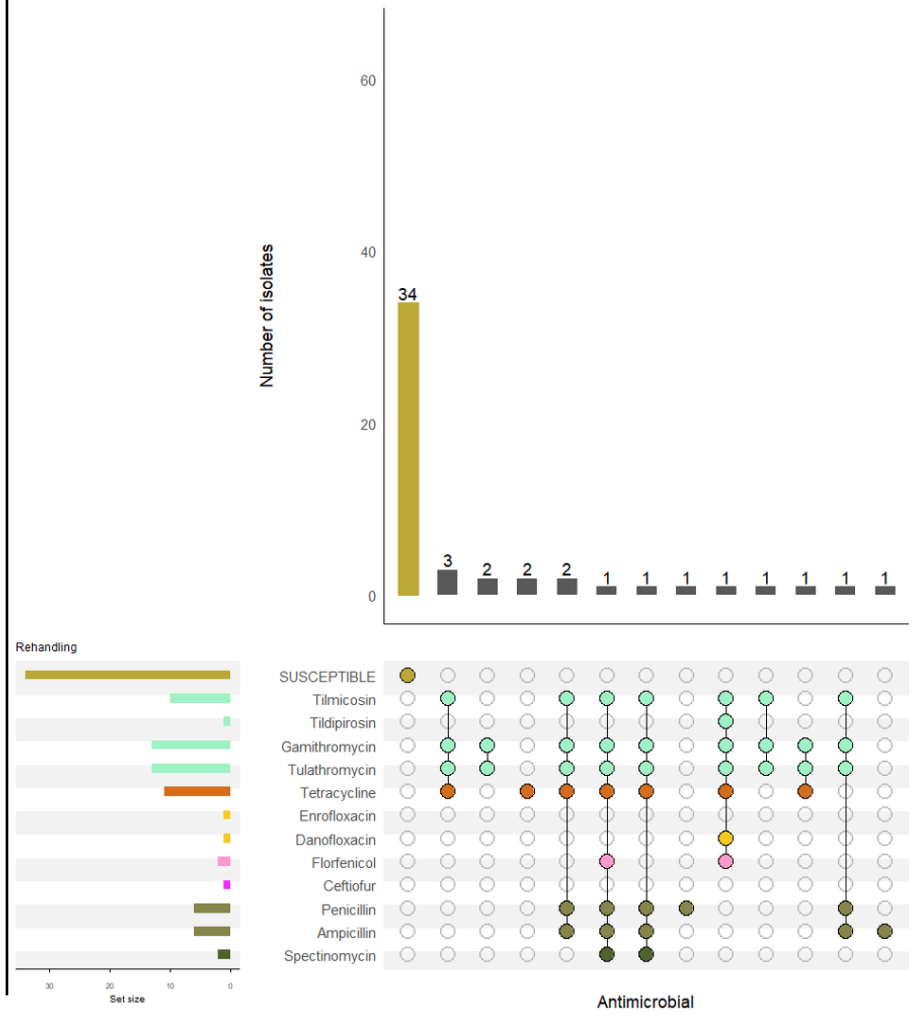


M. haemolytica resistance patterns, arrival vs. rehandling 2025

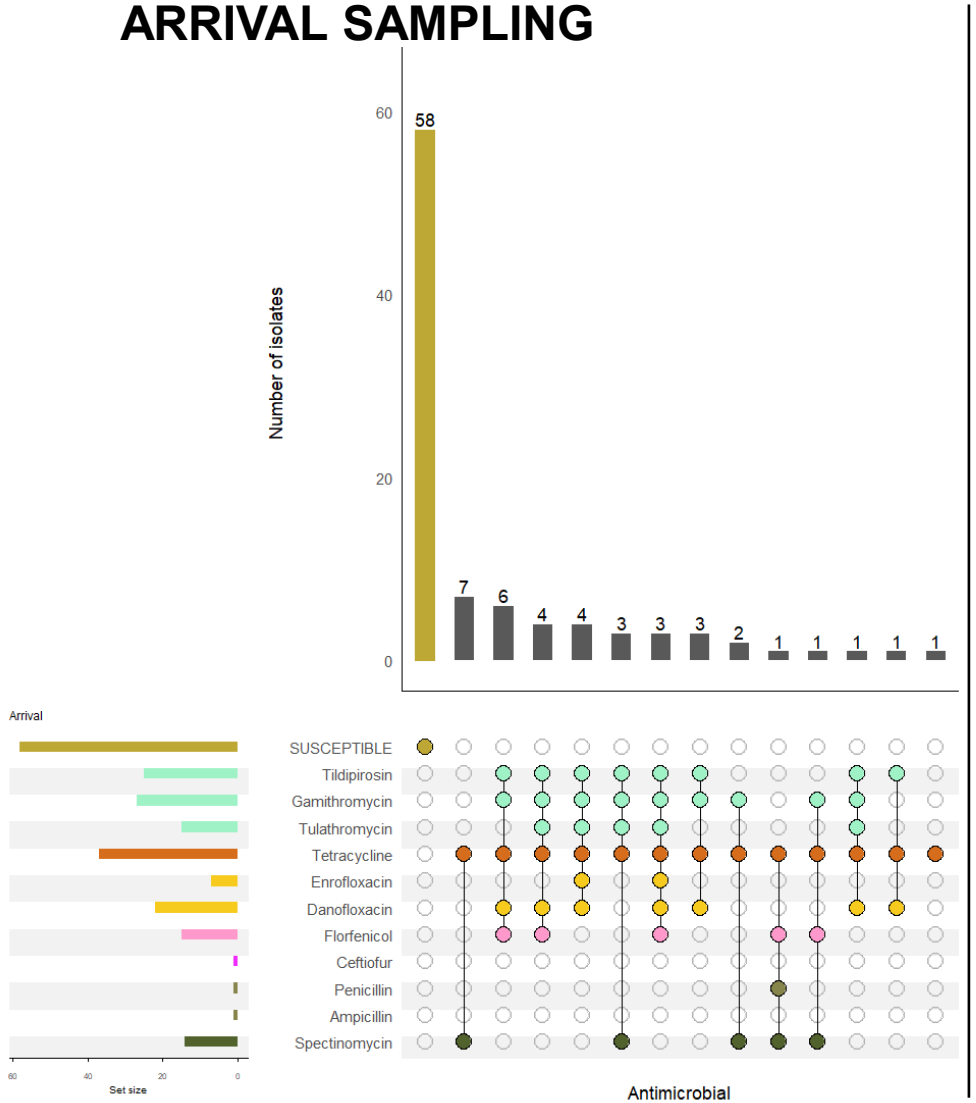
ARRIVAL SAMPLING

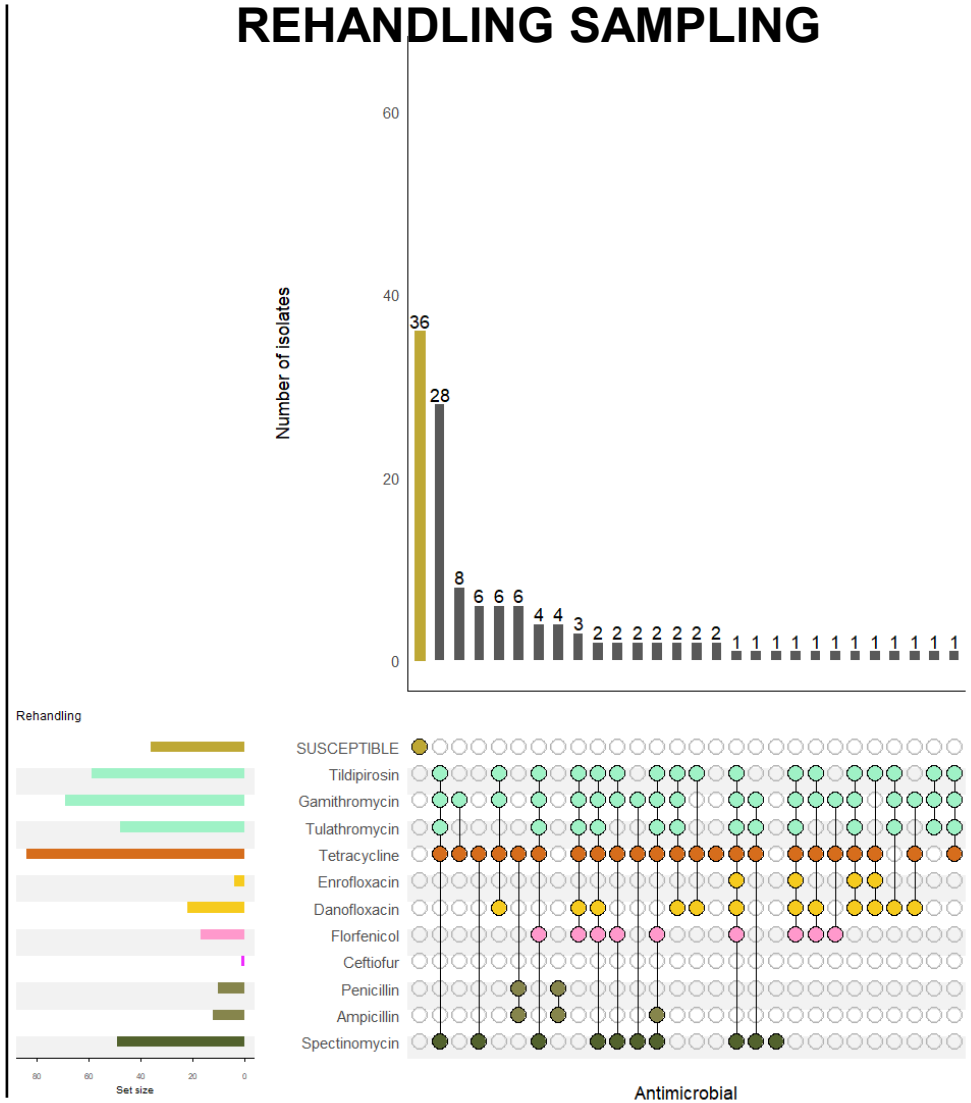


REHANDLING SAMPLING



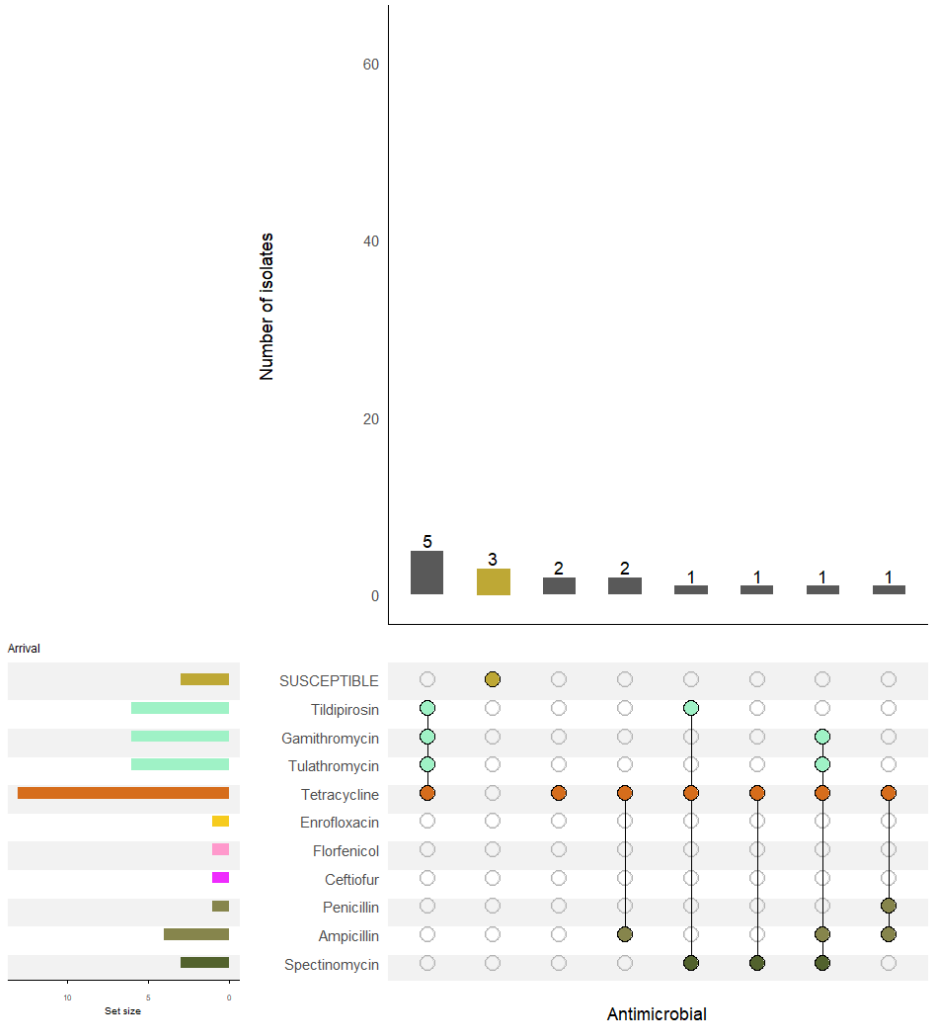
P. multocida resistance patterns, arrival vs. rehandling 2025



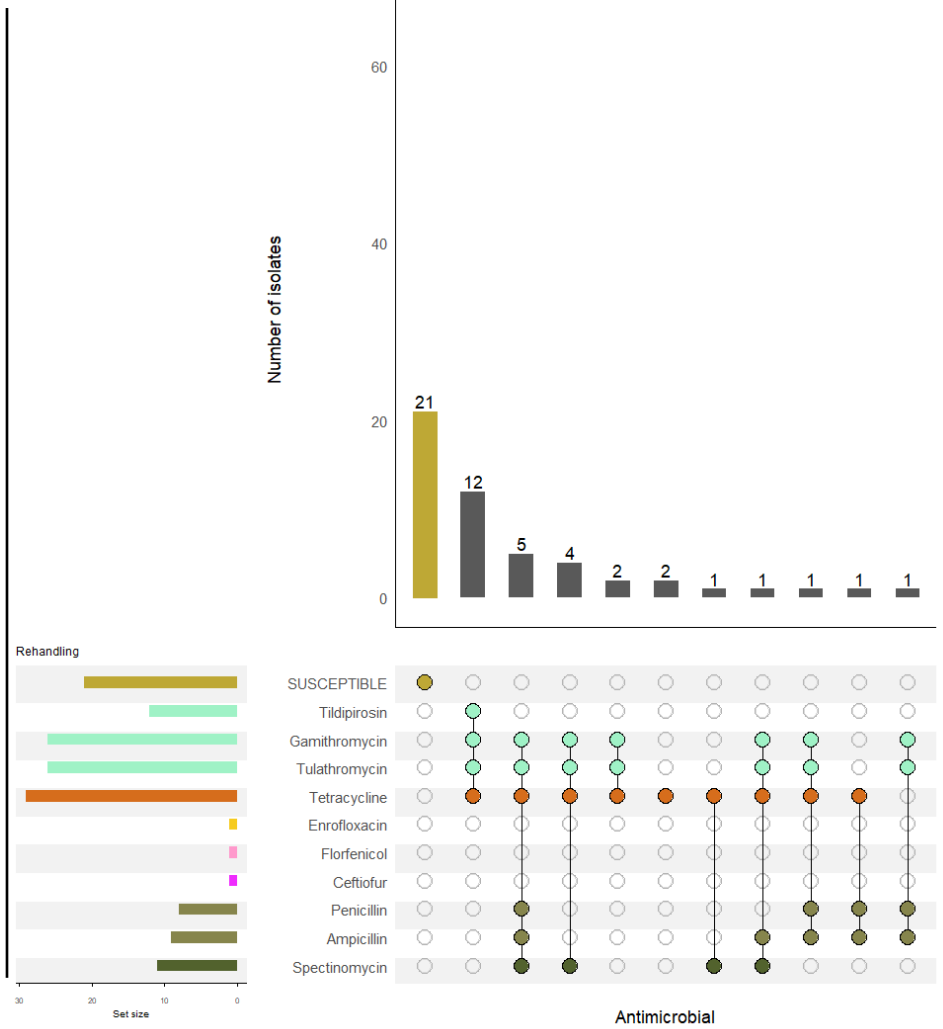


H. somni resistance patterns, arrival vs. rehandling 2025

ARRIVAL SAMPLING

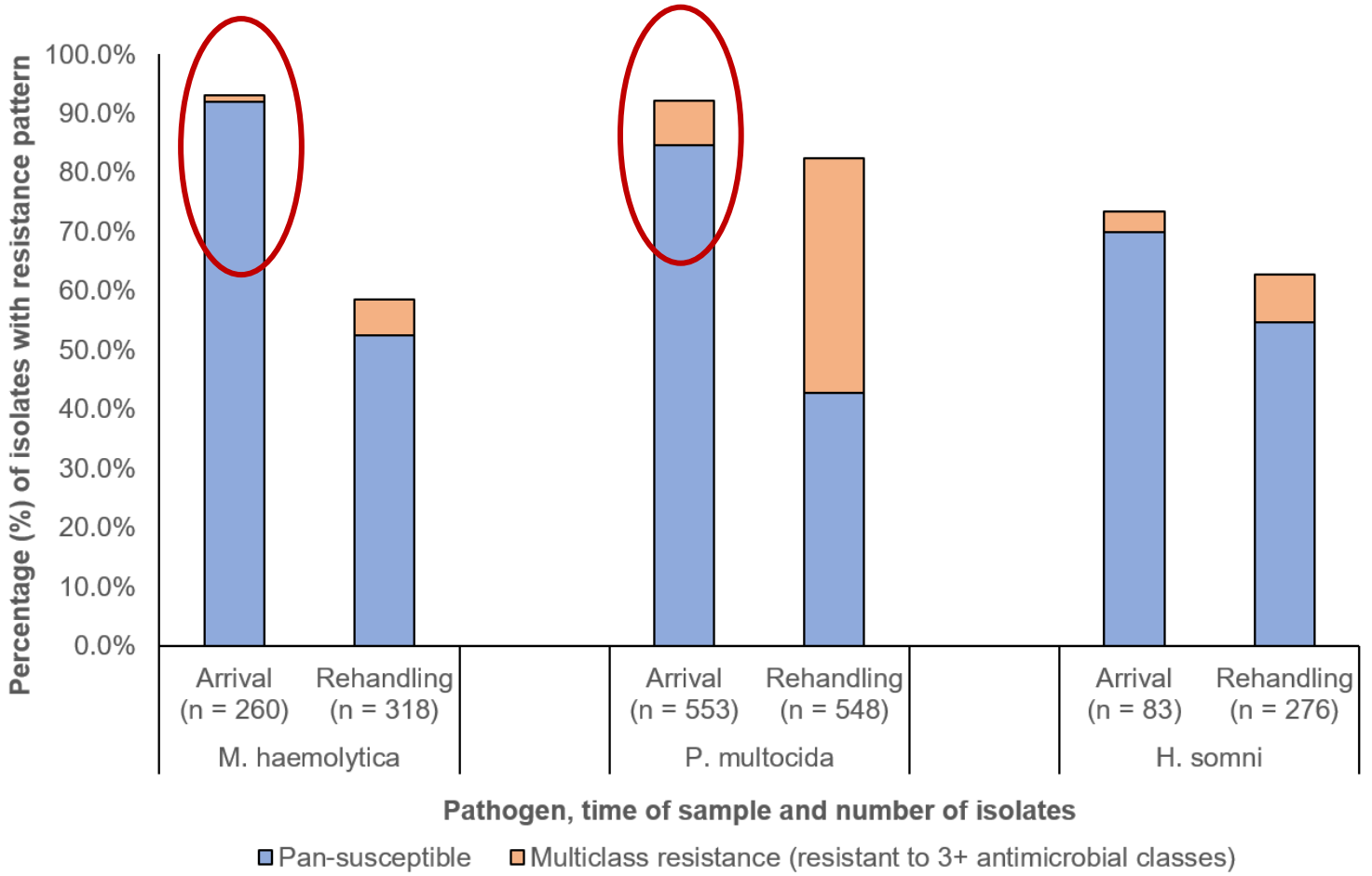


REHANDLING SAMPLING



Key phenotypes by time point, 2019-2024 isolates combined

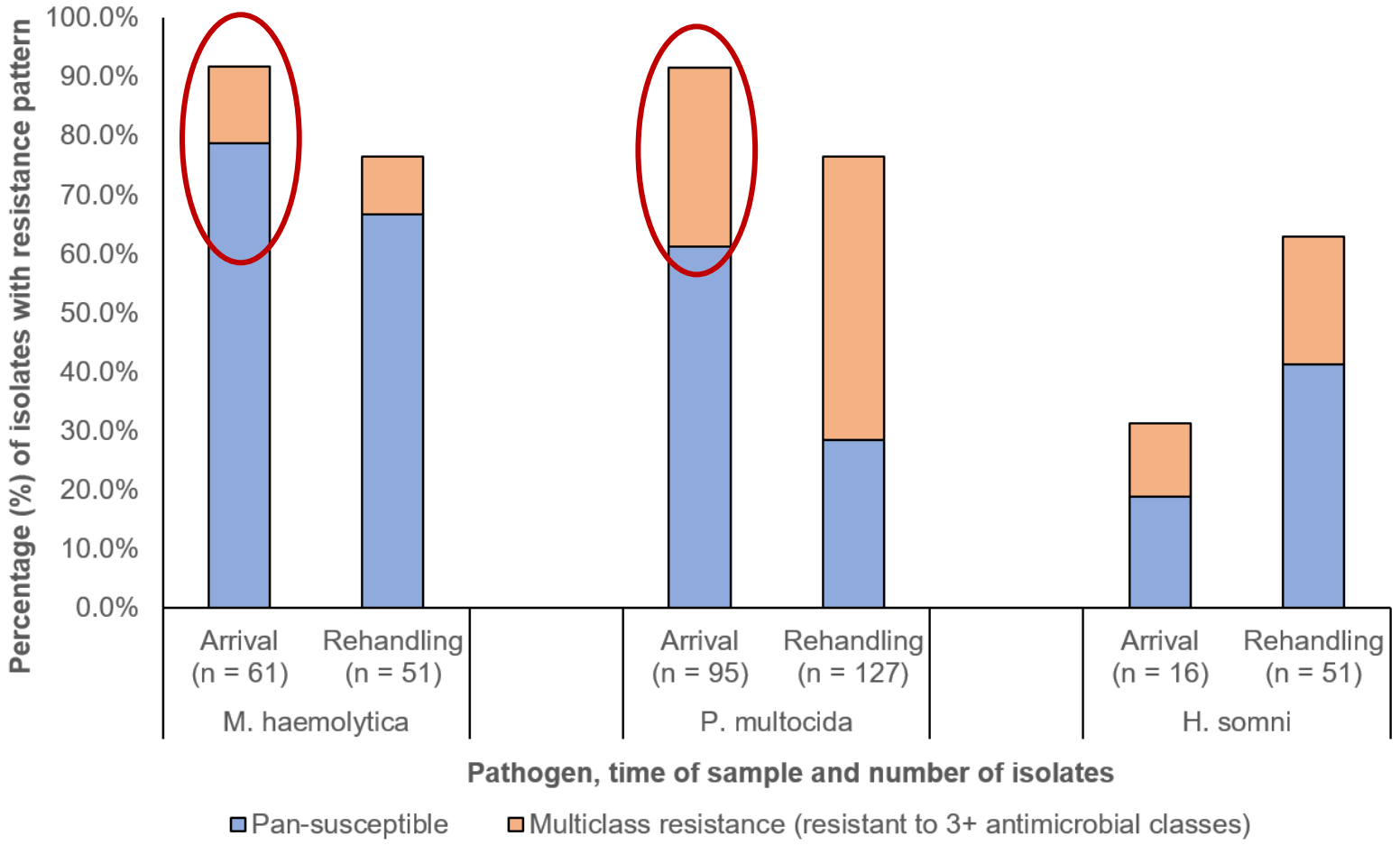
- **Pan-susceptibility**
  - ↓ *MH* isolates (93% to 56%)
  - ↓ *PM* isolates (80% to 41%)
  - ↓ *HS* isolates (64% to 52%)
- **Multiclass resistance**
  - ↑ ***PM* isolates (10% to 43%)**
  - Remained low at rehandling for *MH* (8%) and *HS* (9%)



MH = *M. haemolytica* PM = *P .multocida* HS = *H. somni*

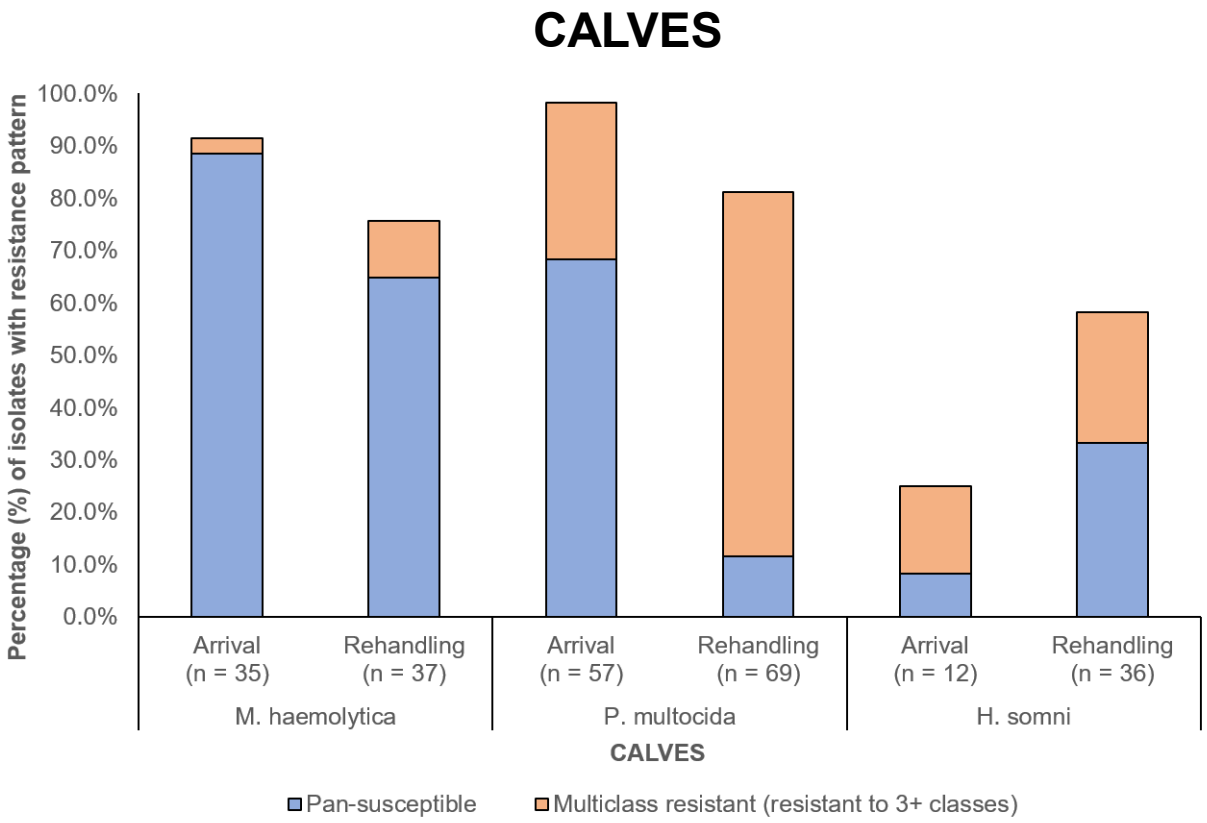
Key phenotypes by time point, 2025 isolates

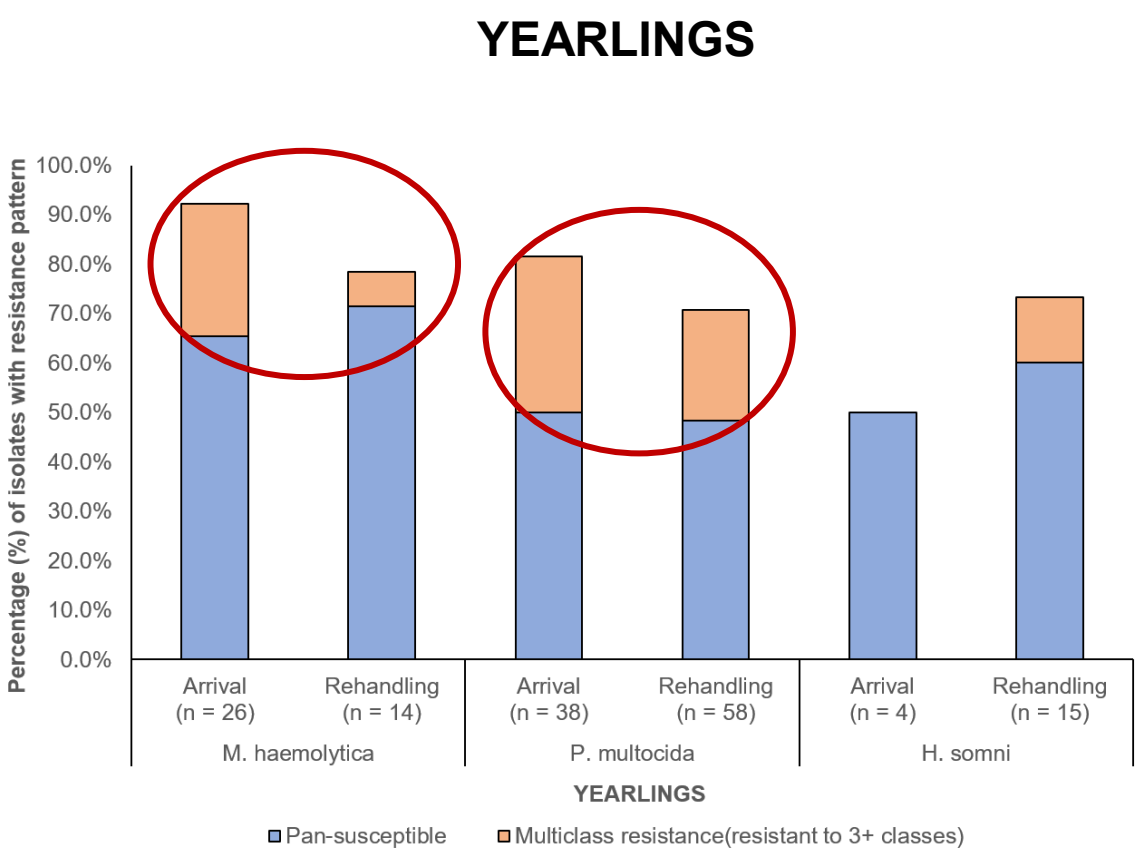
- **Pan-susceptibility**
  - ↓ *MH* isolates (79% to 67%)
  - ↓ *PM* isolates (61% to 28%)
  - ↑ *HS* isolates (19% to 41%)
- **Multiclass resistance**
  - ↓ ***MH* isolates**
  - ↑ ***PM* isolates (31% to 48%)**



MH = *M. haemolytica* PM = *P .multocida* HS = *H. somni*

Key phenotypes by time point, calves vs. yearlings (2025)

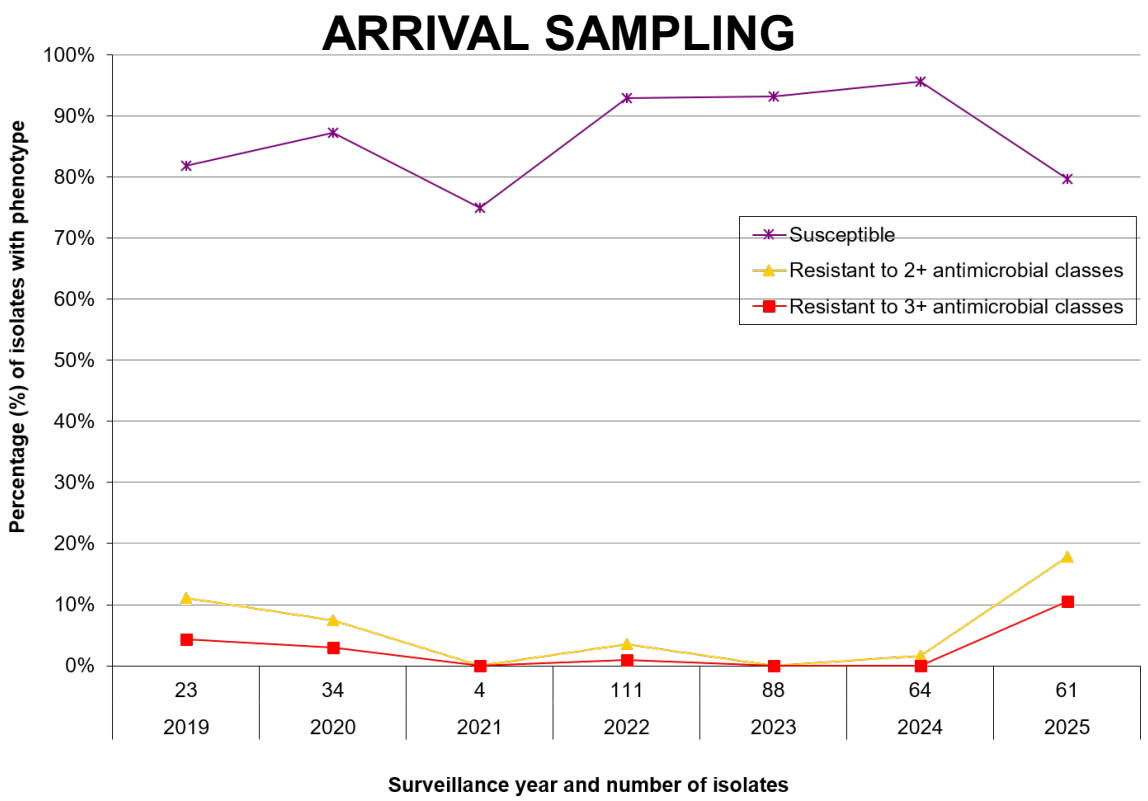




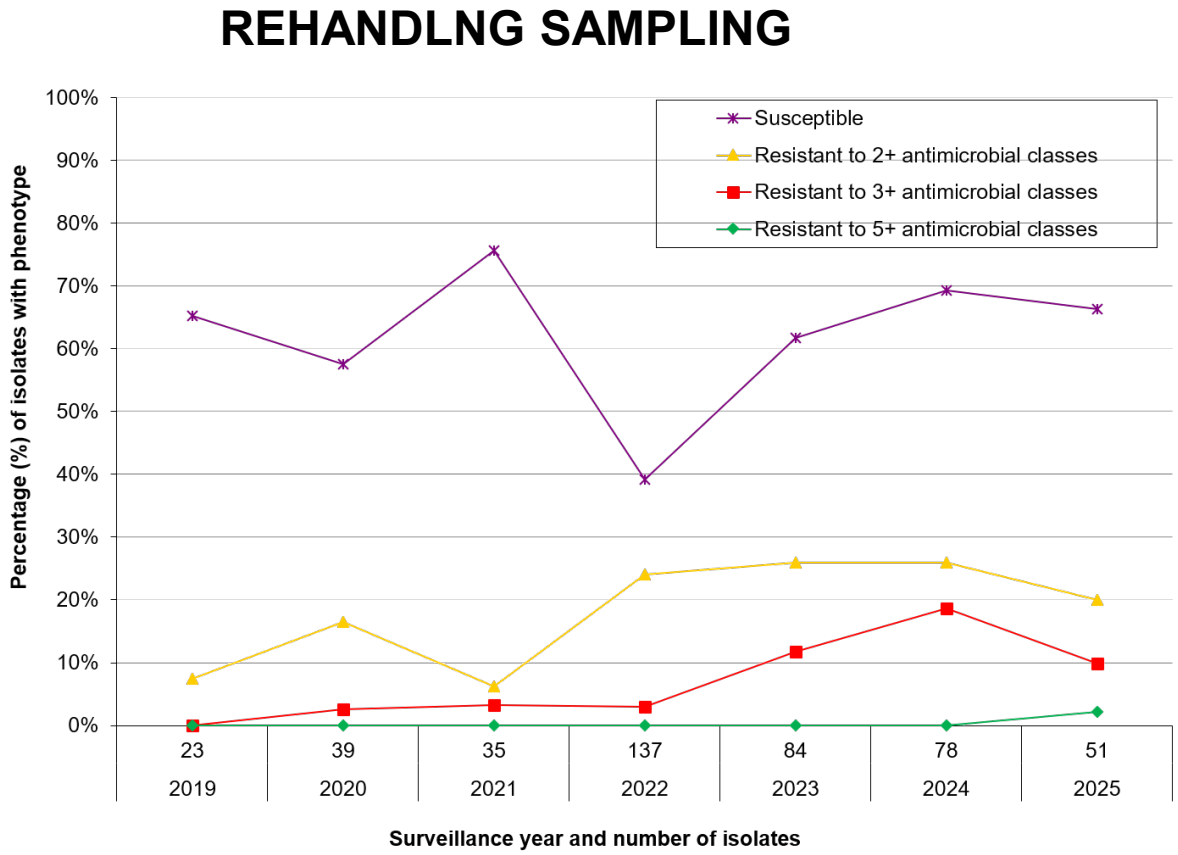
- Atypical trend toward increasing susceptibility of *MH* and *PM* isolates from yearlings between arrival and rehandling time points

MH = *M. haemolytica* PM = *P .multocida* HS = *H. somni*

Trends in multiclass resistance, *M. haemolytica*

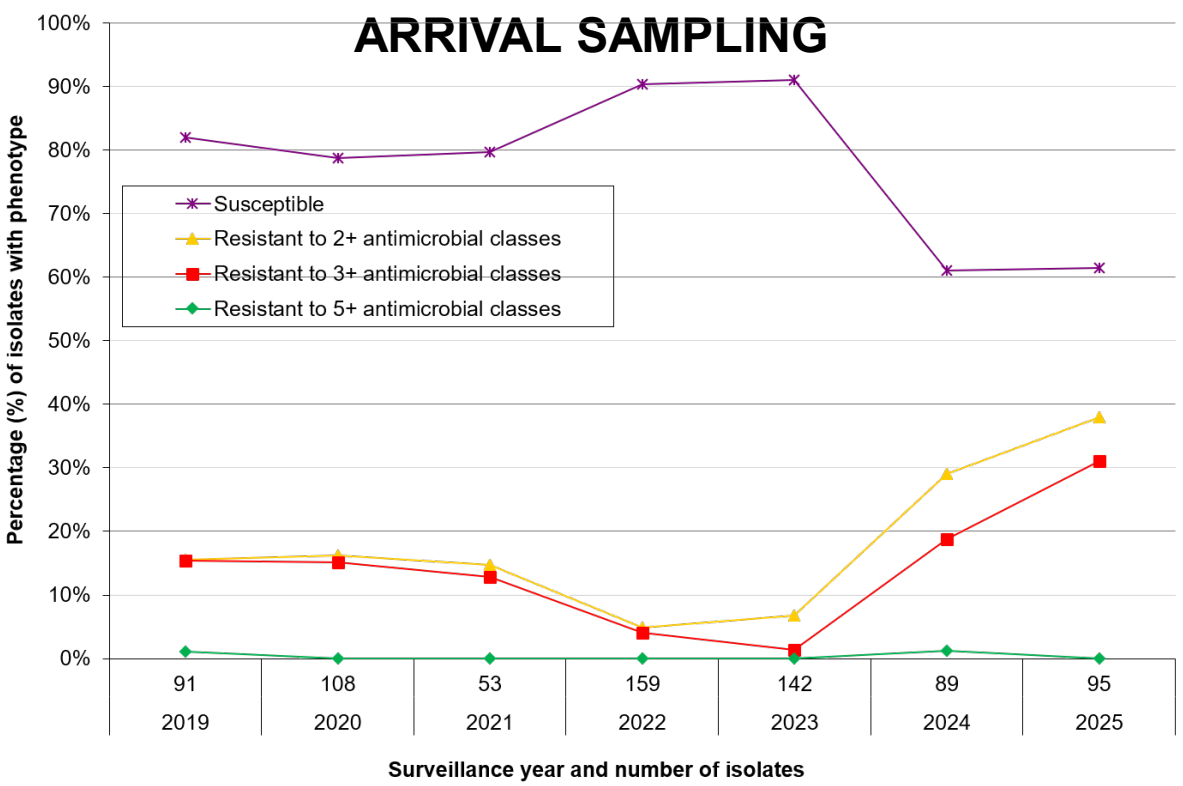


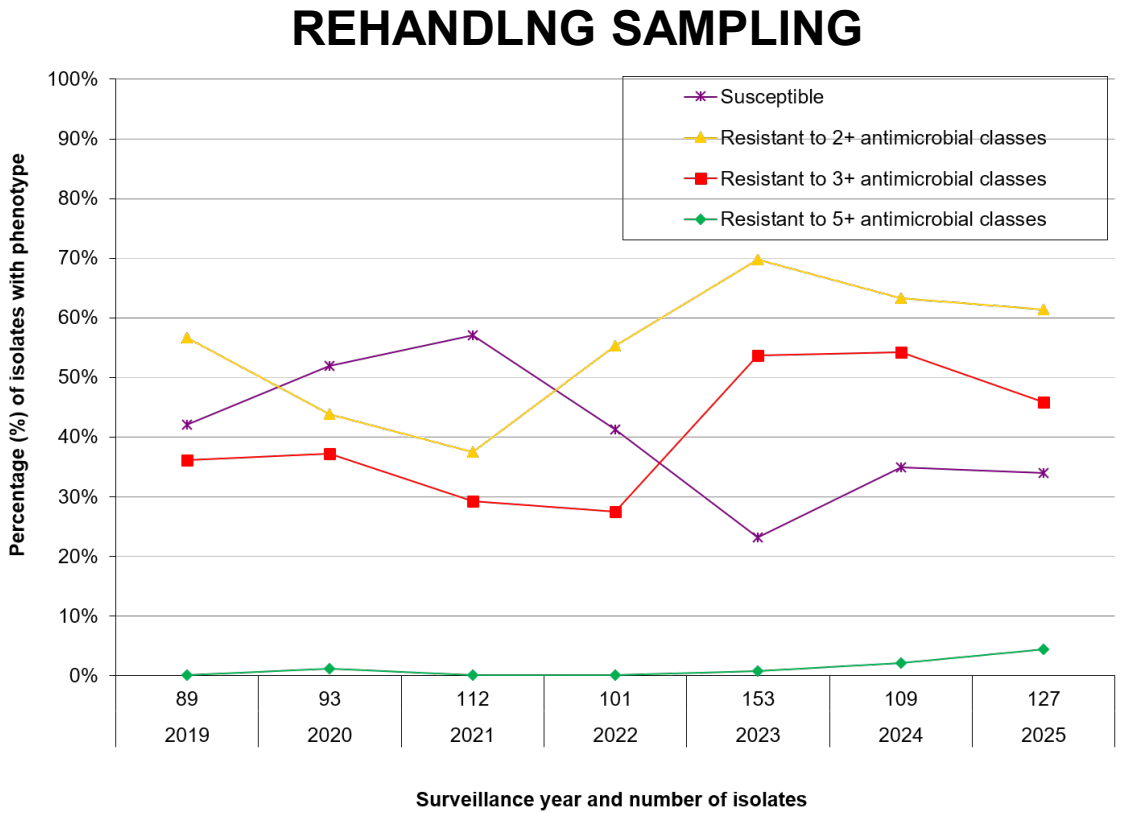
- ↓ in susceptibility from 2024 (96%) to 2025 (80%)
- ↑ in resistance to ≥ 2 antimicrobial classes from 2024 (2%) to 2025 (18%)



- No significant differences

Trends in multiclass resistance, *P. multocida*



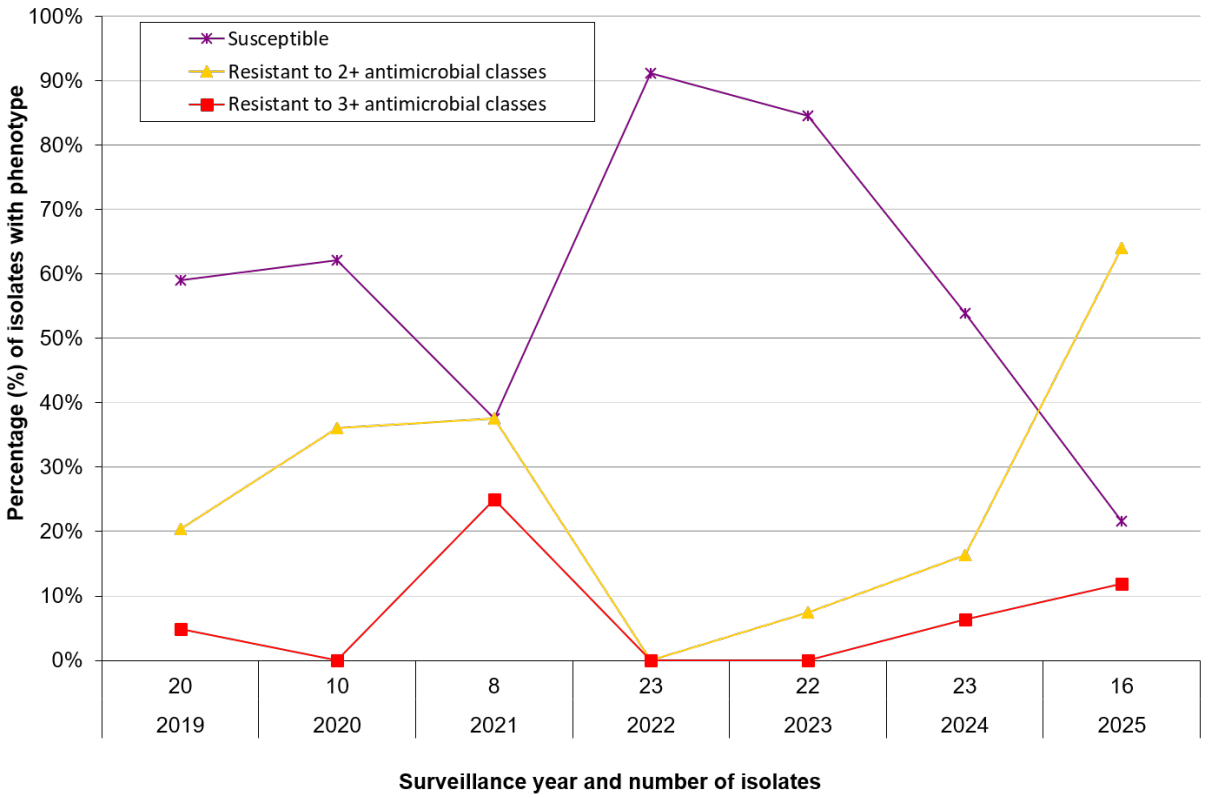


- ↓ in susceptibility from 2019 (82%) to 2025 (61%)
- ↑ in resistance to ≥ 2 antimicrobial classes from 2019 (16%) and 2024 (29%) to 2025 (38%)
- ↑ in resistance to ≥ 3 antimicrobial classes from 2019 (15%) and 2024 (19%) to 2025 (31%)

- No significant differences

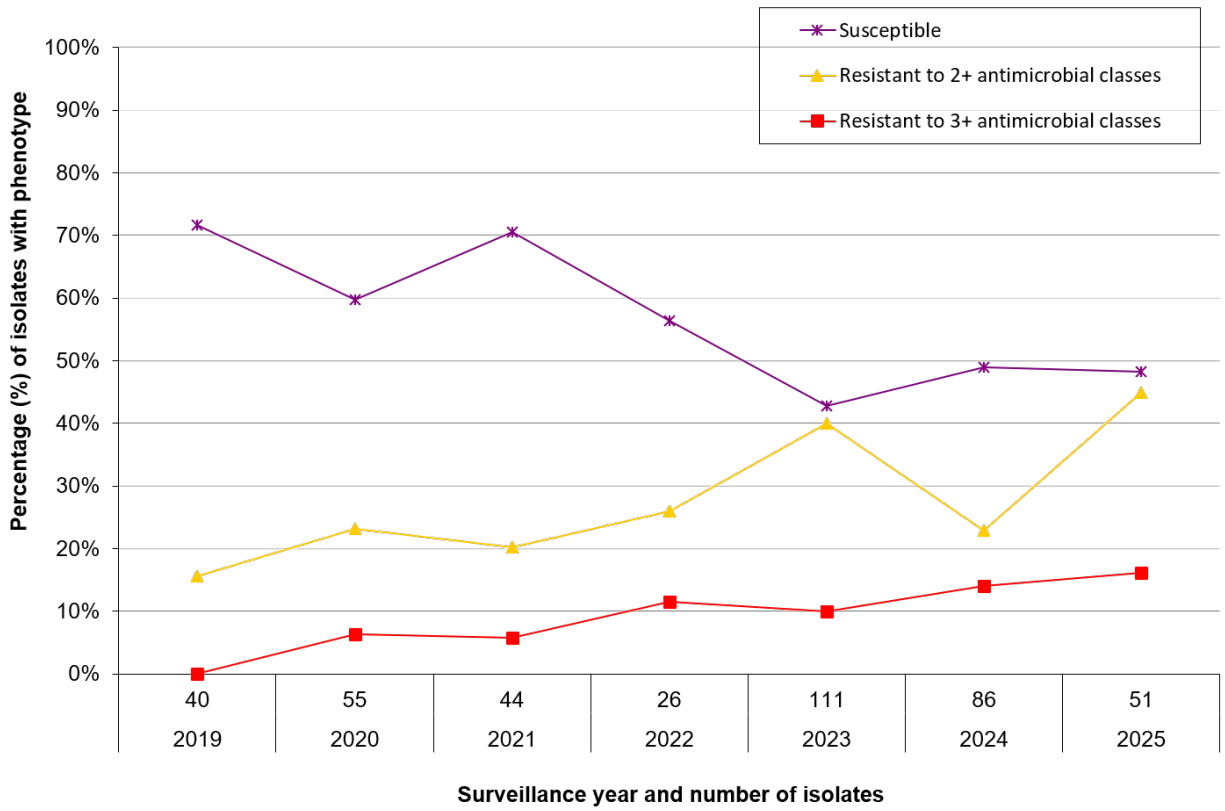
Trends in multiclass resistance, *H. somni*

ARRIVAL SAMPLING



- ↑ in resistance to ≥ 2 antimicrobial classes from 2019 (20%) to 2025 (64%)

REHANDLNG SAMPLING



- ↓ in susceptibility from 2019 (72%) to 2025 (48%)
- ↑ in resistance to ≥ 2 antimicrobial classes from 2019 (16%) and 2024 (23%) to 2025 (45%)

Key take-home messages, respiratory pathogens

- **Significant decreases in pan-susceptibility and increases in resistance across all three pathogens at *arrival* in 2025**
  - Continues trend first observed in 2024 for *PM* and *HS*
  - Unusually high resistance in *MH* and *PM* isolates from **yearlings**
- **Fluoroquinolone resistance in *PM* isolates from calves remains high**
  - 25% and 22% of isolates were resistant to DAN or ENR at *arrival* and *rehandling,* respectively; all were multiclass resistant
- **Temporal trends at *rehandling* to monitor in future surveillance years**
  - Decreased resistance in *MH* and *PM* isolates (continues from 2024)
  - Significantly increased resistance in *HS* isolates

MH = *M. haemolytica* PM = *P .multocida* HS = *H. somni*

ANTIMICROBIAL USE (AMU)

2025 HIGHLIGHTS AND 7-YEAR TEMPORAL TRENDS

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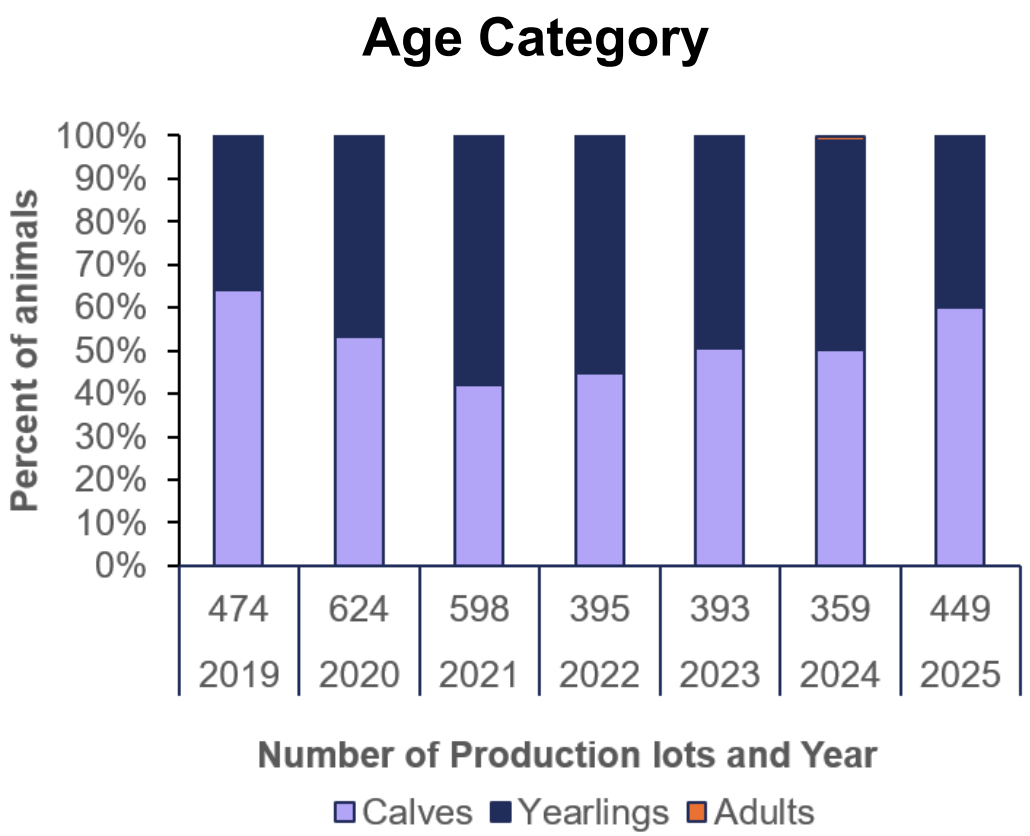
Canada

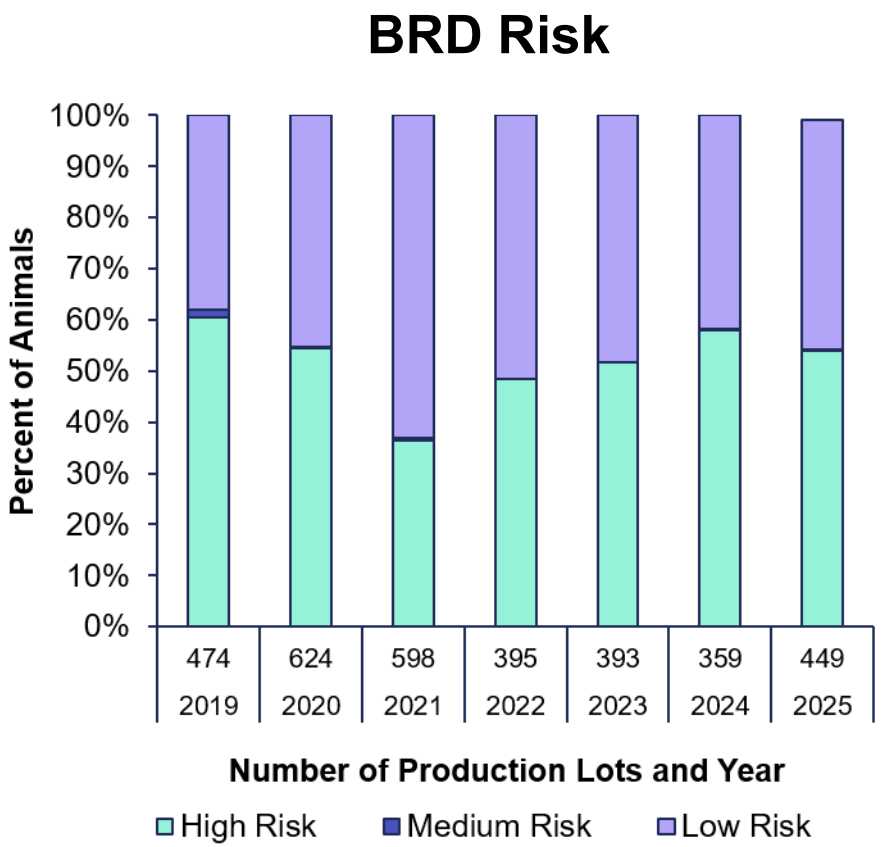
Sampling by Feedlot and Animals at Risk

Year	Number of feedlots	Number of production lots	Average number of days on feed	Average slaughter weight (kilograms) (SD[1])	Population at risk	Biomass
2019	23	474	203	649.5 (67.7)	135,930	88,281,841
2020	26	624	210	670.8 (48.2)	160,458	107,638,380
2021	24	598	201	682.8 (68.9)	140,984	96,268,462
2022	25	395	215	659.3 (63.9)	134,649	88,778,545
2023	26	393	199	643.6 (80.0)	129,872	83,580,049
2024	21	359	213	655.3 (81.3)	116,360	76,319,916
2025	21	449	225	682.0 (81.1)	118,425	80,760,879

[1]SD=standard deviation

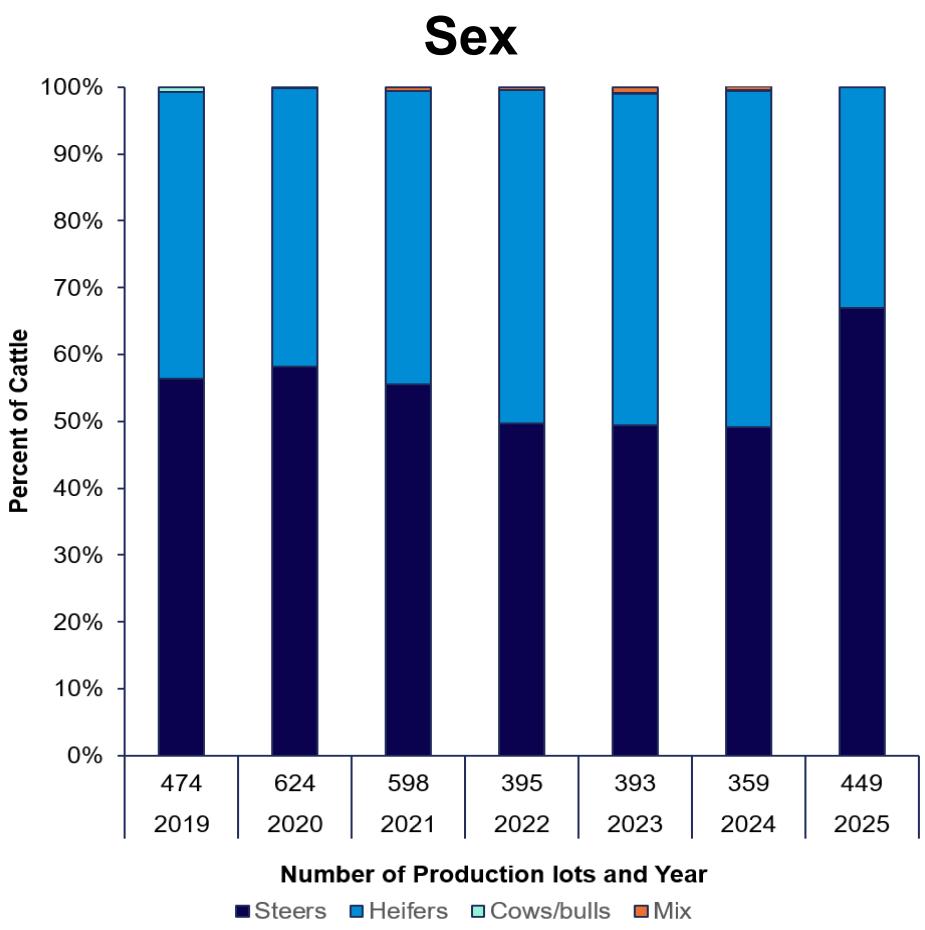
Similar trends in cattle age and bovine respiratory disease (BRD) risk categories

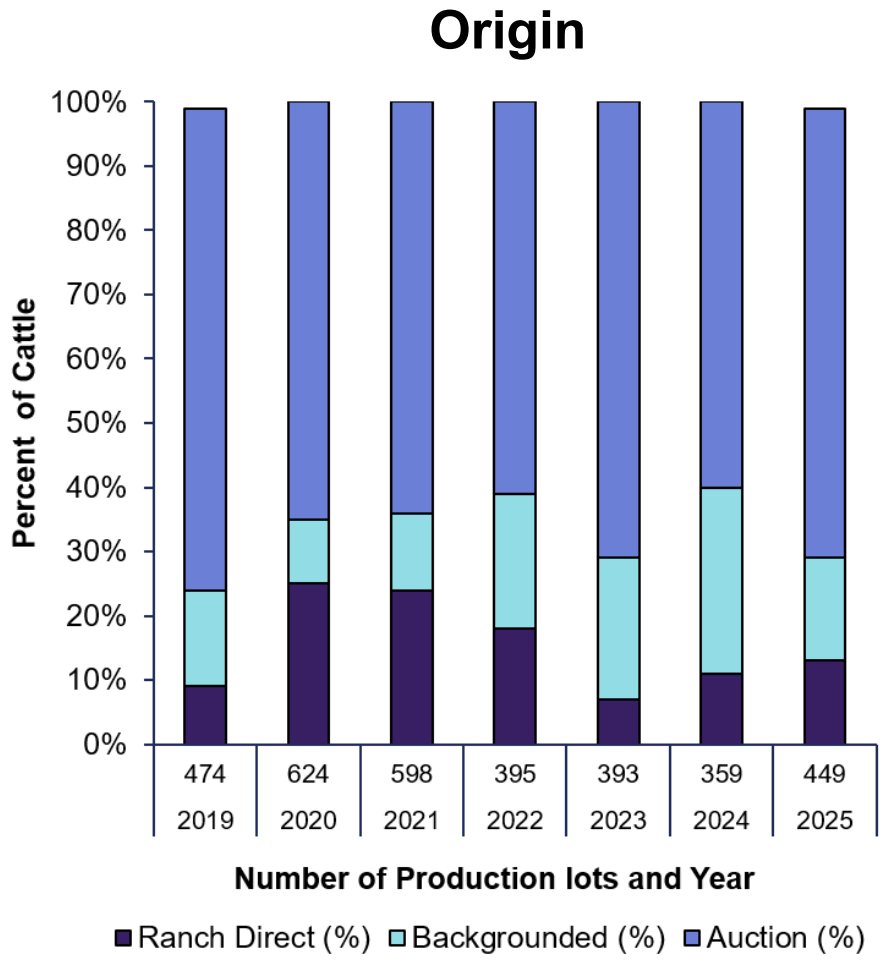




- Adult cattle are uncommon.
- 10% more calves in 2025 than over the last 3 years.
- BRD risk similar between 2025 and 2024.

Sex and Origin



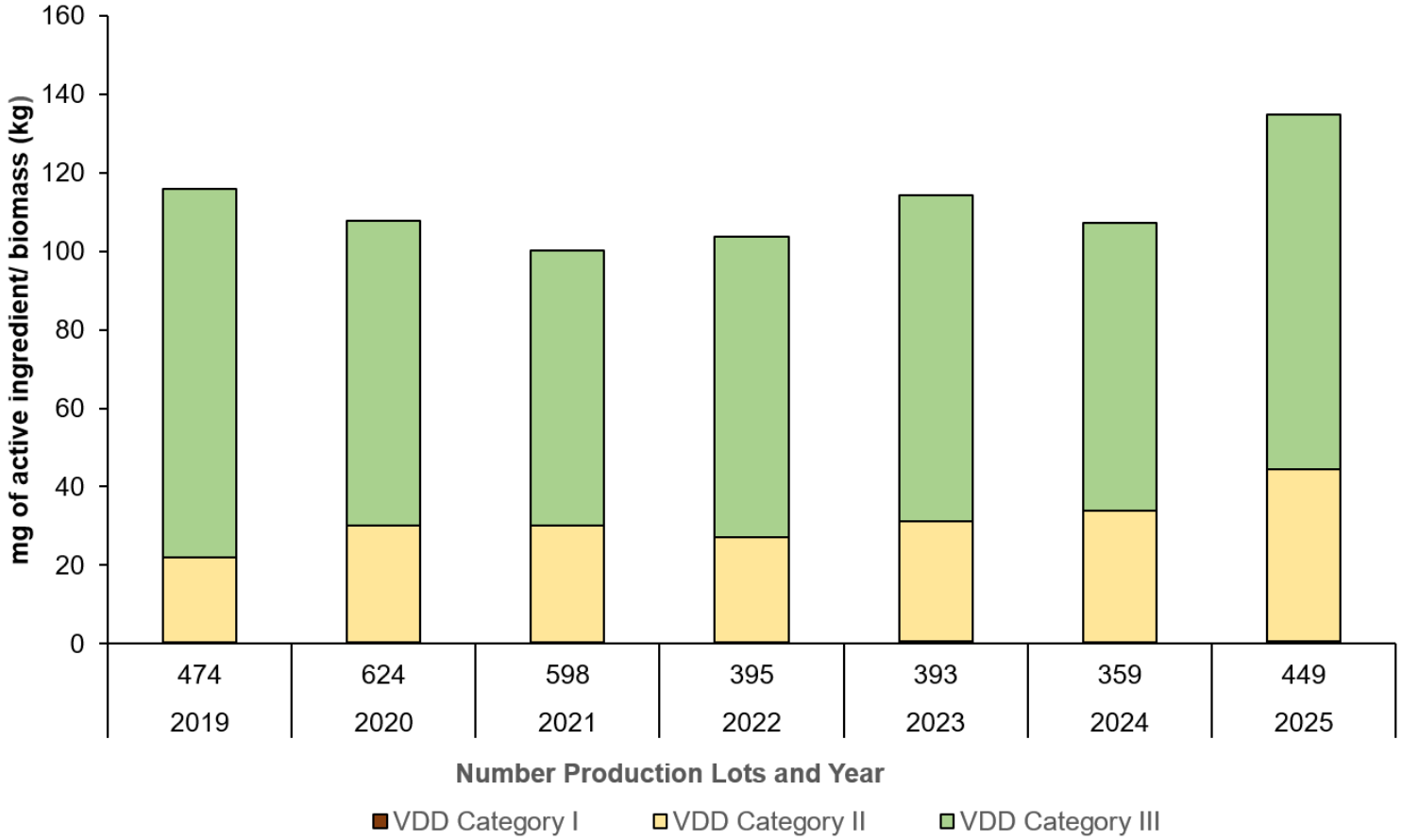


- 67% of cattle placed were steers in 2025
- 70% of cattle were sourced from the auction market

Antimicrobial Use Data: Methodology

- **Data provided in mgs of active ingredient / kg biomass**
  - Calculated annually to adjust the mgs of active ingredient by the number and weight of the cattle
  - Weight used is the annual average slaughter weight of the enrolled cattle
- **Calculating change between years**
  - Percent change = ((current year-previous year)/ previous surveillance year))*100
  - Provided throughout the presentation comparing the current year (2025) to
    - The prior year (2024)
    - Five years prior (2021)
    - The first year of surveillance (2019)

Medically Important Antimicrobials (MIA) via all routes summarized by Health Canada's Categorization of antimicrobials based on importance in human medicine

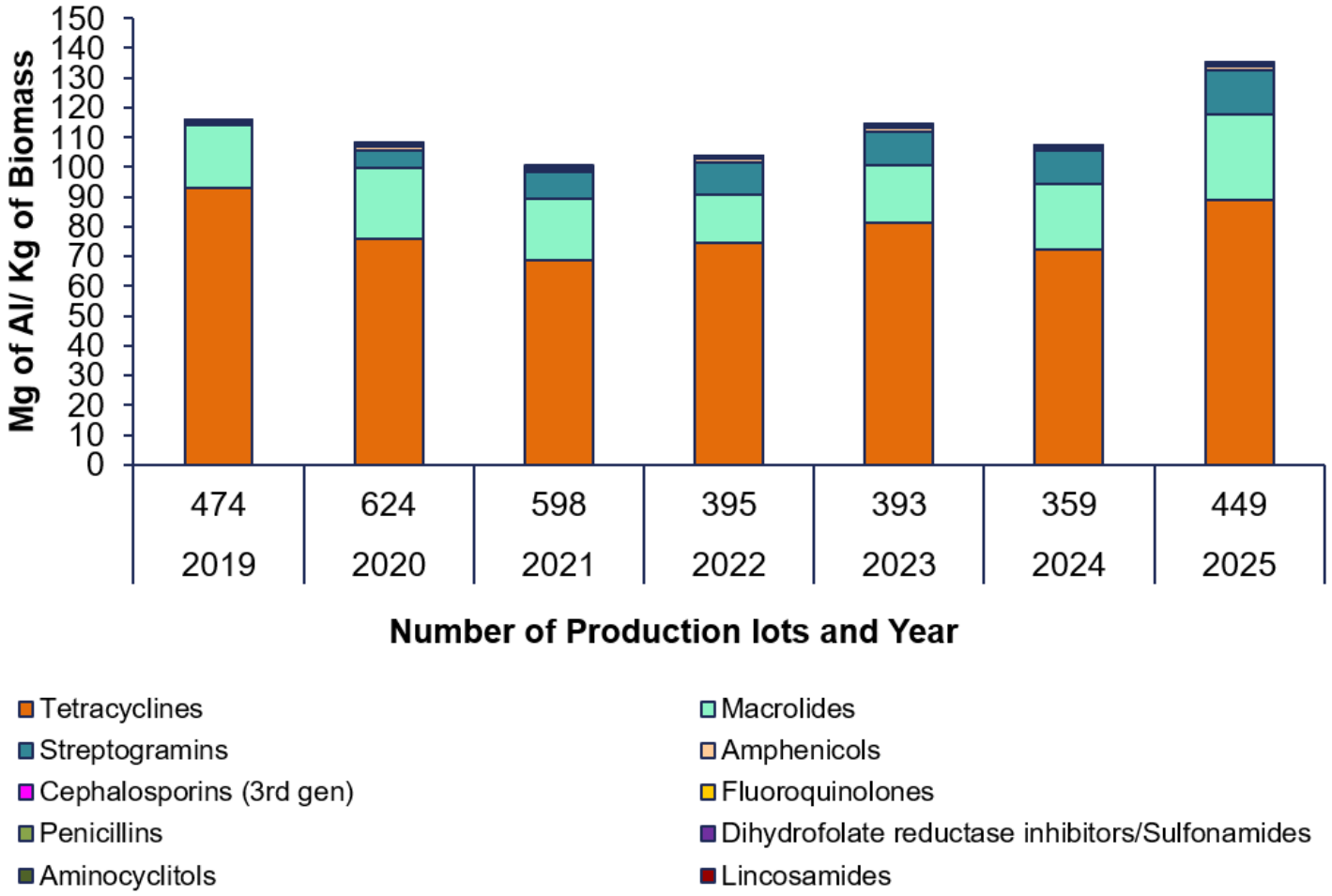


2025 had the highest quantity of AMU since the program's initiation with a total of **135 mg of antimicrobials/kg biomass**

- 16% **increase** between 2019 and 2025
- 35% **increase** between 2021 and 2025
- 26% **increase** between 2024 and 2025

Antimicrobial Use by All Routes, 2019-2025

Tetracyclines are the major (66%) contributor to antimicrobial use



Between 2024 and 2025

- Streptogramins **increase** of 38%
- Cephalosporins **increase** of 40%
- Fluoroquinolones **decrease** of 2%
- Amphenicols **increase** of 66%

Between 2021 and 2025

- Streptogramins **increase** of 67%
- Cephalosporins **increase** of 43%
- Fluoroquinolones **increase** of 2%
- Amphenicols **increase** of 34%

Between 2019 and 2025

- Cephalosporins **increase** of 50%
- Fluoroquinolones **increase** 10%
- Amphenicols **increase** of 30%

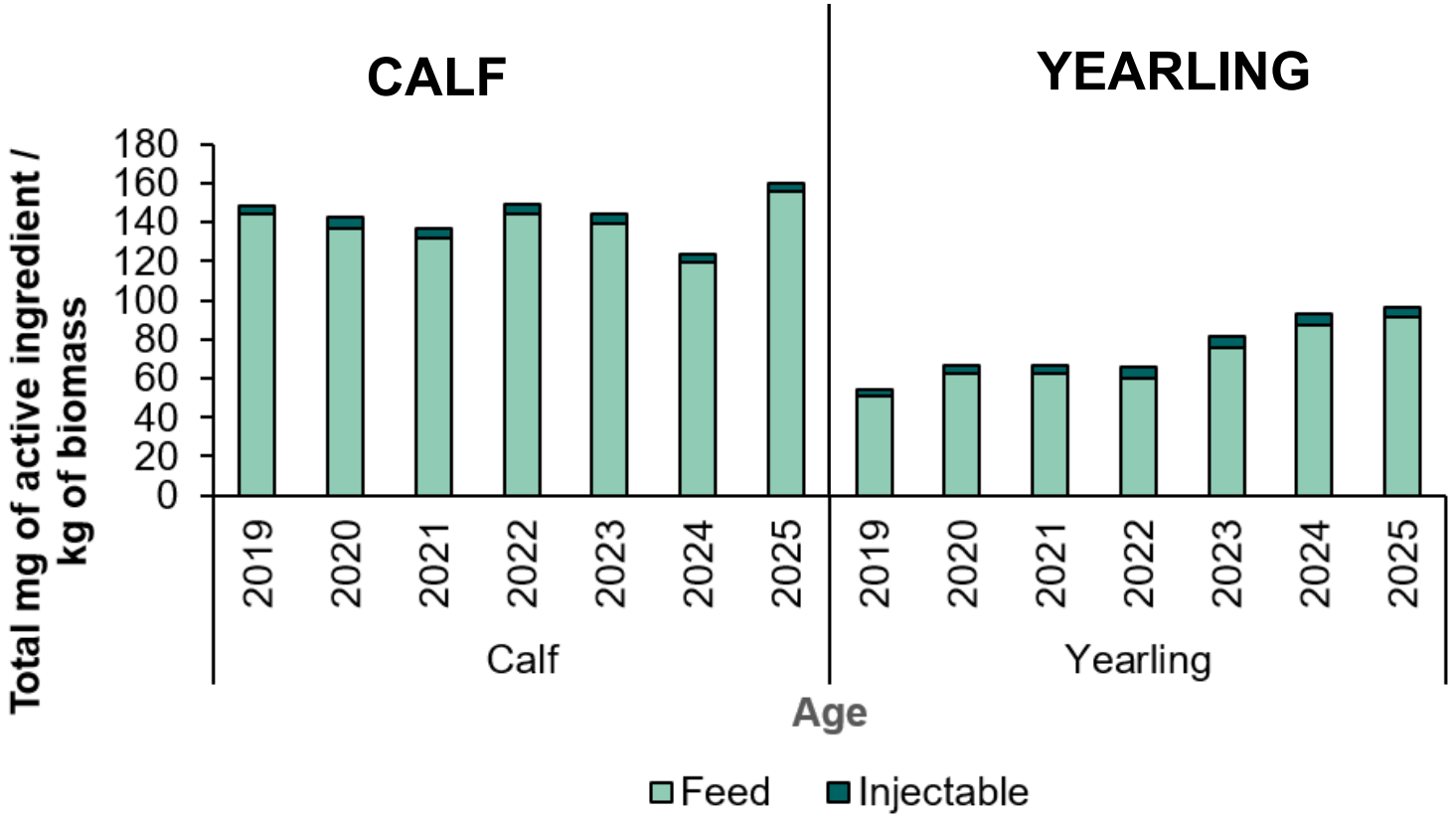
AMU by all Routes of Administration by Age, 2019-2025

Calves in 2025 = 160 mgs of AI/kg biomass

- 30% **increase** between 2024 and 2025
- 17% **increase** between 2021 and 2025
- 8% **increase** between 2019 and 2025

Yearlings in 2025 = 97 mgs of AI/kg biomass

- 4% **increase** between 2024 and 2025
- 46% **increase** between 2021 and 2025
- 78% **increase** between 2019 and 2025

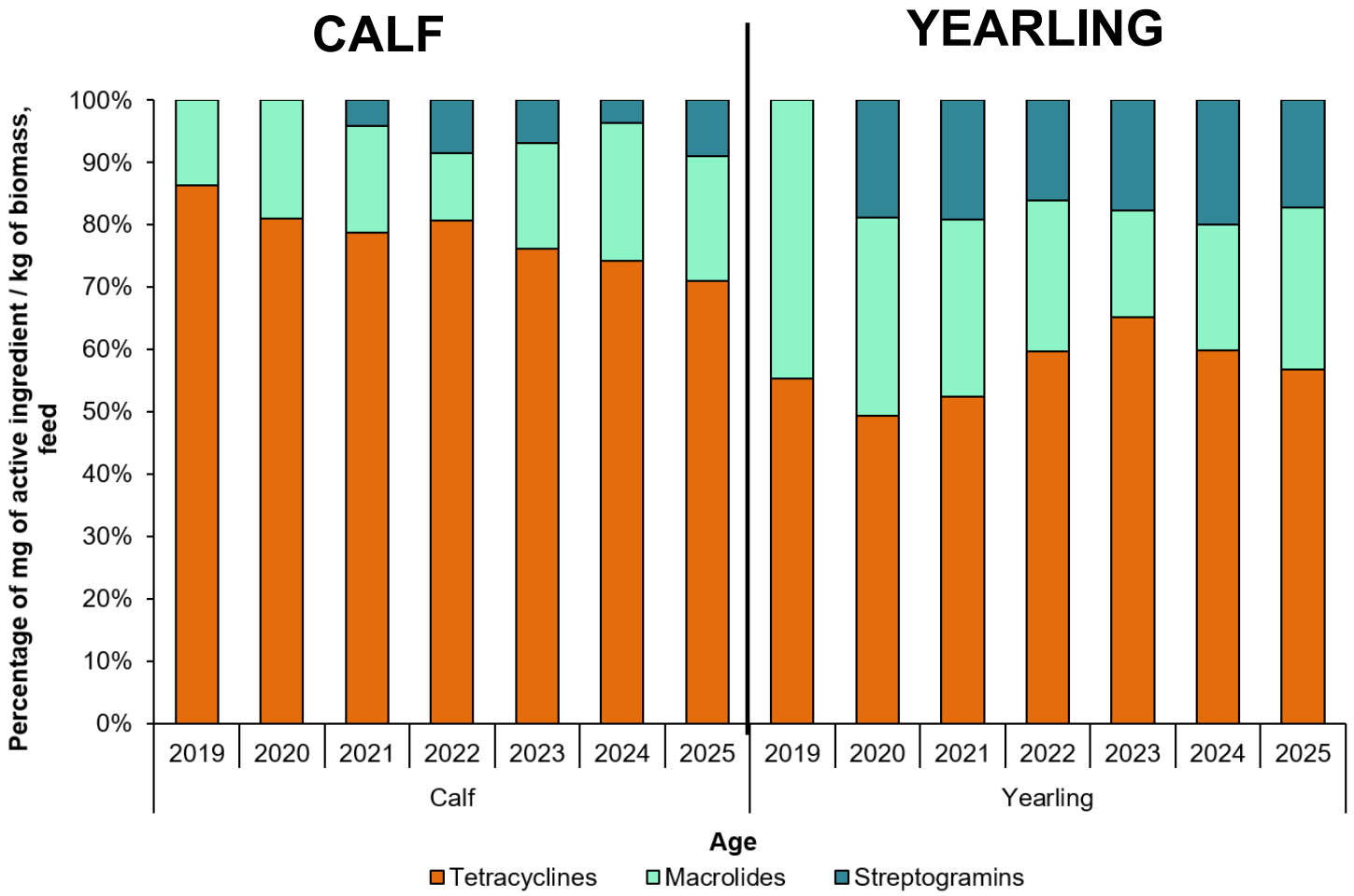


In-feed AMU by Age

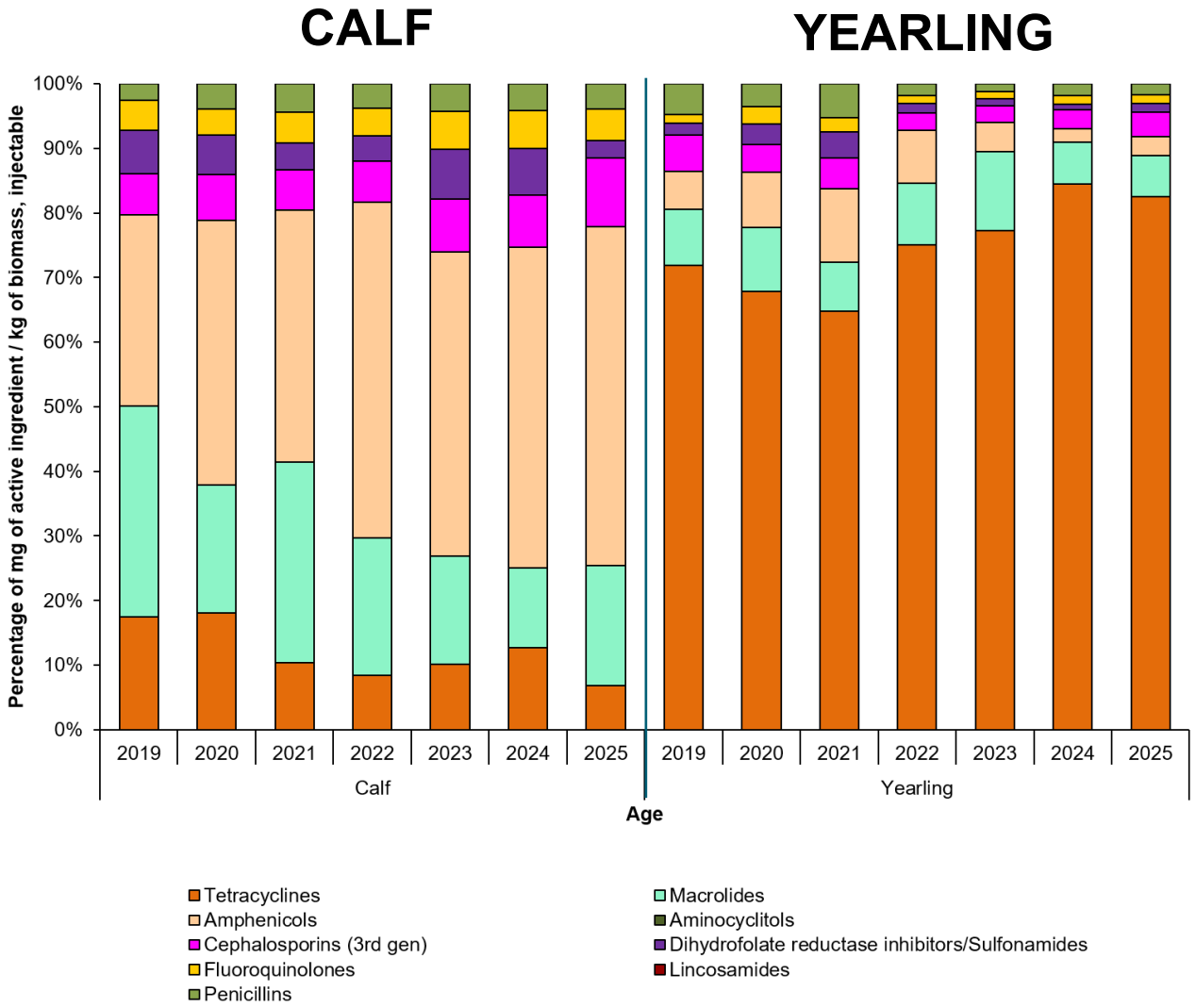
- In-feed tetracycline AMU was more common in calves than in yearlings
- Macrolide and streptogramin in-feed AMU more common in yearlings than calves

Calf	2025 vs 2024	2025 vs 2021	2025 vs 2019
Tetracycline	25%	6%	-11%
Macrolides	18%	38%	58%
Streptogramins	219%	154%	-

Yearling	2025 vs 2024	2025 vs 2021	2025 vs 2019
Tetracycline	-1%	59%	85%
Macrolides	36%	34%	5%
Streptogramins	-10%	33%	



Injectable AMU by Age.



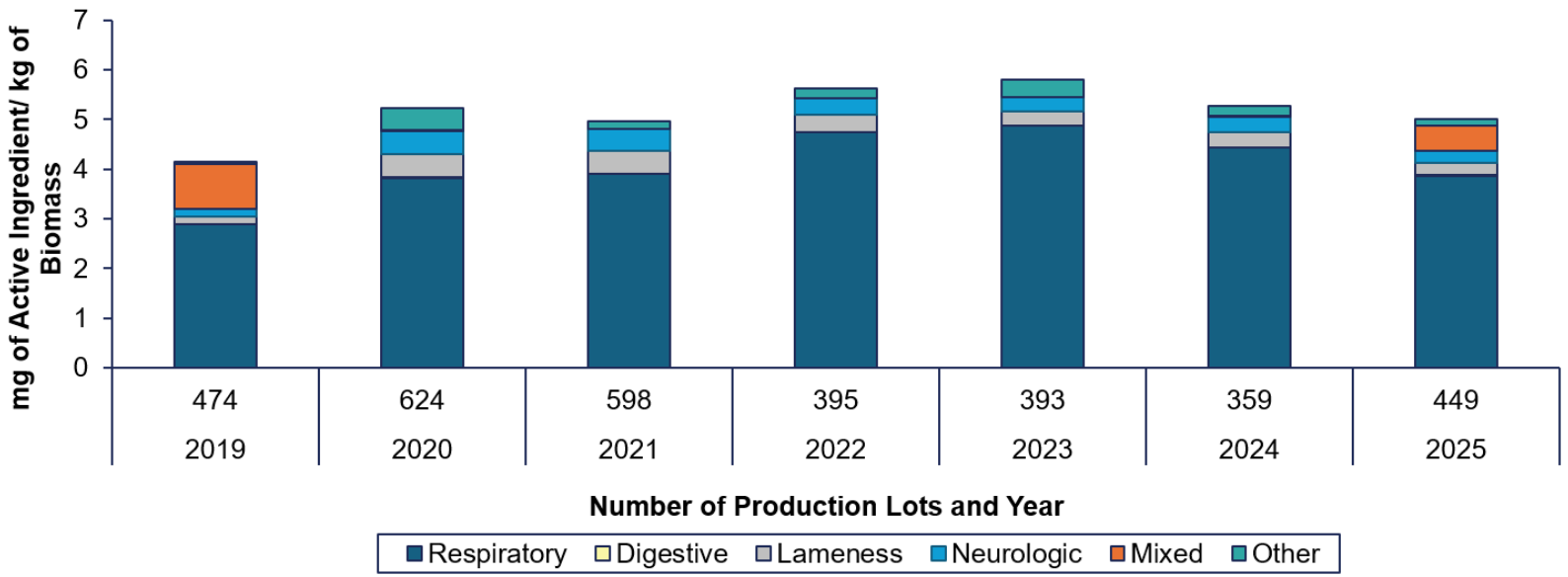
Calf Injectable Use

- 70% of injectable AMU in calves due to macrolide and amphenicol use
- Between 2019 and 2025
  - 76% **increase** in amphenicol use
  - 26% **increase** in cephalosporin use
  - 60% **decrease** in tetracycline use

Yearling Injectable Use

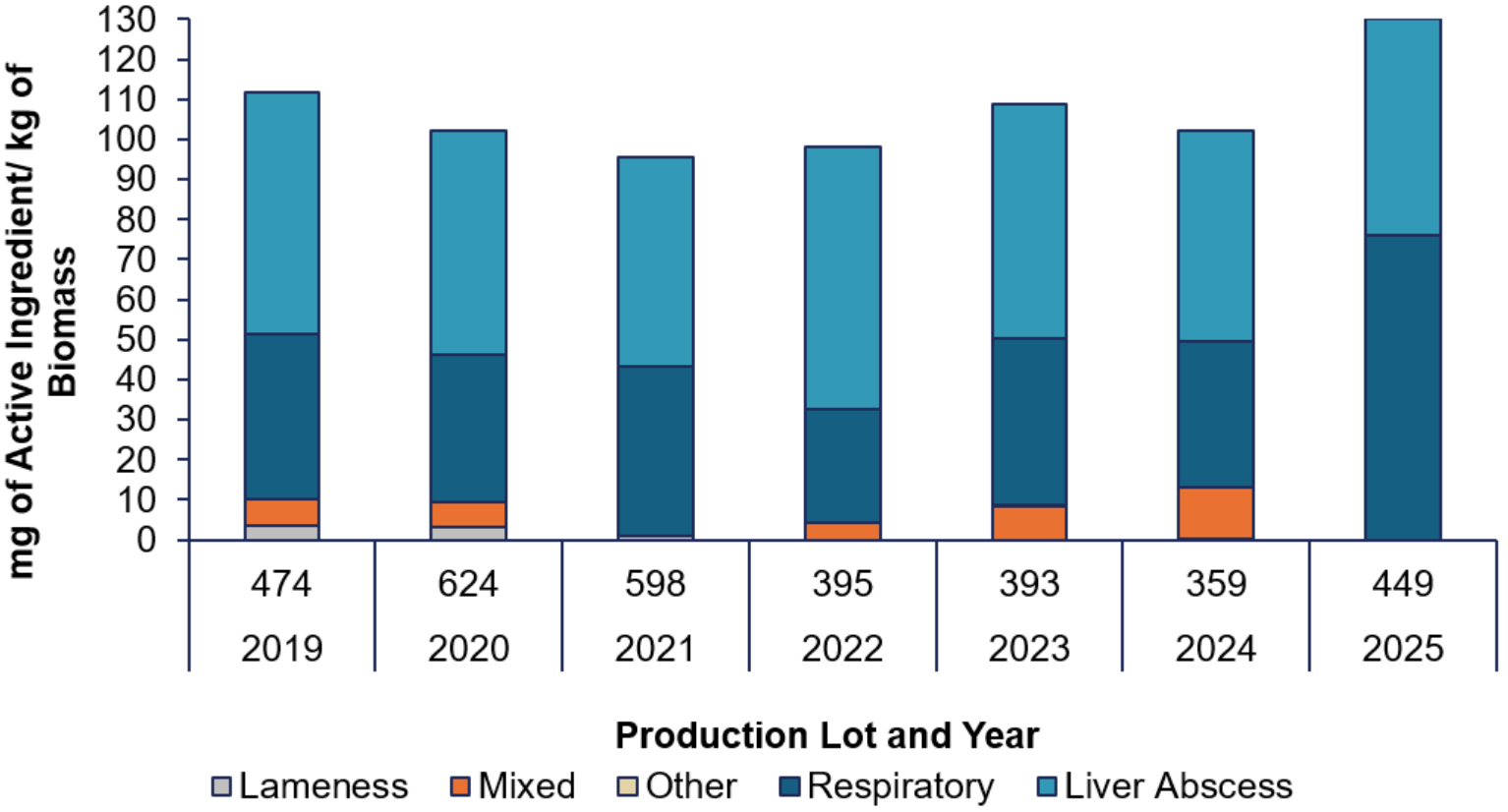
- 83% of injectable AMU in yearlings due tetracyclines
- Between 2019 and 2025
  - 70% **increase** in tetracycline use
  - 40% **increase** in fluoroquinolone use
- 18% **increase** in cephalosporin use between 2024 and 2025

Parenteral Reasons for Use



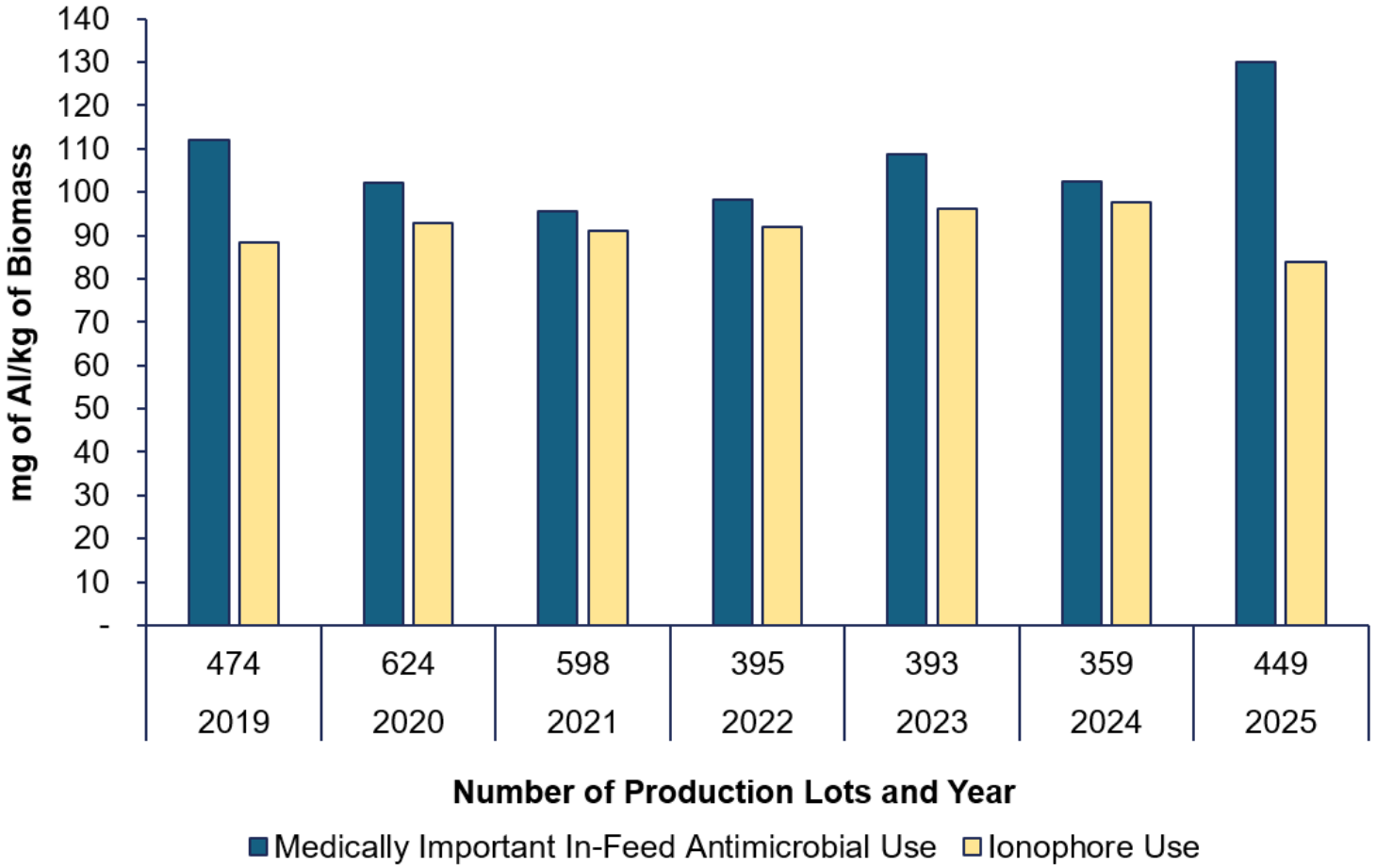
- **Respiratory disease –** accounts for **81%** of AMU via injection
- **Lameness**-related AMU peaked in 2021 and 2022. Only **5%** of the injectable use in 2025 was for lameness.
- **Digestive and neurologic** conditions have remained uncommon reasons for AMU via injection.

In-feed AMU Reasons for Use



- **Liver abscesses (42%, 2025)** and **respiratory disease (including histophilosis)(58%, 2025)** were the primary reasons for antimicrobial use in feed and are the principal drivers of AMU in beef cattle.

In 2025 Medically Important Antimicrobial (MIA) use exceeded ionophore use



- Historically MIA and ionophore use have been closer in quantity used in mgs/kg biomass
- 46 more mg of MIA/kg biomass than ionophores in 2025

Key Messages

- AMU in feedlot cattle reached a **peak of 135 mg/kg biomass** in 2025
  - 16% increase since 2019, a 35% increase since 2021 and a 26% increase since 2024.
  - 96% of all antimicrobial use is via feed
- **Increase in Category II** antimicrobial use in 2025
  - 104% increase since 2019, a 48% increase since 2021 and a 31% increase since 2024.
  - Rise likely due to **increased** use of **Streptogramins**

Key Messages

- **Yearlings- In-feed**
  - 80% increase of in-feed AMU between 2025 and 2019.
    - Increase due to increased Tetracycline use
  - In 2025- tetracyclines contributed to 57%, macrolides 26% and streptogramins 17% of in-feed AMU.
- **Calves-In-feed**
  - 70% of the quantity provided attributed to tetracyclines.
  - Streptogramin use increased by 219% between 2025 and 2024, and 154% between 2025 and 2021.

Key Messages

- **Yearlings Injectable**
  - 83% of the quantity by injection was attributed to tetracyclines.
  - 70% increase in quantity of tetracycline use between 2019 and 2025 and 67% between 2021 and 2025.
  - 40% increase in fluroquinolone use between 2019 and 2025.
  - 18% increase in cephalosporin use between 2024 and 2025.
- **Calves Injectable**
  - 71% of the quantity by injection was attributed to amphenicols and macrolides.
  - Amphenicol use increased by 76% between 2019 and 2025, and 14% between 2021 and 2025.
  - 10% increase in fluroquinolone use between 2019 and 2025.
  - 26% increase in cephalosporin use between 2019 and 2025.

Key Messages

- **Reasons for use**
  - 81% of AMU via injection for respiratory disease.
  - 100% of AMU via feed for respiratory disease (58%) or liver abscesses (42%).
- **Why the rise in AMU in 2025?**
  - Possibly due to the high price of cattle and willingness of producers to spend more?
  - More calves being fed (10% more calves in 2025)?
  - More days on-feed -12 additional days compared to 2024, and 26 days compared to 2023 (lowest days on feed in 7 years).

NEW COLLABORATIVE COMPONENT: Alberta Feedlot Animal Health and Welfare Surveillance System (AFAHWS)

SUMMARY OF 2016 TO 2024 DATA

Public Health Agency of Canada
Agence de la santé publique du Canada

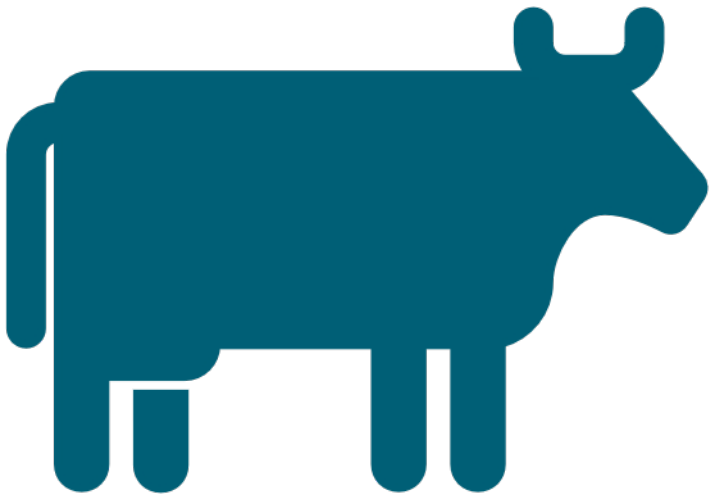
Canada

Collaboration

Led by Dr. Joyce Van Donkersgoed

Commitment to animal health and welfare

"Collection of high-quality feedlot data allows for the beef industry to detect, benchmark, and monitor disease rates overtime to identify risks to animal health and welfare to enhance industry knowledge and improve public agriculture awareness."



Objectives

1) Provide estimates of morbidity and mortality rates in finishing feedlots.
2) Monitor disease rates in feedlot cattle over time.
3) Investigate disease rates and antimicrobial use (AMU) and resistance (AMR) on a targeted basis.
4) Provide feedlot producers and veterinarians with industry benchmark data.
5) Provide industry stakeholders with reliable animal health data for determinants of priority research.

Program at a Glance

6 Years Surveilled (2019 to 2024)

Crude Mortality across all years = 2.5%

Median Annual sample size

= 128, 763 cattle

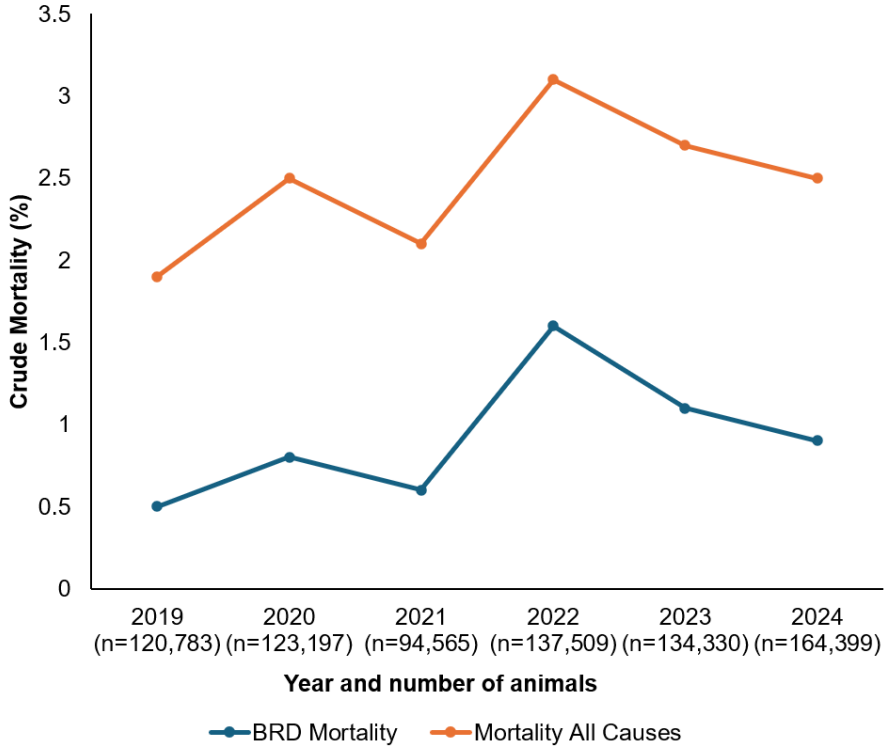
Average percent of cattle treated for the first time for BRD=14.4%

BRD Proportionate Mortality ranges from 26.0% (2019) to 50.1% (2022)

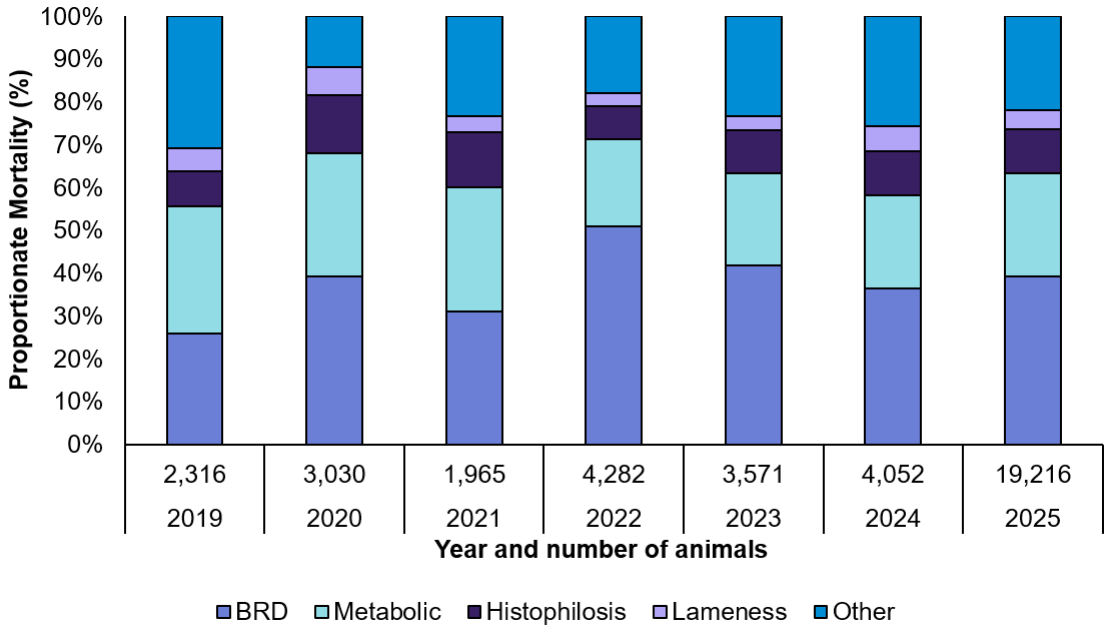
Cattle classified as ‘High Risk for BRD” ranges from 37.8% (2021) to 47.2% (2019)

BRD=bovine respiratory disease

Example of Mortality data: On average 38% of all mortalities are due to BRD



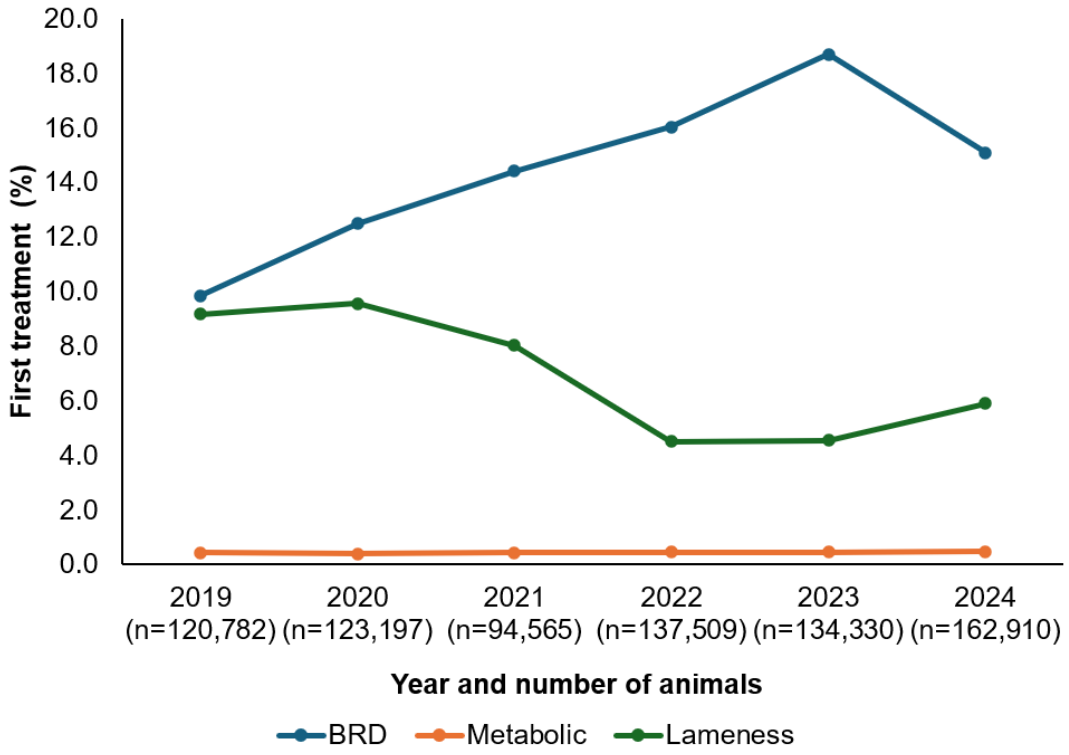
Crude mortality rate (n deaths/total animals) by year for all causes and BRD.



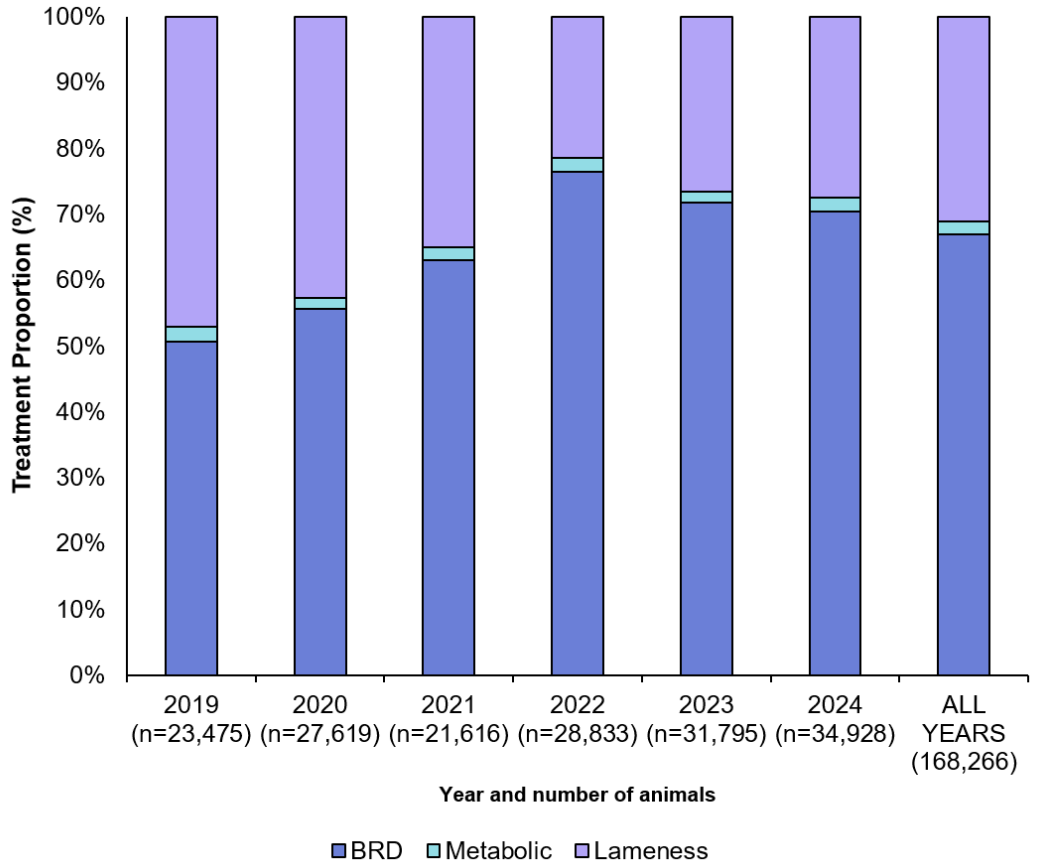
Proportion of total deaths attributable to disease categories by year.

BRD= bovine respiratory disease

Example of Morbidity data: On average 70% of all treatments are for BRD



Percent of cattle treated for the first time stratified by syndrome and year



Proportion of first treatments based on syndromic category

BRD= bovine respiratory disease

Further information available at

- Canadian Feedlot Antimicrobial Use and Antimicrobial Resistance Surveillance Project (CFAASP) Website: https://cfaasp.ca/

- Alberta Feedlot Animal Health and Welfare Surveillance System (AFHWS) Website: https://cfaasp.ca/alberta-feedlot-health-and-welfare-surveillance-system

BRD= bovine respiratory disease

Acknowledgements

- **Veterinarians and producers who make the program possible**

- **Funding Sources: Program commencement 2019**

Current Funding	Historical Funding
Beef Cattle Research Council	Alberta Cattle Feeders
Canadian Agricultural Partnership Alberta	Bayer Animal Health
Public Health Agency of Canada	Beef Cattle Research Council
Results Driven Agriculture Research	Beef Farmers of Ontario
Saskatchewan Agriculture	Canadian Agricultural Partnership Alberta
	Canadian Agricultural Partnership Ontario
	Canadian Veterinary Medical Association
	McDonalds
	National Cattle Feeders ACFA
	Public Health Agency of Canada
	Results Driven Agriculture Research
	Saskatchewan Agriculture
	Saskatchewan Cattle Association
	Vetoquinol

Questions?

