Canadian Feedlot Antimicrobial Use and Antimicrobial Resistance Surveillance Program

CANADIAN FEEDLOT AMU/AMR SURVEILLANCE PROGRAM (CFAASP)

WAAW
November 18, 2025

Join at menti.com | use code 3298 1512

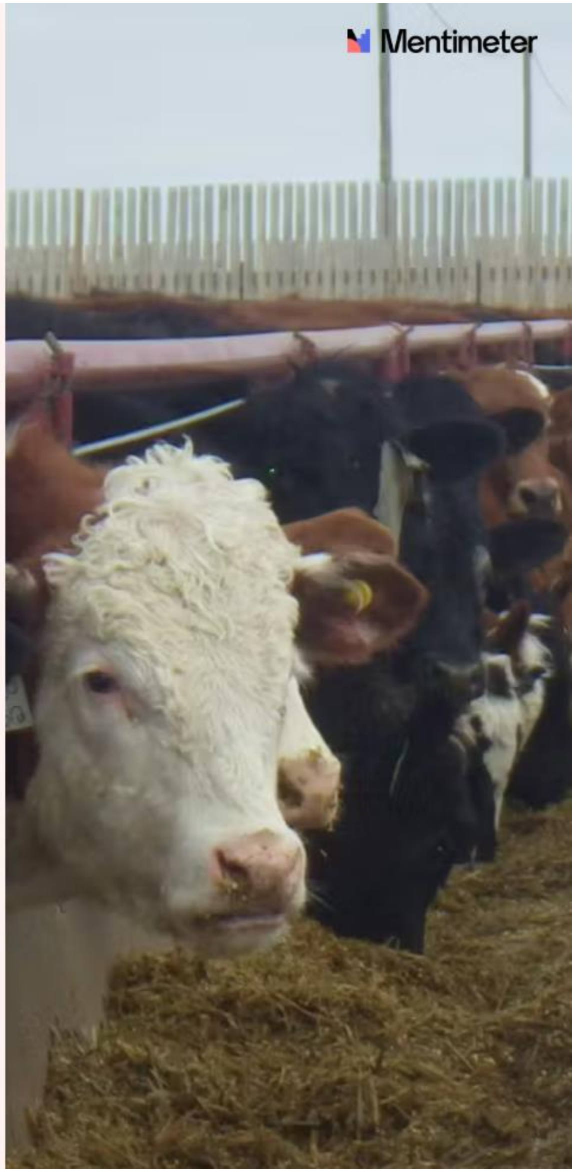
CIPARS Feedlot Cattle Component Presentation 2024 / Présentation de la composante bovins en parc d'engraissment de 2024 du PICRA

World Antimicrobial Resistance Awareness Week

November 18, 2025

Semaine mondiale de sensibilisation à la résisance aux antimicrobiens

18 novembre 2025



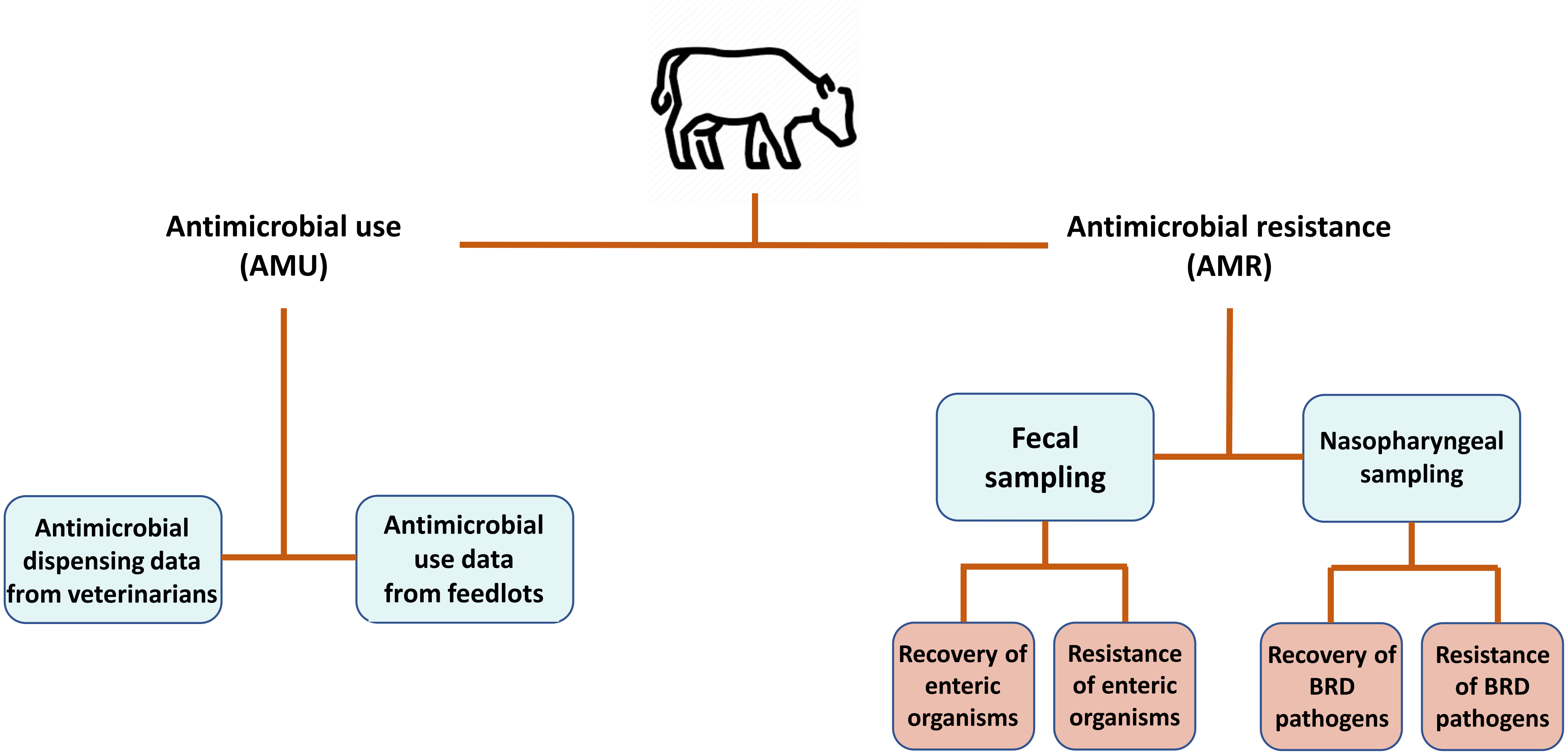
Objectives

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

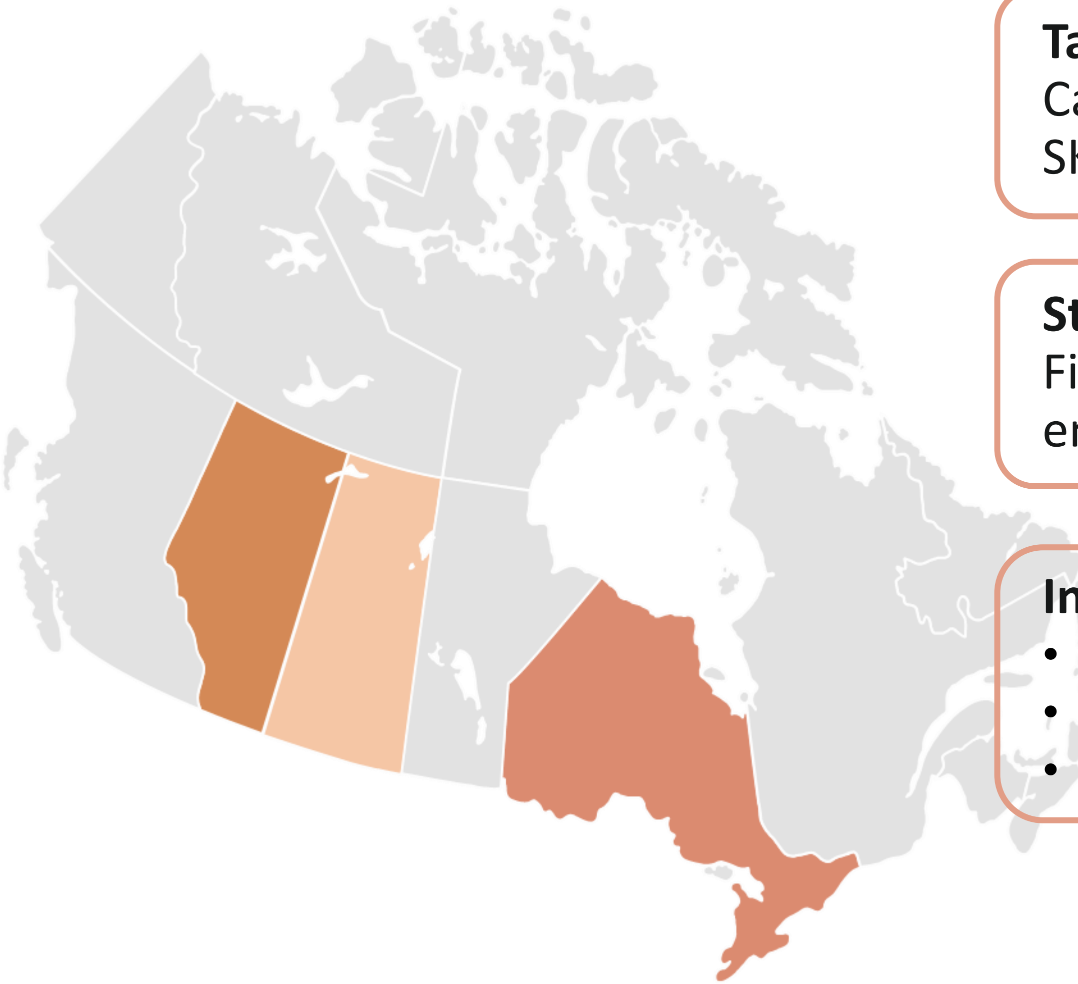
Monitor trends in AMU and AMR in feedlots over time and in the context of changes to veterinary practice

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

Data collection framework



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

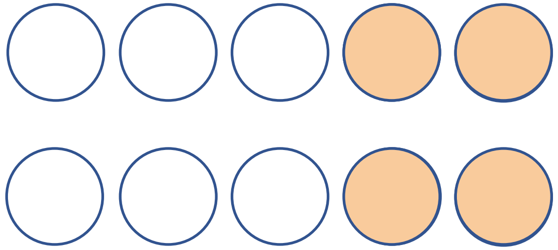
AMR: FECAL ORGANISMS

2024 HIGHLIGHTS AND 6-YEAR TEMPORAL TRENDS

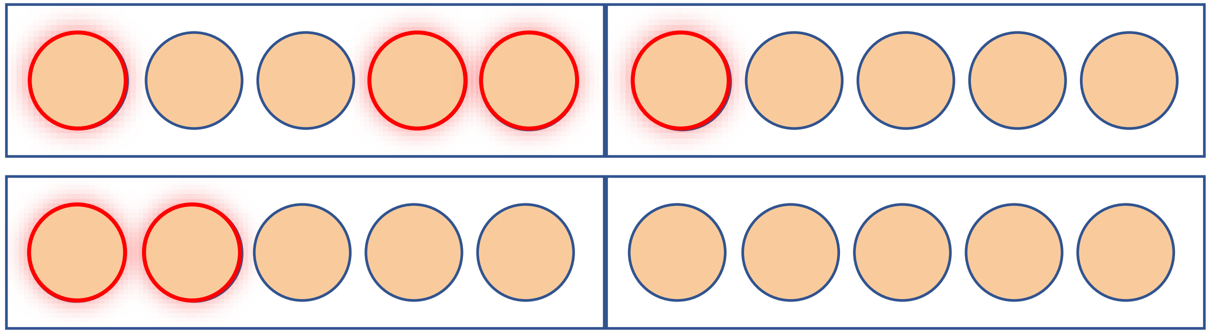
Methods: fecal organism recovery + resistance

- Composite fecal samples obtained from 10 pens per feedlot annually
- Feedlots requested to distribute sample collection across all quarters

10 samples submitted to the lab for primary isolation of fecal organisms → Organism X isolates are tested for sensitivity to a panel of antimicrobials



Organism X is recovered from 4/10 (40%) of the samples



3/4 (75%) of organism X isolates are resistant to antimicrobial 1

1/4 (25%) of organism X isolates are multidrug resistant (resistant to 3+ classes)

Sample collection: fecal organisms (2024)

NML in Saint-Hyacinthe, QC

180 fecal samples

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

EC

S

C

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.

PDS in Saskatoon, SK

180 fecal samples

Isolation: *Enterococcus* spp.
Susceptibility testing: *E. faecalis, E. faecium* and *E. hirae* **(n = 180)**

EF EH EF

O

Only one *Enterococcus* spp. isolate per sample was tested for susceptibility to a panel of 16 antimicrobials (13 classes)

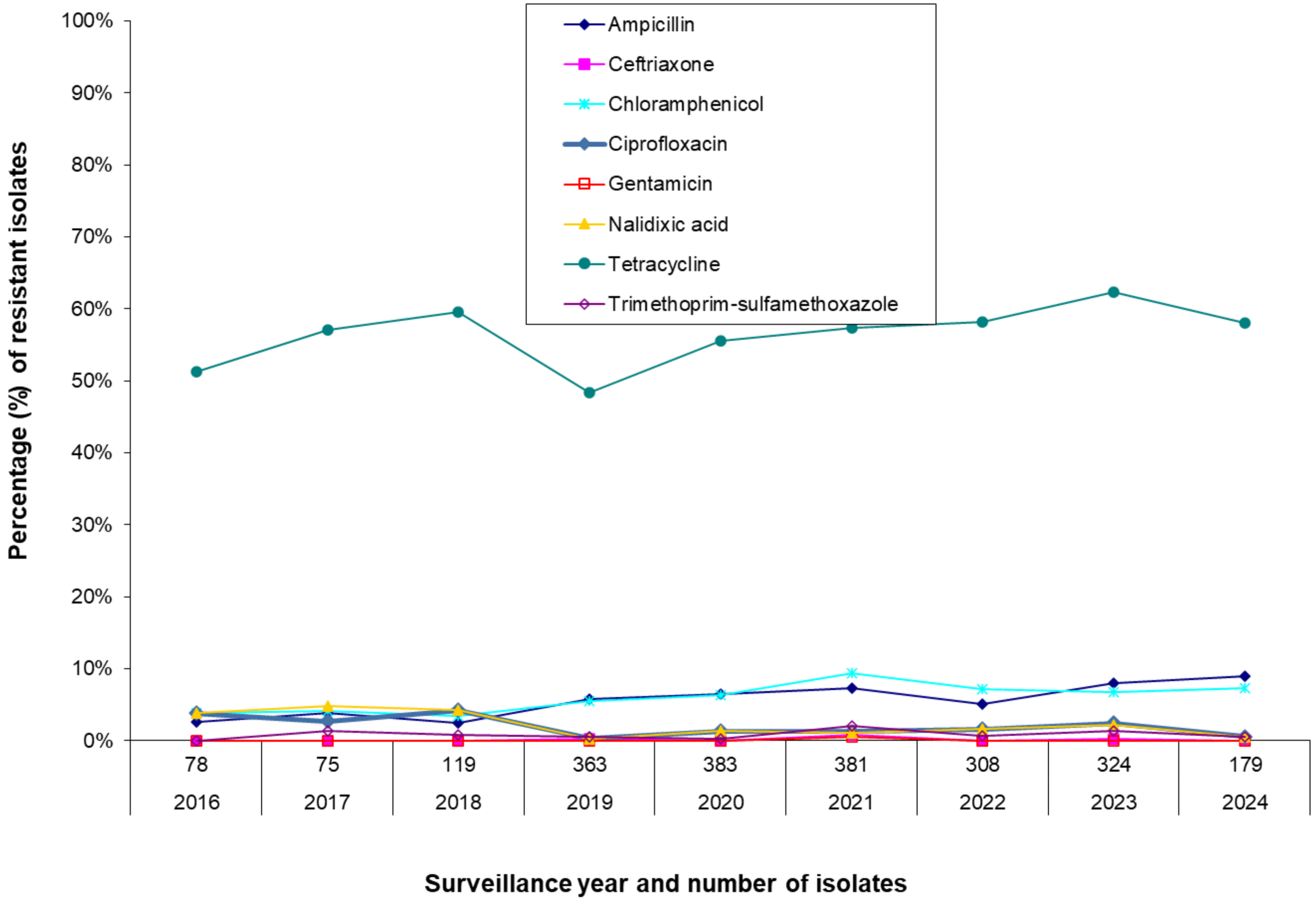
E. faecalis was preferred over *E. faecium* and *E. hirae*

Fecal organism recovery

Province/ region	Year	Percentage (%) of isolates recovered (number of isolates recovered/number of samples submitted)							
		Escherichia coli		*Salmonella spp.*		*Campylobacter spp.*		*Enterococcus spp.*	
National	2019	**99.2%**	363/366	**7.1%**	26/366	**44.3%**	162/366	**100.0%**	355/355
	2020	**97.5%**	384/394	**3.8%**	15/394	**23.4%**	92/394	**97.5%**	384/394
	2021	**99.0%**	381/385	**4.4%**	17/385	**64.2%**	247/385	**99.0%**	386/390
	2022	**99.0%**	308/311	**2.9%**	9/311	**59.2%**	184/311	**99.4%**	309/311
	2023	**98.8%**	324/328	**4.9%**	16/328	**45.4%**	149/328	**100.0%**	329/329
	2024	**99.4%**	179/180	**5.5%**	10/180	**51.7%**	93/180	**100.0%**	180/180

- ↑ in *Salmonella* spp. recovery between 2023 and 2024
- ↑ in *Campylobacter* spp. recovery between 2023 and 2024

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



- No statistically significant changes detected
- 41% of isolates fully susceptible
- 8% resistant to ≥ 3 antimicrobial classes

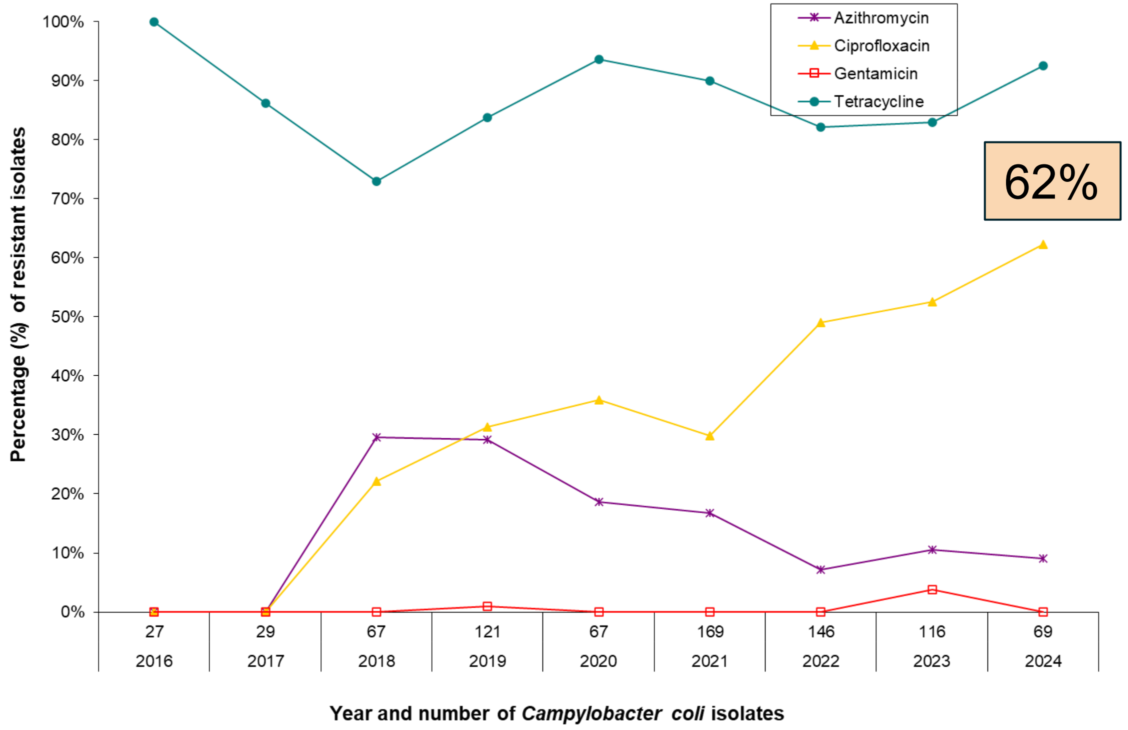
Salmonella spp. resistance only detected to sulfasoxazole (70%) and tetracycline (80%)

Province or region	Serotypes	Number (%) of isolates	Number of isolates by number of antimicrobial classes in the resistance pattern						
			0	1	2–3	4–5	6–7	8-9	10-11
National									
	Muenchen	6 (60.0%)		1	5				
	Uganda	2 (20.0%)			2				
	Mbandaka	1 (10.0%)	1						
	Rubislaw	1 (10.0%)	1						
	Total	**10 (100.0%)**	**2**	**1**	**7**				

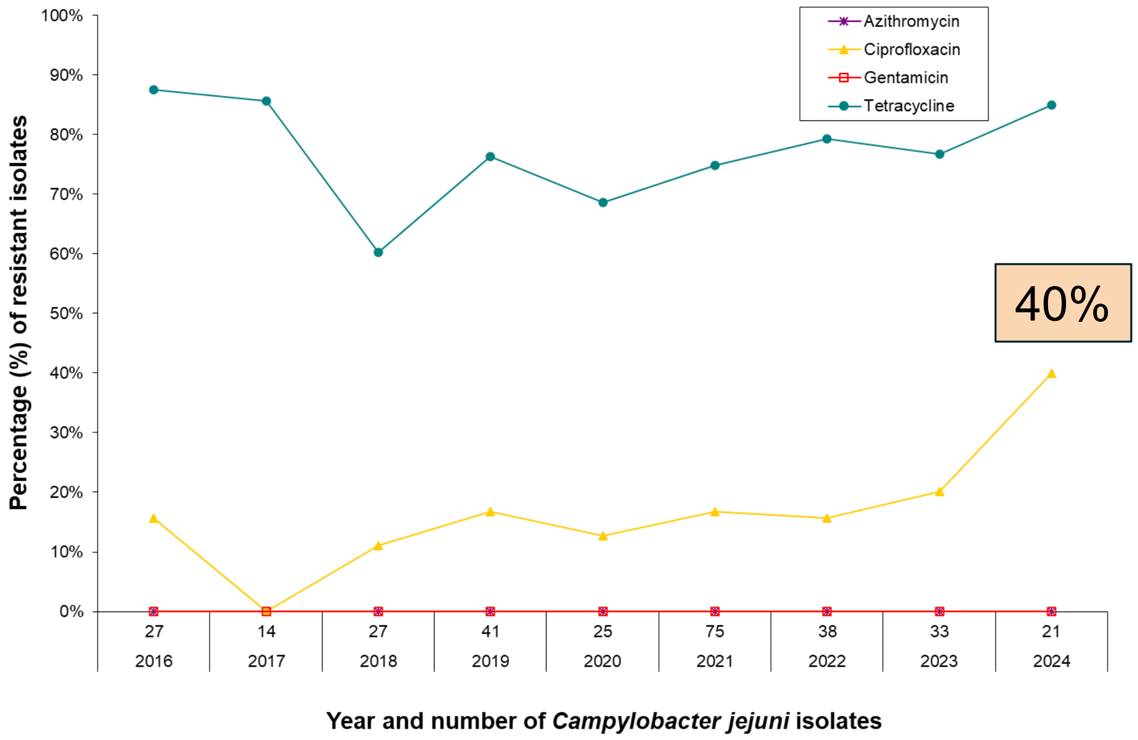
- Low number of isolates
- No category I resistance detected
- No isolates resistant to ≥ 3 antimicrobial classes
- 22% of isolates fully susceptible

Campylobacter spp. ciprofloxacin resistance is high (>20 to 50%) to very high (>50 to 70%)

C. coli (n = 69 in 2024)



C. jejuni (n = 21 in 2024)



Campylobacter spp. extremely low pan-susceptibility (0-20%)

C. coli (n = 69 in 2024)

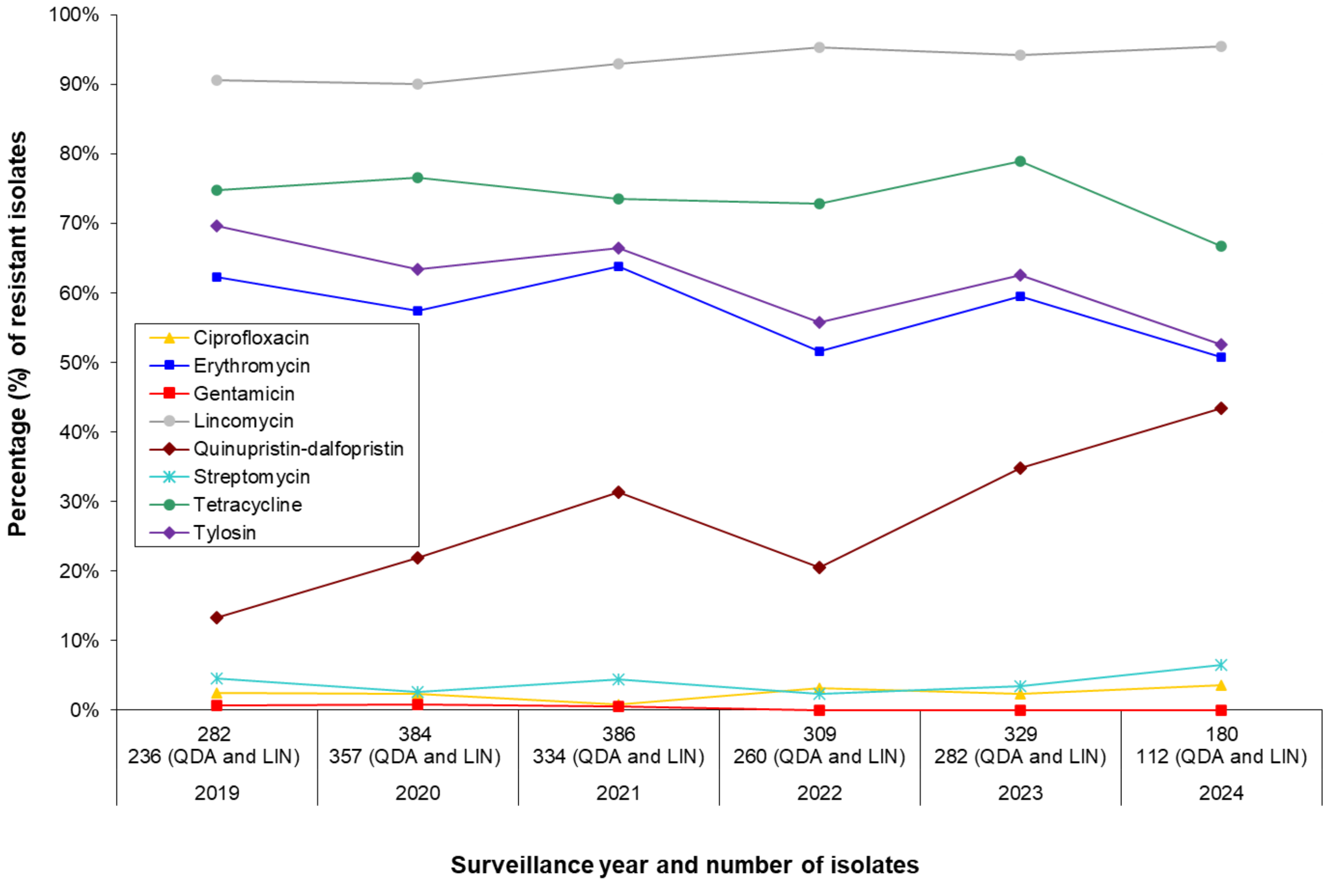
- Pan-susceptible: 0%
- CIP resistance: 62%
- Dominant phenotypes
  - TET- (32%)
  - CIP-NAL-TET- (51%)

C. jejuni (n = 21 in 2024)

- Pan-susceptible: 15%
- CIP resistance: 40%
- Dominant phenotypes
  - TET- (48%)
  - CIP-NAL-TET- (38%)

Enterococcus spp. 31%↑ in quinupristin-dalfopristin resistance since 2019

- *E. faecium* – only 2 isolates
  - 1 isolate CIP-DAP-TET-
- Category I resistance
  - CIP 4% of total isolates
  - LNZ 2% of total isolates
    - All *E. faecalis* (n=4) MDR
      - CHL-ERY-KAN-LNZ-TET-TYL- (n=3)
      - CHL-ERY-KAN -LNZ-TIG-TET-TYL (n=1)
  - No vancomycin resistance

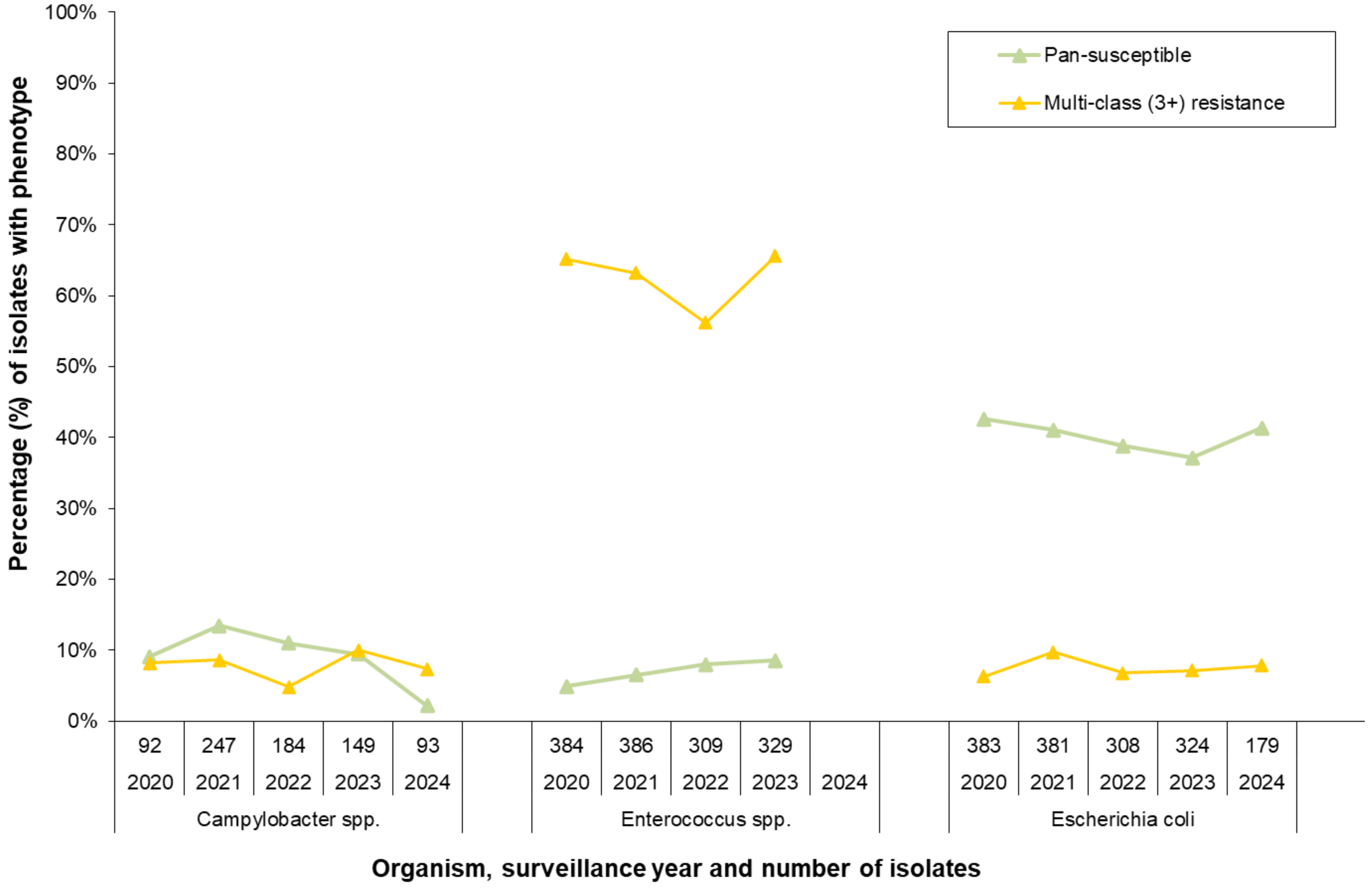


Enterococcus spp. MCR includes a variety of patterns

- **10** isolates (6%) resistant to 6 classes of antimicrobials
  - 9 *E. hirae* isolates
    - DAP-ERY-LIN-NIT-QDA-TIG-TET-TYL- (n = 3)
    - DAP-ERY-LIN-QDA-STR-TET-TYL- (n=2)
    - DAP-ERY-LIN-QDA-TIG-TET-TYL- (n=3)
    - ERY-LIN-QDA-STR-TIG-TET-TYL- (n=1)
  - 1 *E. faecalis* isolate
    - CHL-ERY-KAN-LNZ-TIG-TET-TYL- (n=1)

	Species	Number (%) of isolates	Number of isolates by number of antimicrobial classes in the resistance pattern				
			0	1	2–5	6–9	10–13[a]
National							
	Enterococcus hirae	100 (55.6)	1	2	88	9	
	Enterococcus faecalis	68 (37.8)	34	12	21	1	
	Enterococcus faecium	2 (1.1)			2		
	Enterococcus durans	4 (2.2)			4		
	Enterococcus casseliflavus	3 (1.7)		2	1		
	Enterococcus gallinarum	2 (1.1)		2			
	Enterococcus malodoratus	1 (0.6)		1			
	Total	**180 (100)**	**35**	**19**	**116**	**10**	

Trends in key phenotypes, fecal organisms (2016-2024); very high MCR in *Enterococcus* spp., high susceptibility in *E. coli*, low MCR and susceptibility in *Campylobacter spp.*



Key take-home messages, AMR in fecal organisms

- AMR in ***E. coli* stable** over time
- **No MCR *Salmonella*** *spp.*
- Ciprofloxacin-resistant *Campylobacter spp.*
  - **Increase of 50% in CIP resistance between 2016 and 2024** (9% to 59%)
- Streptogramin resistance in *Enterococcus spp.*
  - **31% increase in QDA resistance since 2019** (13% to 44%) coincides with increasing use of virginiamycin in feed

AMR: RESPIRATORY PATHOGENS

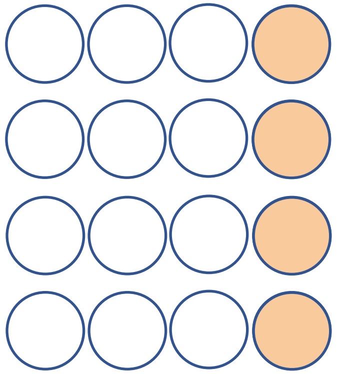
2024 HIGHLIGHTS AND 6-YEAR TEMPORAL TRENDS

Methods: respiratory pathogen recovery + resistance

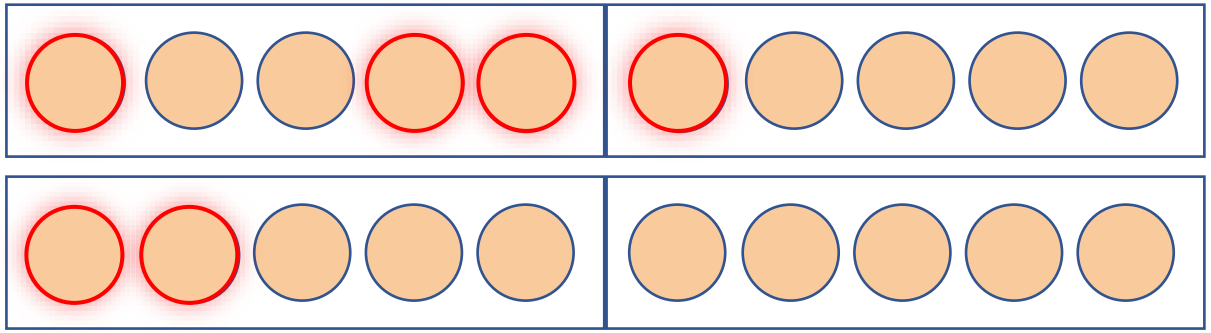
- Nasopharyngeal samples collected twice yearly from 16 animals per feedlot (at arrival and rehandling)
- Feedlots requested to distribute sample collection across all quarters

16 samples submitted to the lab for primary isolation of respiratory pathogens

Organism X isolates are tested for sensitivity to a panel of 19 antimicrobials



Pathogen X is recovered from 4/16 (25%) of the samples



3/4 (75%) of pathogen X isolates are resistant to antimicrobial 1

1/4 (25%) of pathogen X isolates are multidrug resistant (resistant to 3+ classes)

Sample collection: respiratory pathogens (2024)

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

PDS in Saskatoon, SK

Time point 1: on **arrival**

272 NP samples

MH

PM

HS

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**

288 NP samples

MH

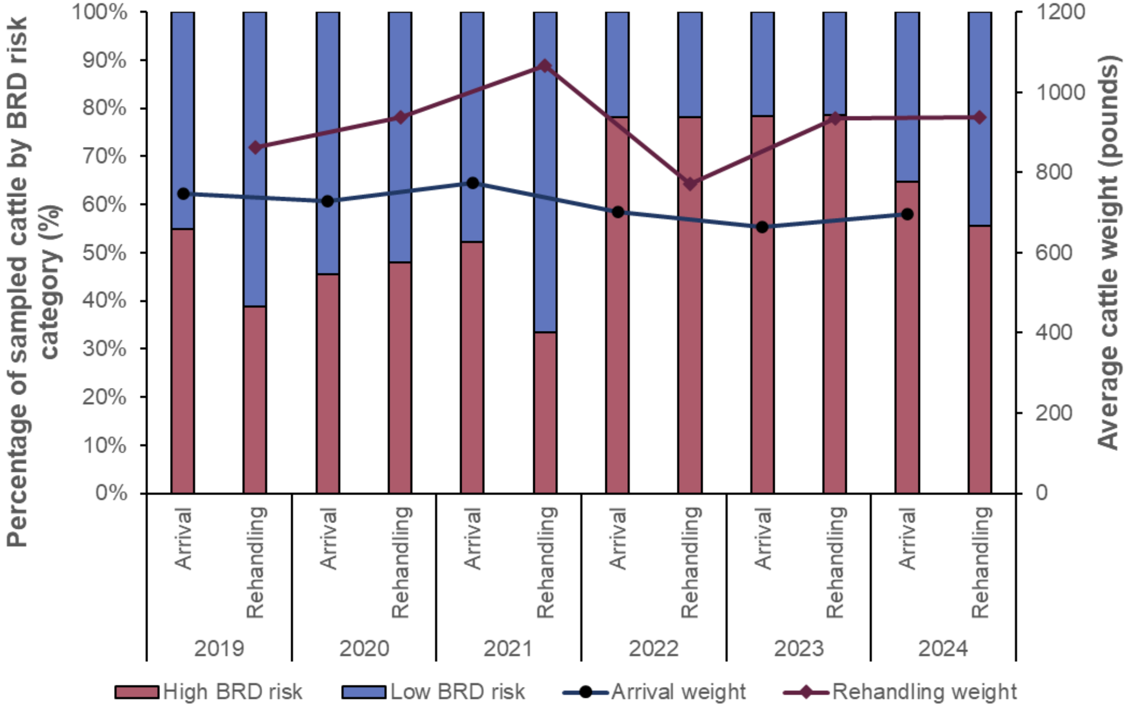
PM

HS

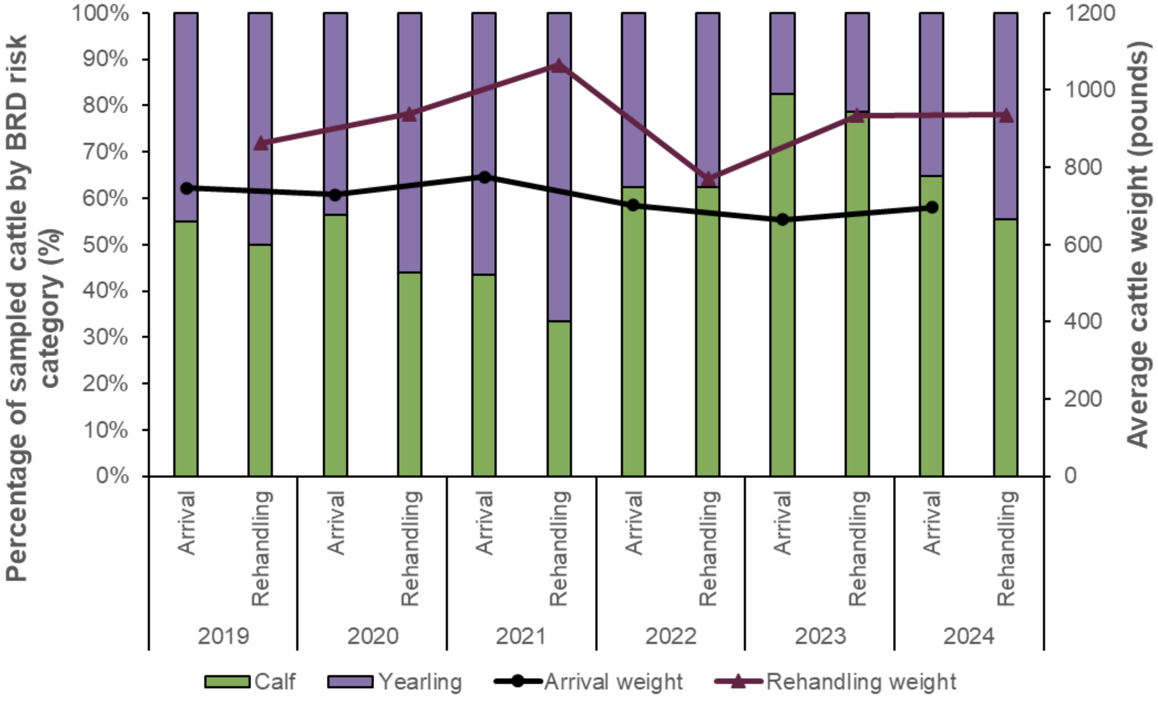
One isolate of each recovered organism per sample was tested for susceptibility to a panel of 19 antimicrobials (10 classes)

Trends in sample characteristics, respiratory pathogens, 2019-2024

BRD risk

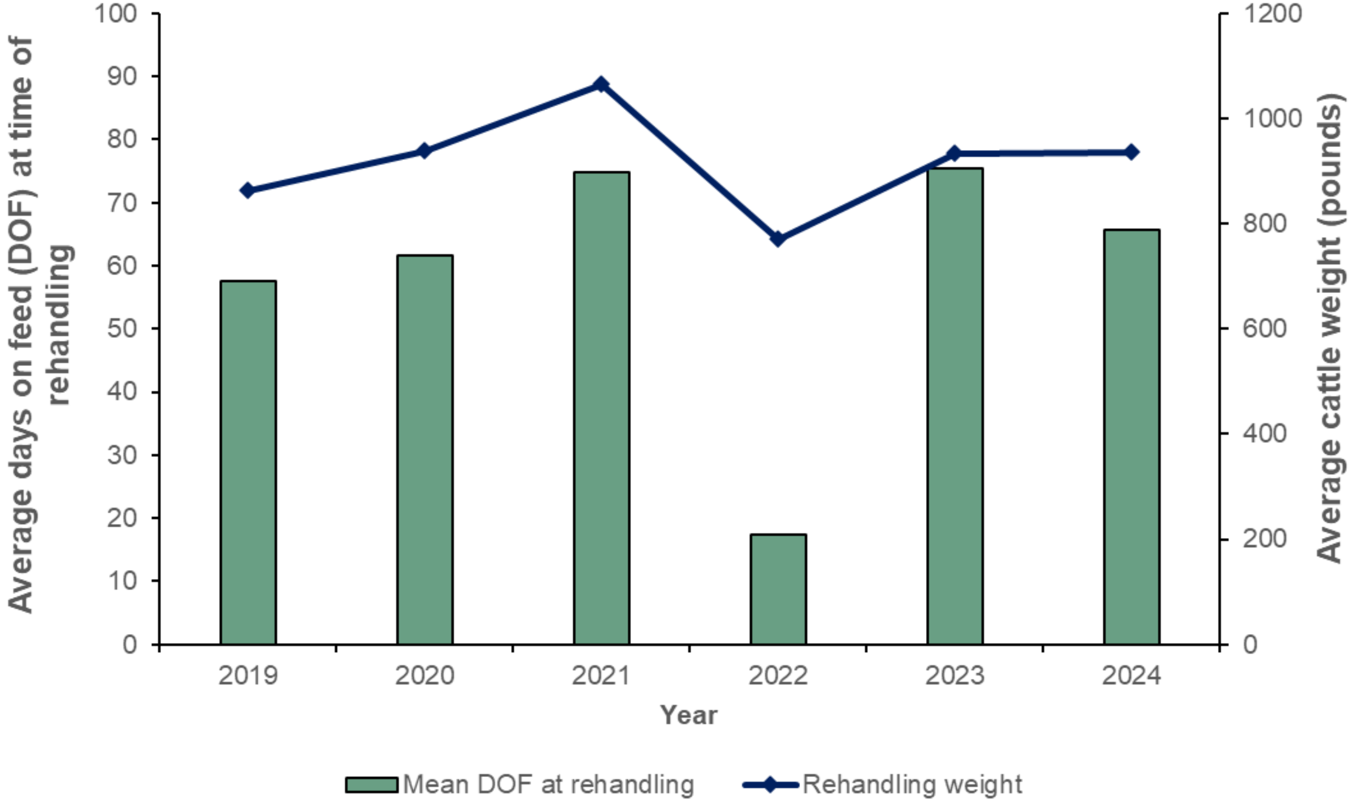


Age category



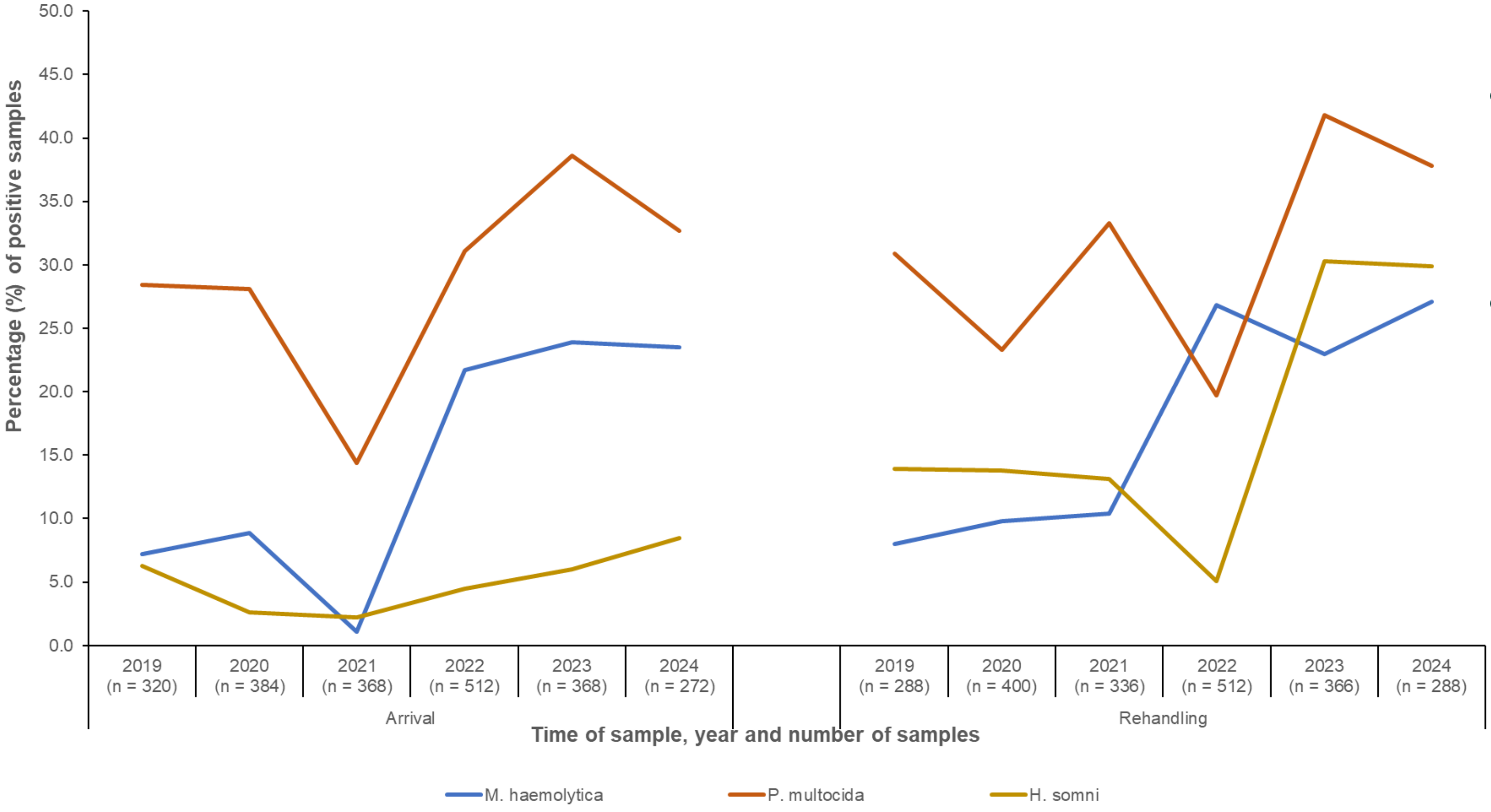
- Despite a higher proportion of low-risk cattle in 2024, than in 2022 or 2023, the temporal trend is toward sampling younger and higher-risk calves.

Characteristics of rehandling samples, 2019-2024



- Mean DOF in 2024: **66**
  - Mean weight: 936 pounds
- Mean DOF in 2023: **75**
  - Mean weight: 934 pounds
- Mean DOF in 2022: **17.5**
  - Mean Weight: 770 pounds
  - Collaboration resulting temporary change in the sampling protocol

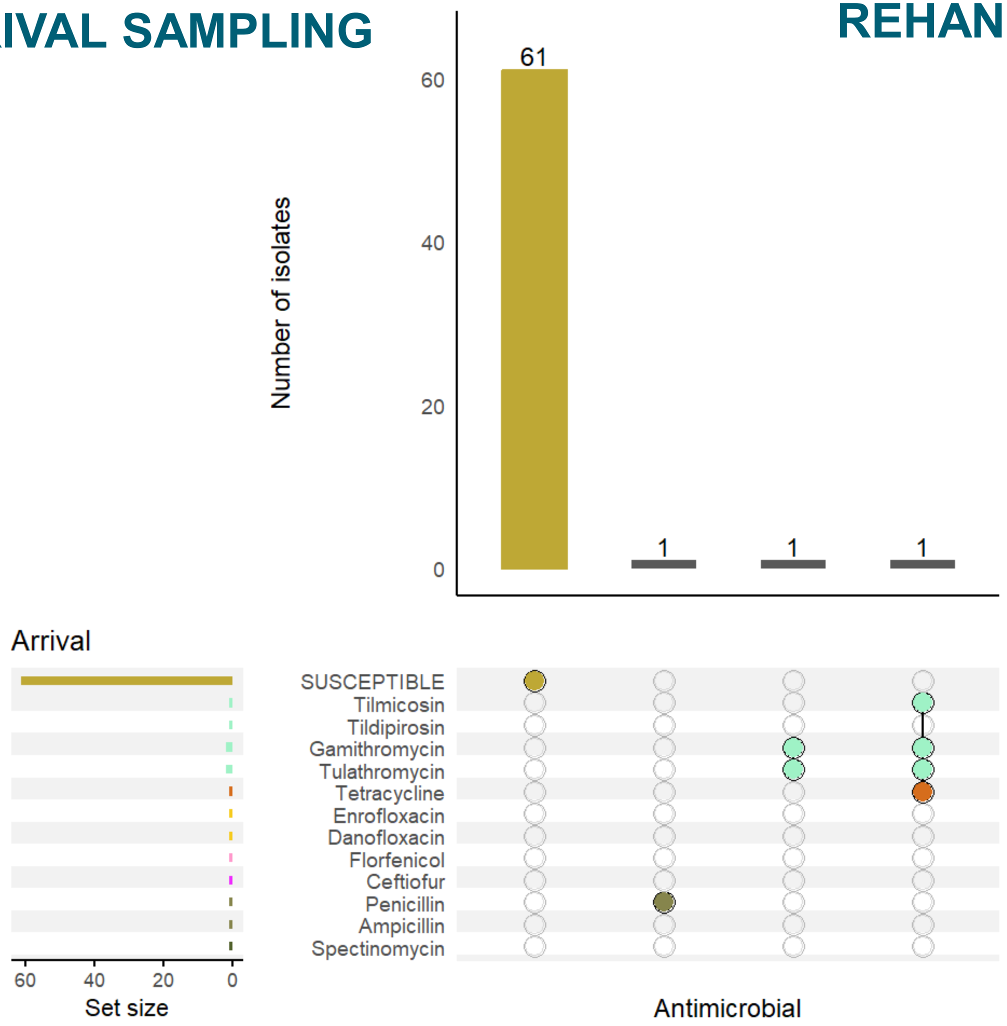
Respiratory pathogen recovery, 2019-2024



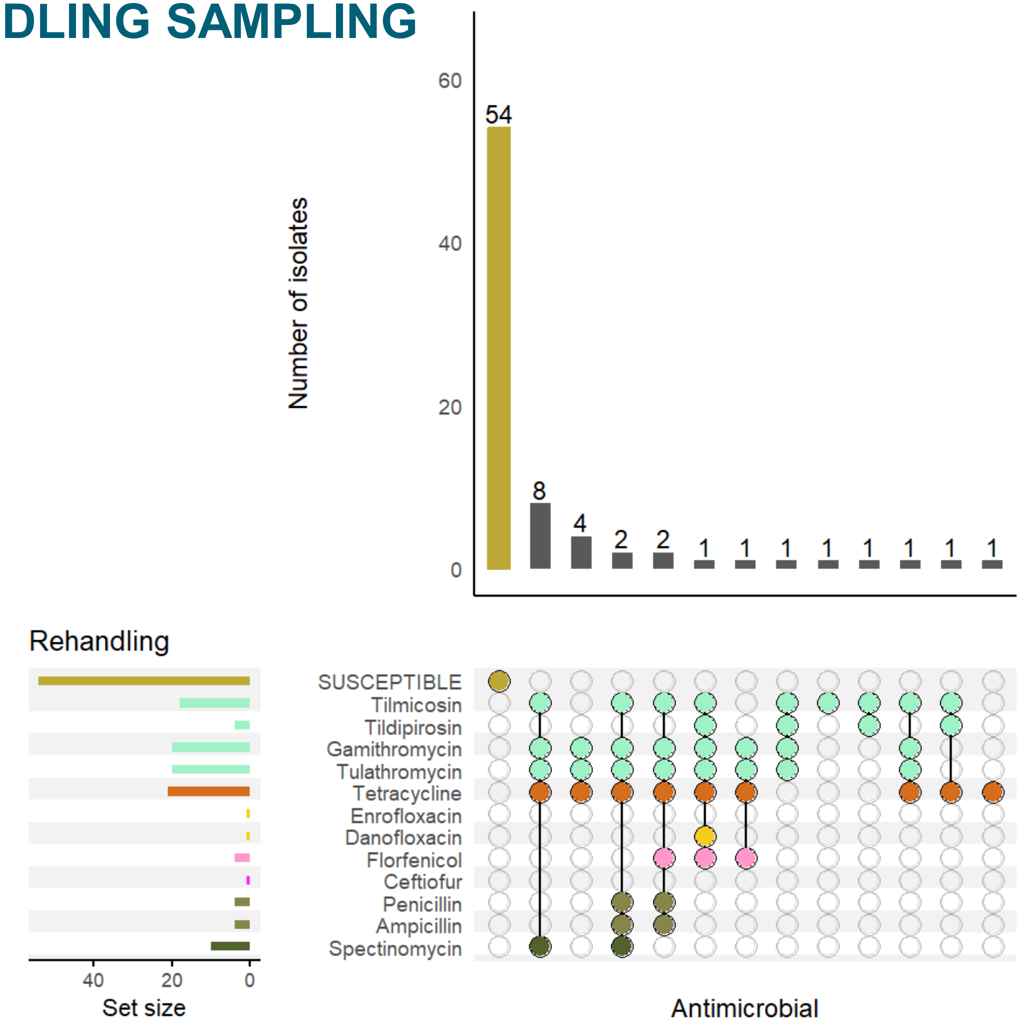
- Improved recovery since 2021
- Recovery decreased at rehandling in 2022
    - Timing of the sampling 17.5 DOF in 2022 vs 75 DOF in 2023 and 66 DOF in 2024

M. haemolytica resistance patterns, arrival vs. rehandling 2024

ARRIVAL SAMPLING

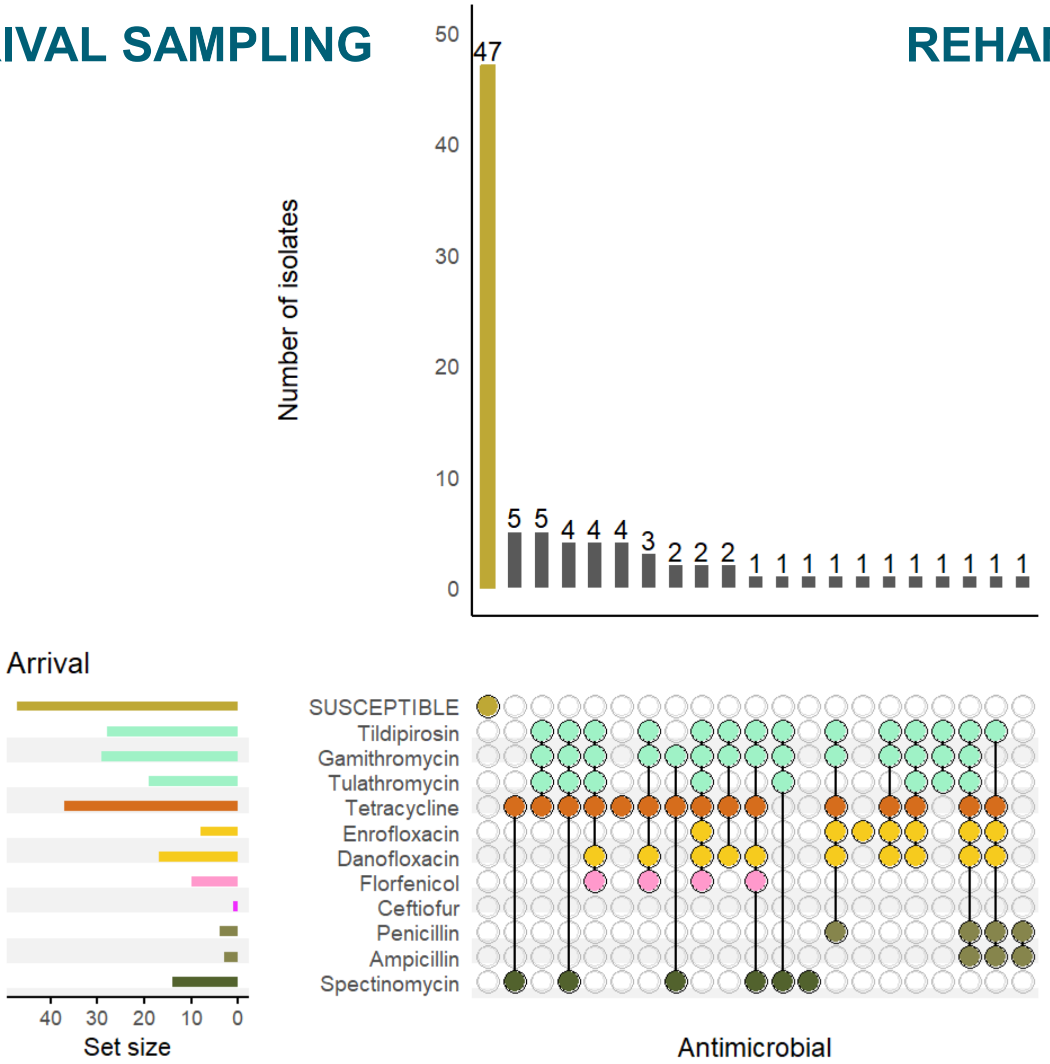


REHANDLING SAMPLING

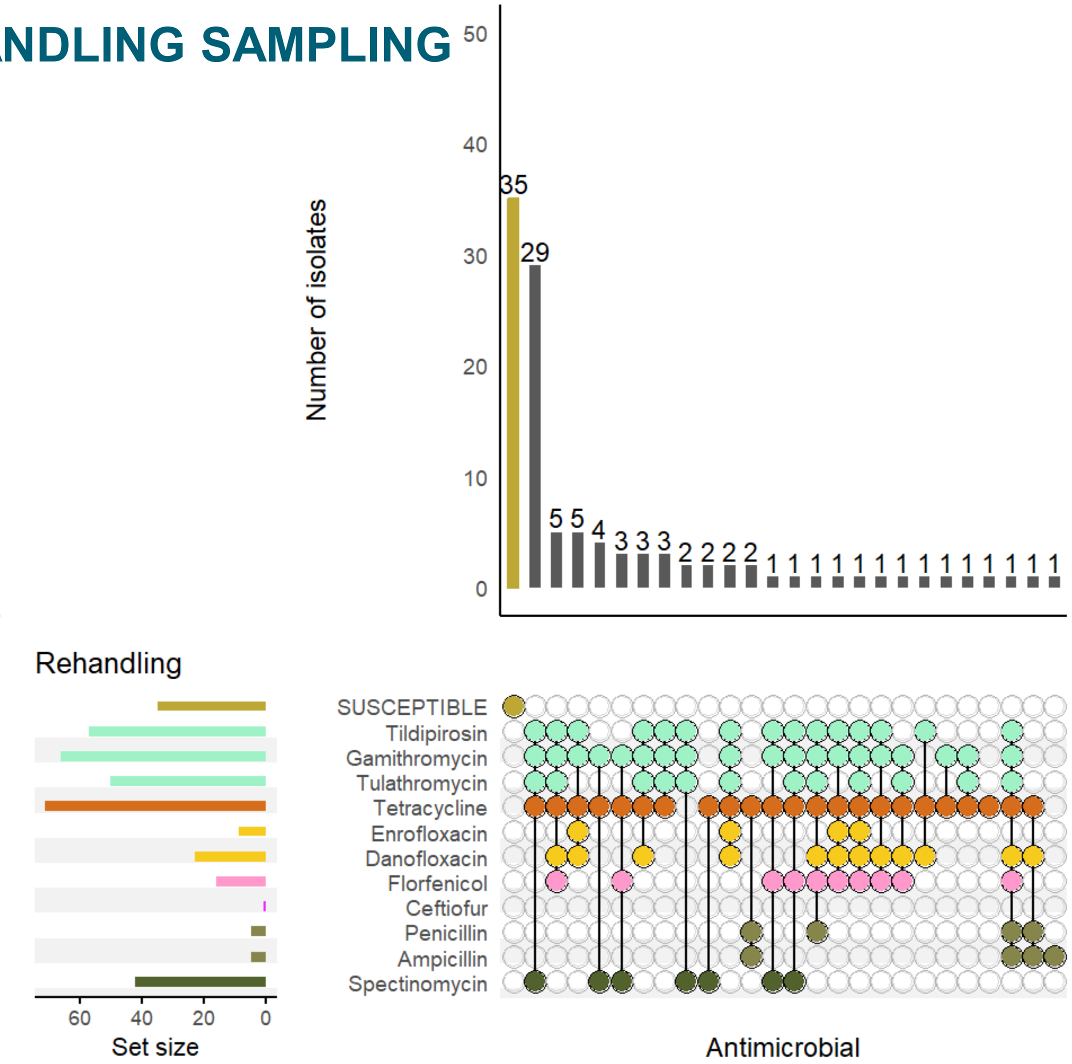


P. multocida resistance patterns, arrival vs. rehandling 2024

ARRIVAL SAMPLING

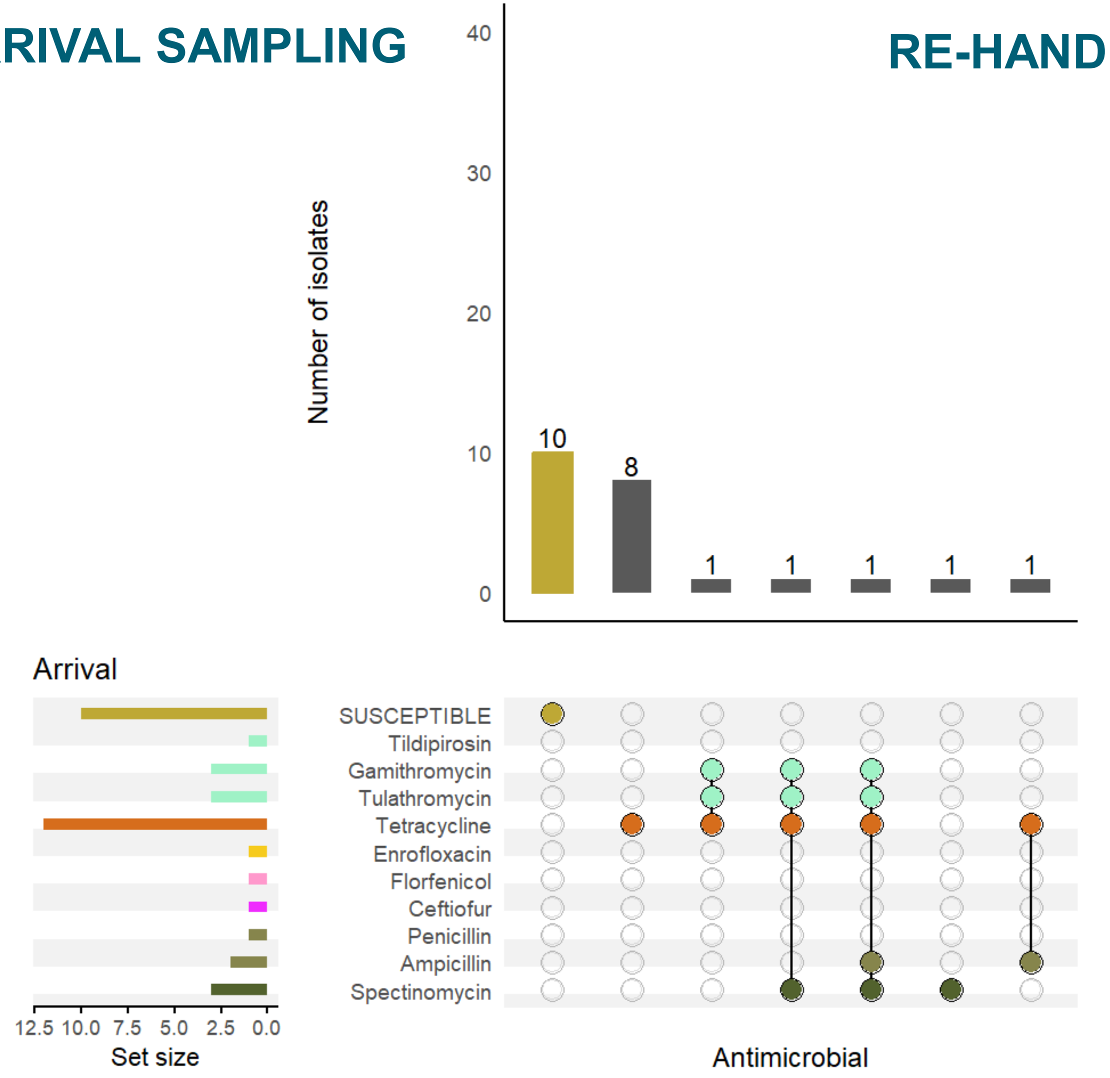


REHANDLING SAMPLING

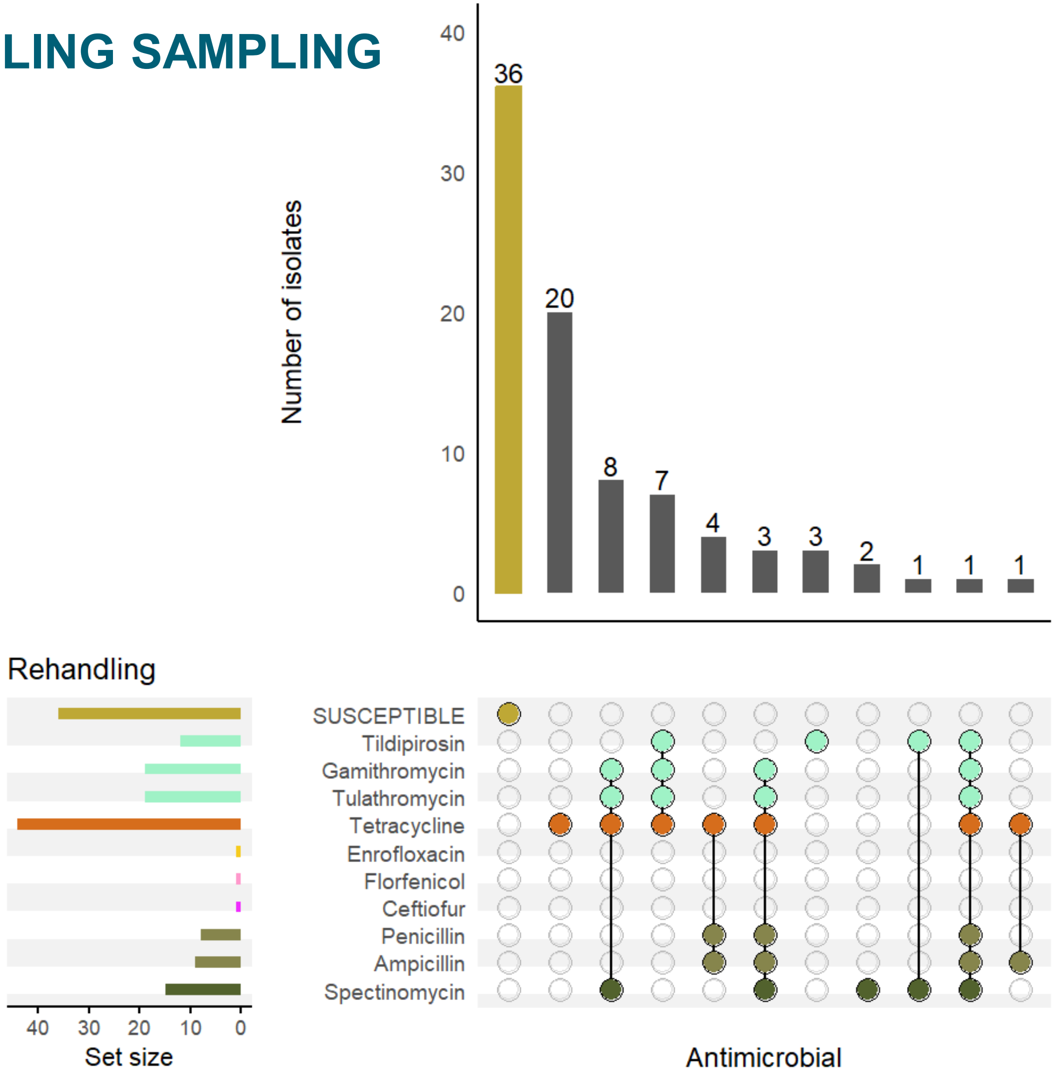


H. somni resistance patterns, arrival vs. rehandling 2024

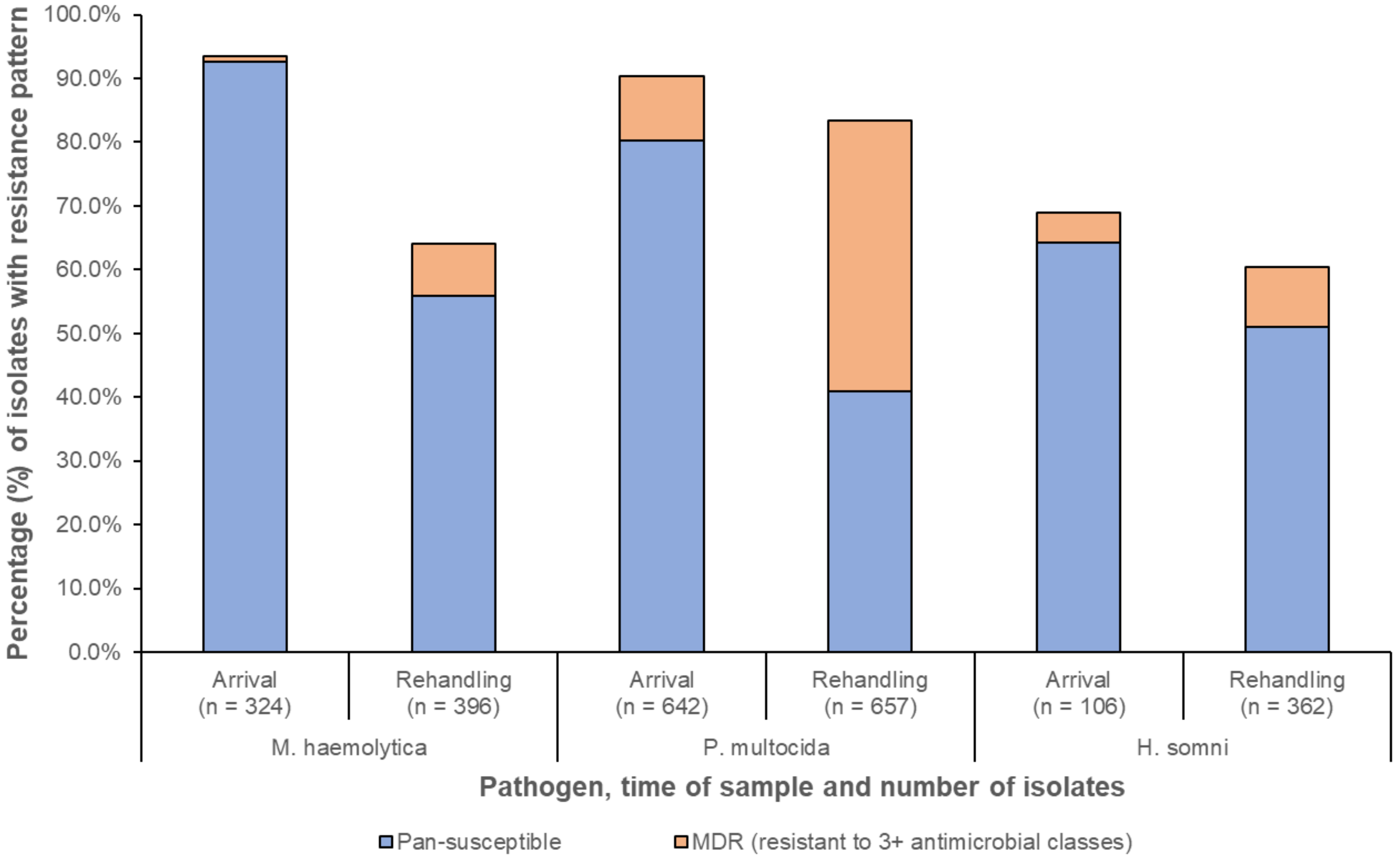
ARRIVAL SAMPLING



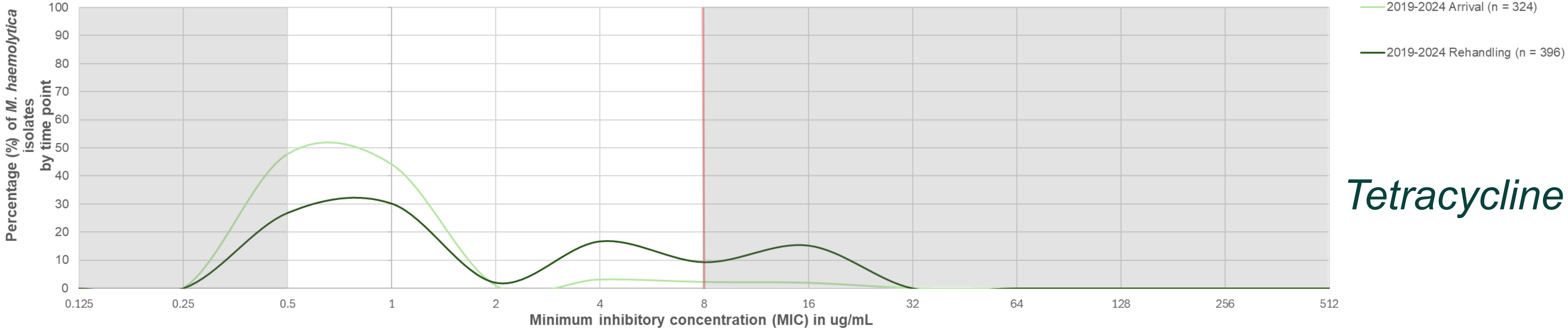
RE-HANDLING SAMPLING



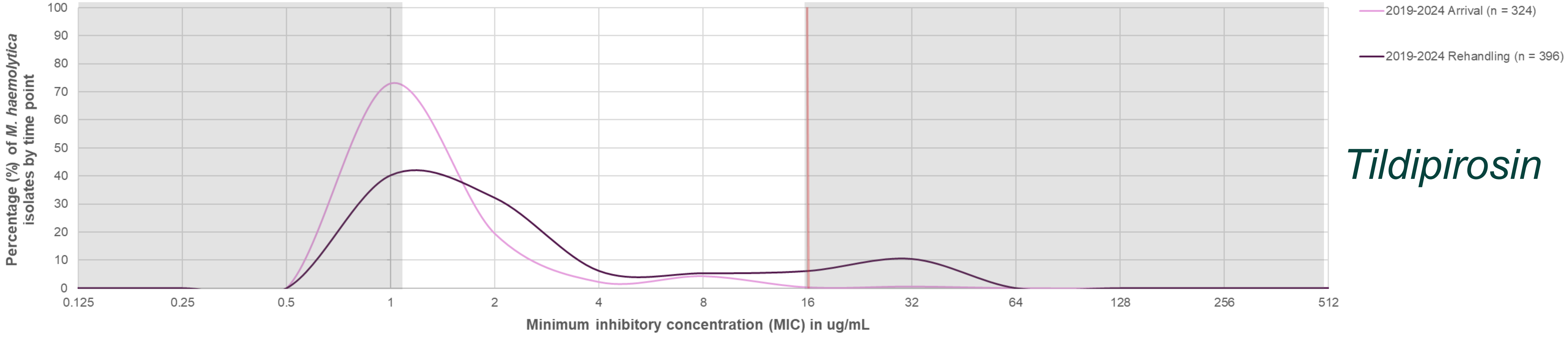
Key phenotypes by time point, 2019-2024 isolates combined; increased MCR at rehandling sampling



Trends in BRD pathogen susceptibility: M. haemolytica MIC distributions

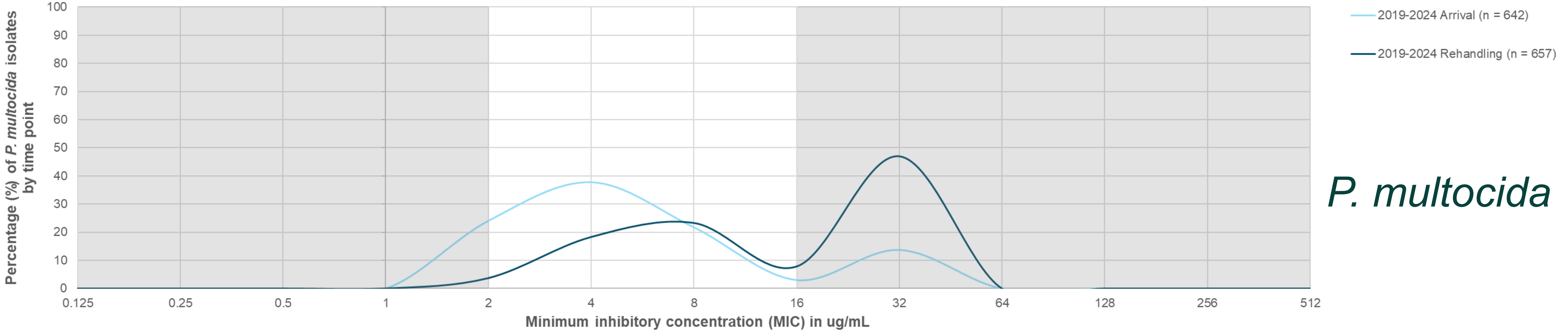


Tetracycline

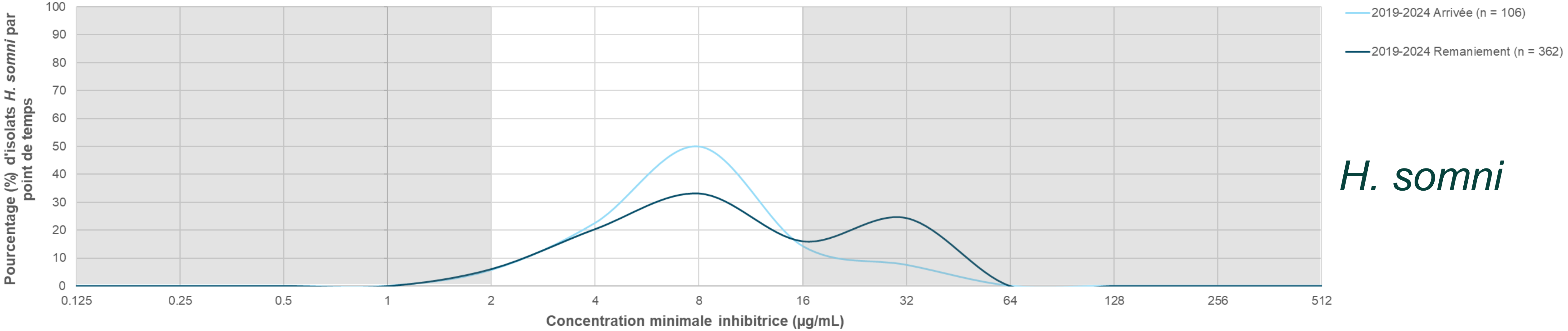


Tildipirosin

Trends in BRD pathogen susceptibility: MIC distributions (TILMICOSIN)



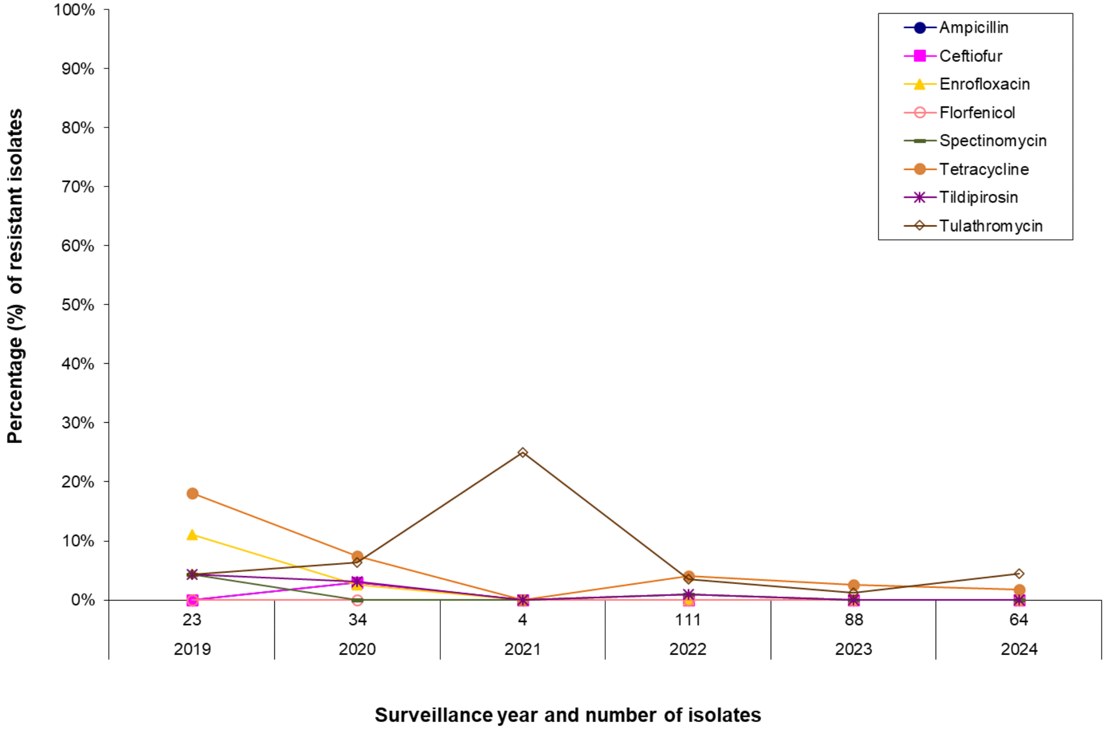
P. multocida



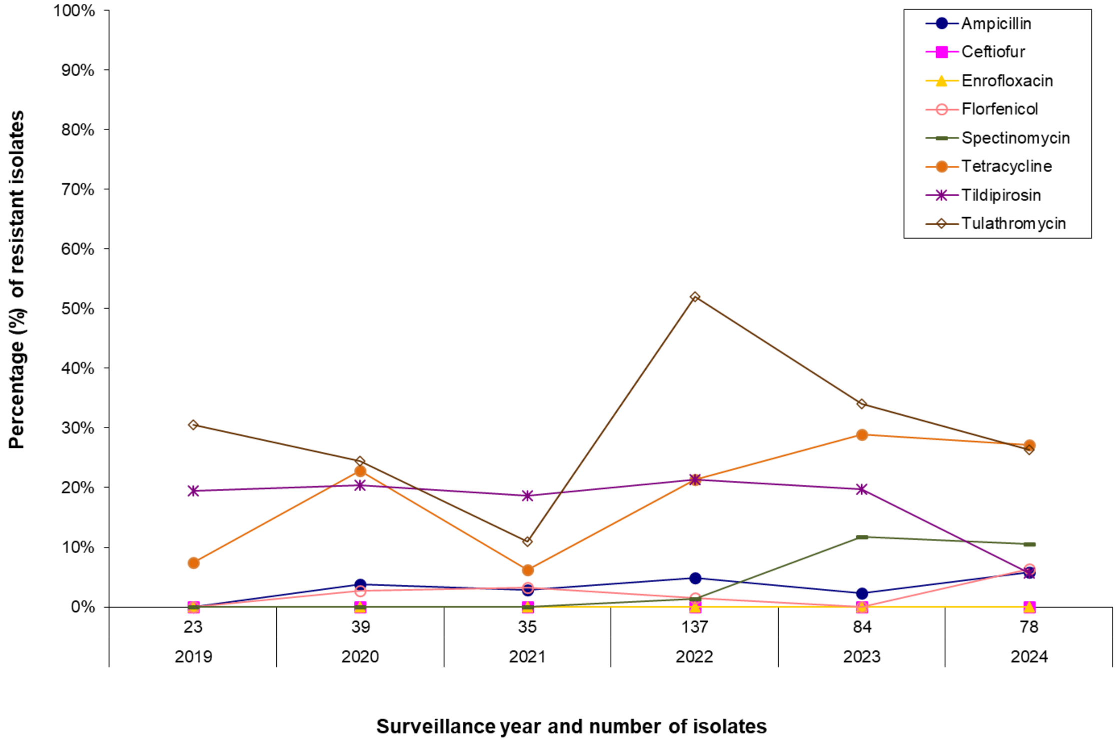
H. somni

Trends in M. haemolytica resistance

ARRIVAL SAMPLING



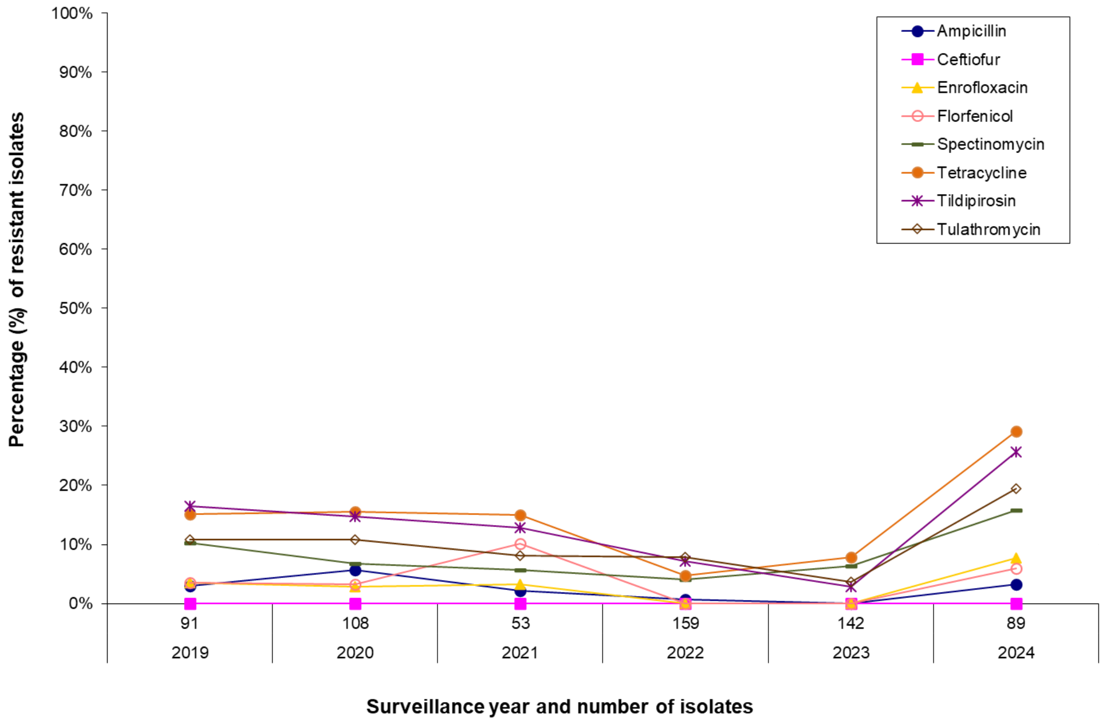
RE-HANDLNG SAMPLING



- ↓ in TET resistance since 2019 (18% to 2%)
- ↓ in TILD resistance since 2023 (20% to 6%)

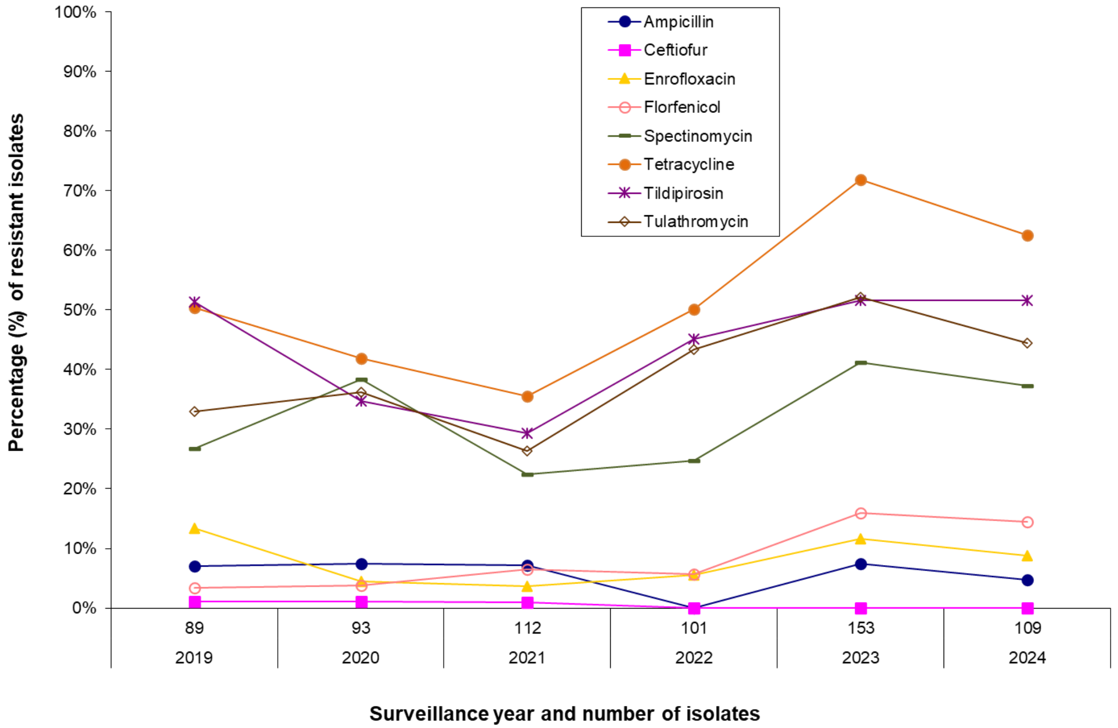
Trends in P. multocida resistance

ARRIVAL SAMPLING



- ↑ in ENRO, FLOR, SPT, TET, TILD + TUL resistance since 2023
- ↑ in TET, TILD + TUL resistance since 2019

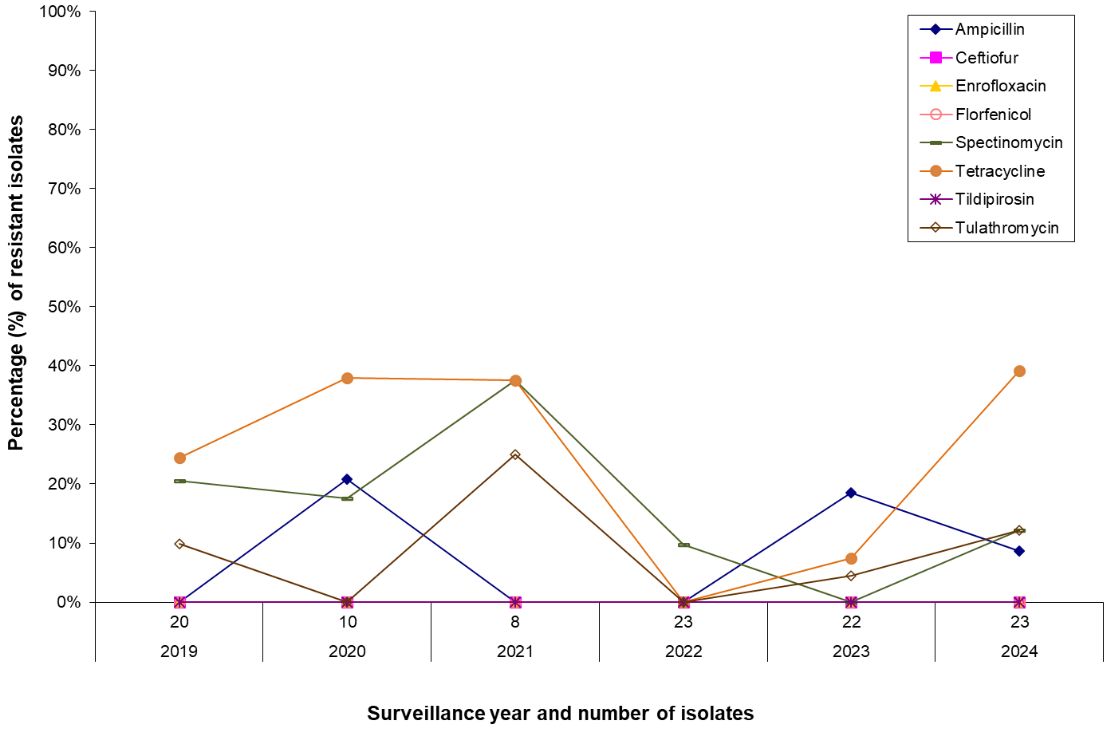
RE-HANDLING SAMPLING



- ↑ in SPT resistance since 2019
- ↓ in TET resistance since 2023, ↑ since 2019
- ↑ in TUL resistance since 2019

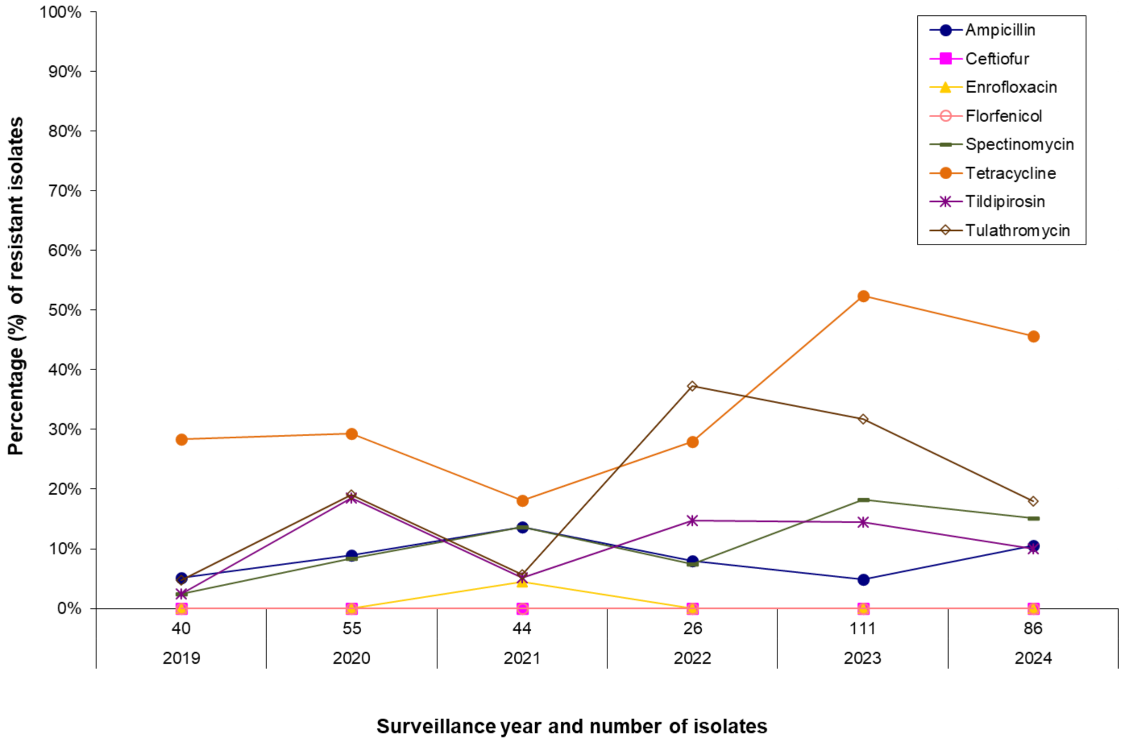
Trends in H. somni resistance

ARRIVAL SAMPLING



- ↓ in SPT resistance since 2019

RE-HANDLING SAMPLING



- ↑ in TET resistance since 2019
- ↓ in TUL resistance since 2023 but net ↑ since 2019

Key take-home messages, respiratory pathogens

- *P. multocida* **arrival isolates** significant increase in **fluoroquinolone,** tetracycline, and macrolide resistance since 2023
- **Pan-susceptibility at arrival decreased**
  - *P. multocida* from 91% to 53% between 2023 and 2024
  - *H. somni* from 82% to 43% between 2023 and 2024
- **MCR at arrival increased**
  - *P. mutocida* between 2023 and 2024 from 1% to 19%
  - *H. somni* between 2023 and 2024 from 0% to 9%
- Despite shift to increased MCR at arrival *P. multocida* and *H. somni* **rehandling samples** still have **more MCR than arrival samples**

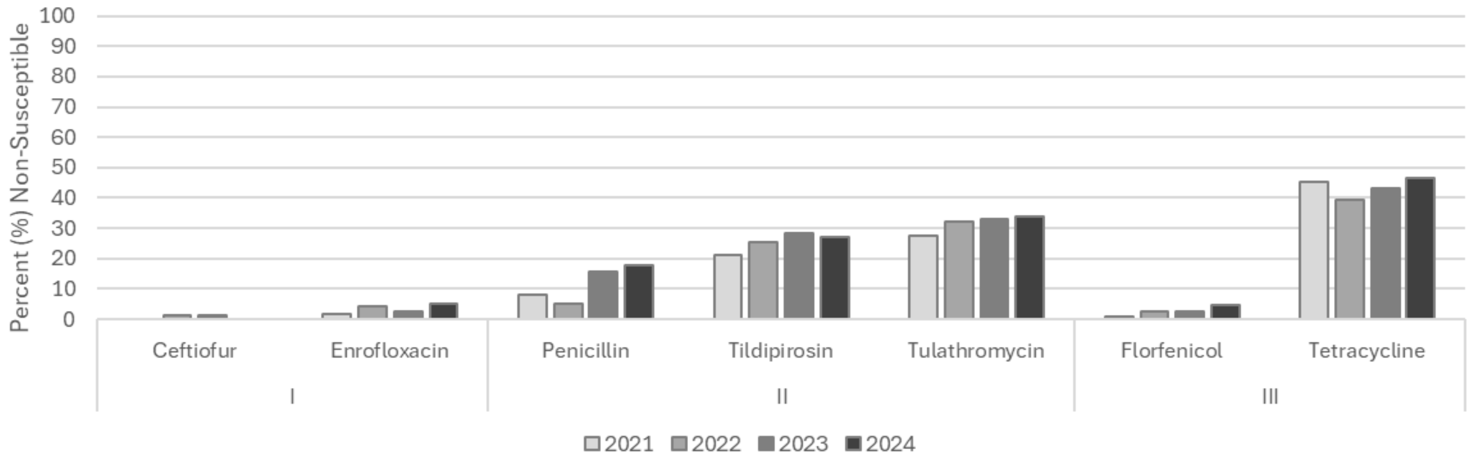
AMRNet Vet

Clinical isolates 2021 to 2024

Bovine/Cattle (clinical isolates) – ***Preliminary Results***

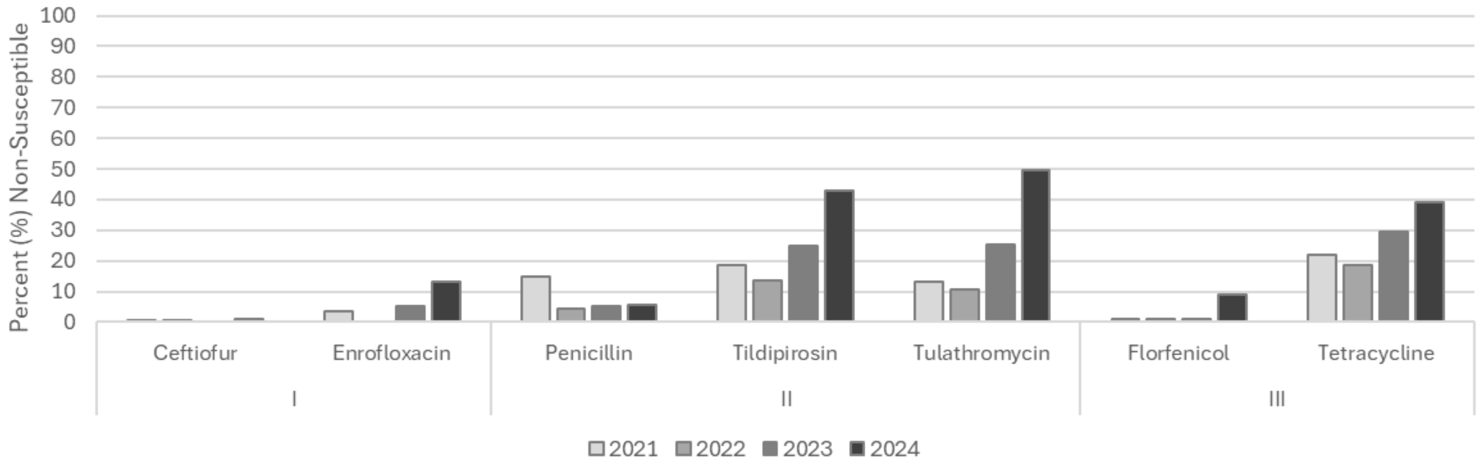
M. haemolytica

n=1309



P. multocida

n=1161



Includes data from labs in ON, NB, PEI, MB, AB and SK; not all labs submitted data in all years. Breakpoint interpretations provided by data submitters. Data reflect diagnostic testing; submission and testing procedures may change over time. Data may include duplicate submissions from the same animal/herd. Categorization of antimicrobials (I, II, III) based on importance to human health.

ANTIMICROBIAL USE (AMU)

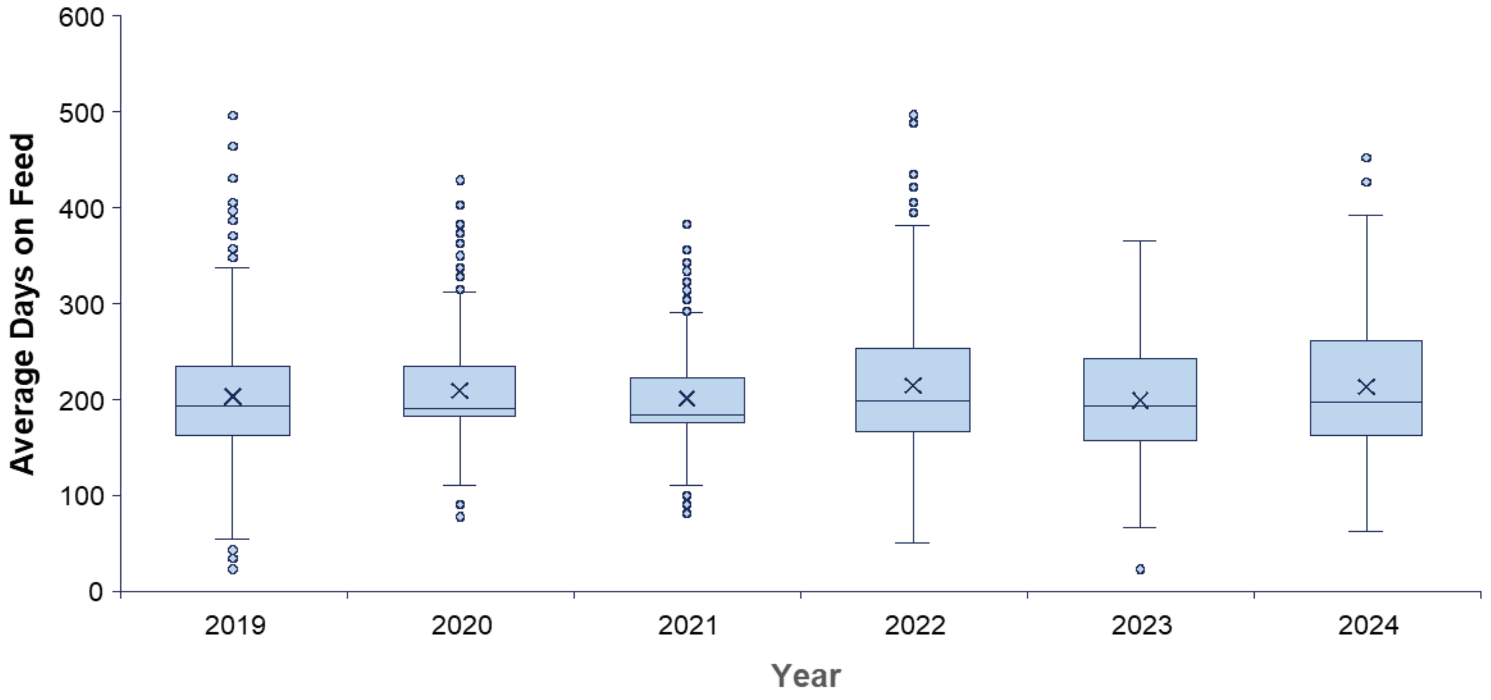
2024 HIGHLIGHTS AND 6-YEAR TEMPORAL TRENDS

Data Collection Approach

Year	Number of feedlots	Number of production lots	Animals at Risk	Average number of days on feed
2019	23	474	135,929	203
2020	26	624	160,458	210
2021	24	598	140,984	201
2022	25	395	134,649	215
2023	26	393	129,871	199
2024	21	359	116,360	213

- Targeted number of animals to collect AMU data from is 150,000
- The number of participating feedlots remained relatively stable from 2019 to 2023 decreased in 2024
- The average days on feed varied only slightly over the past six years, ranging from 199 to 215 days on feed

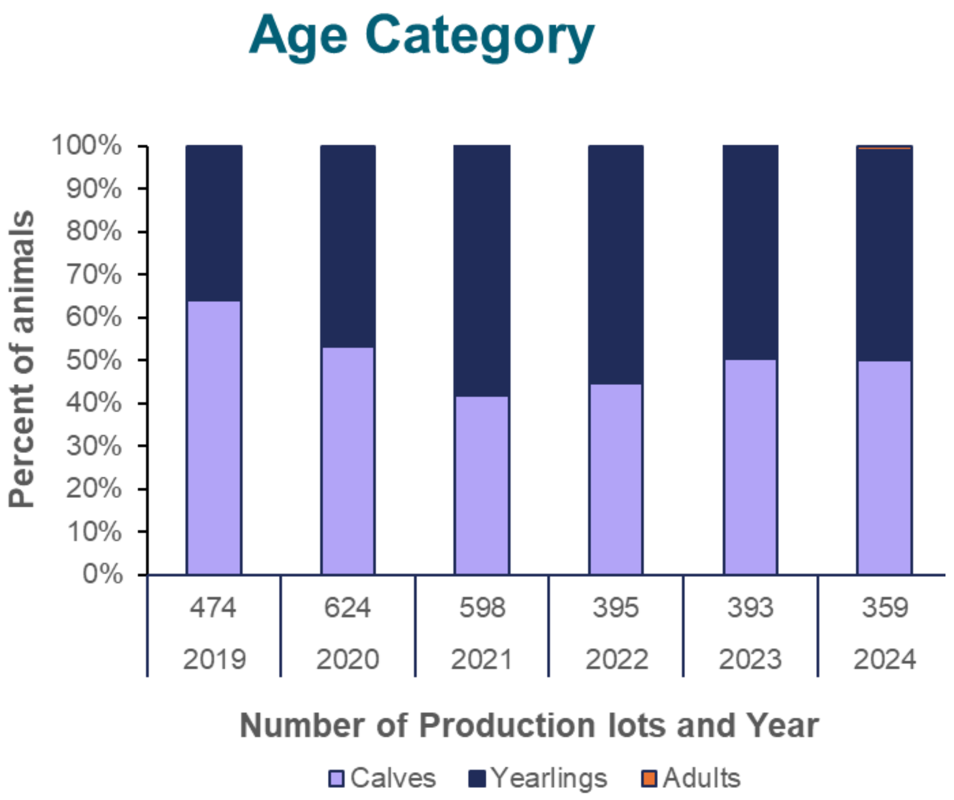
Shift from decreasing variability in days on feed (DOF) since 2019 to more variability in 2024

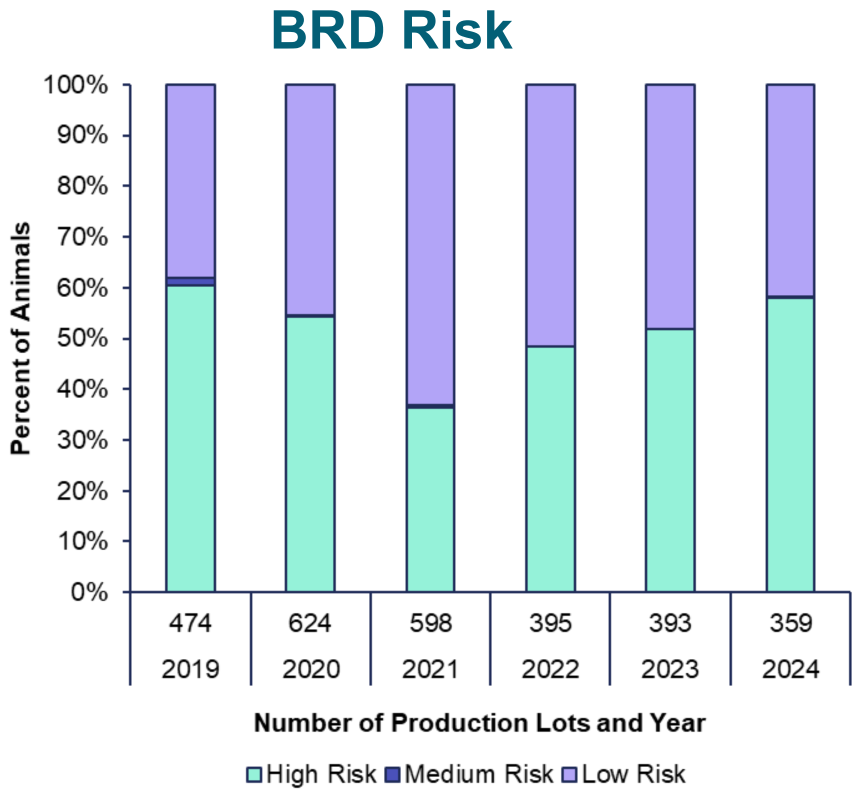


- Average of 207 DOF over 6 years
- Extra 14 DOF between 2023 and 2024 (199 vs 213)

Average days on feed per lot; 2019-2023

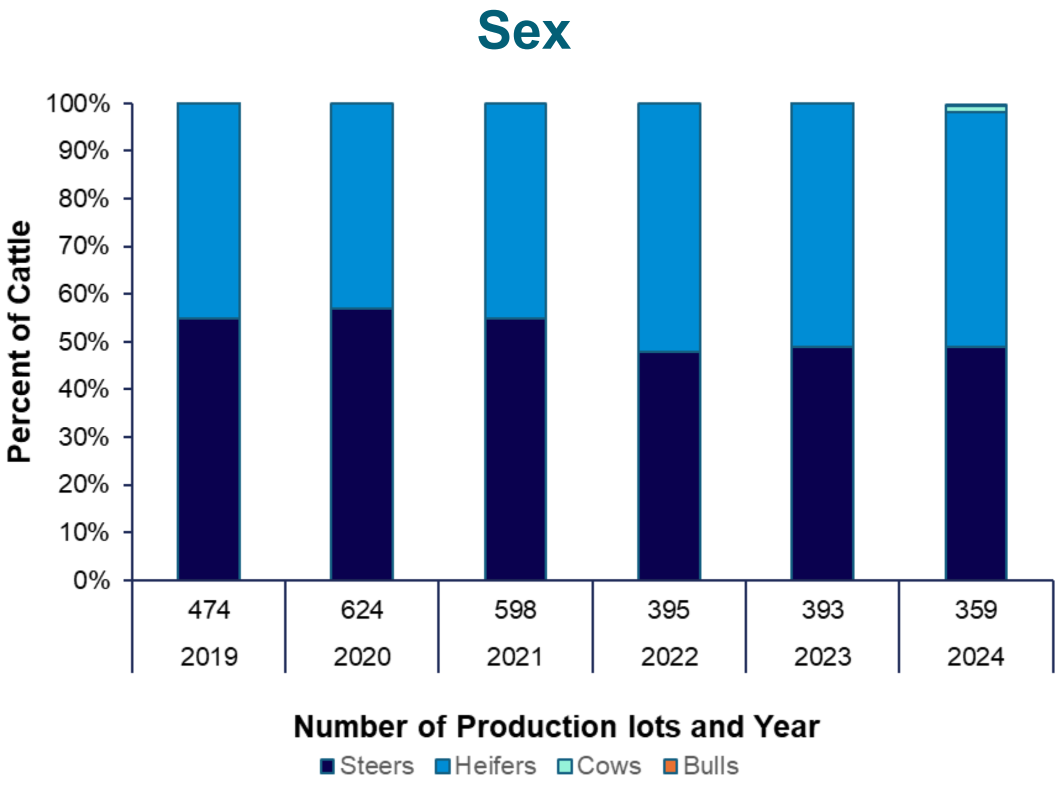
Cattle age and bovine respiratory disease (BRD) risk categories reflected each other, 2019-2024

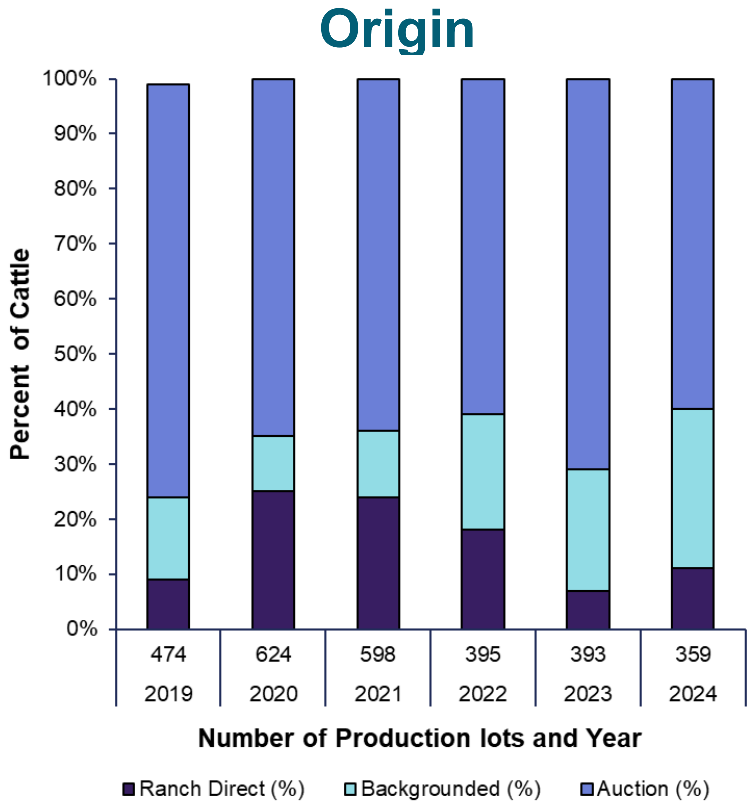




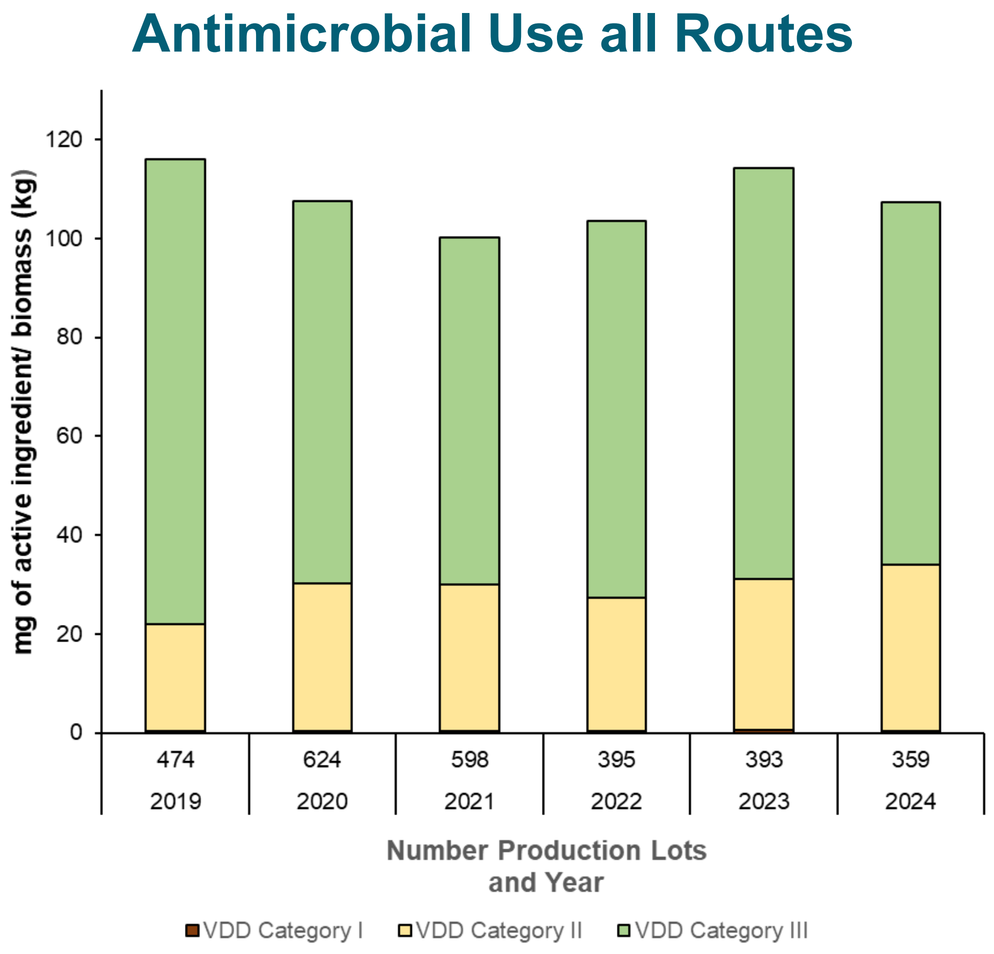
- Adult cattle are uncommon
- % of calves and yearlings similar since 2022
- % of cattle categorized as high and low risk for BRD similar since 2022

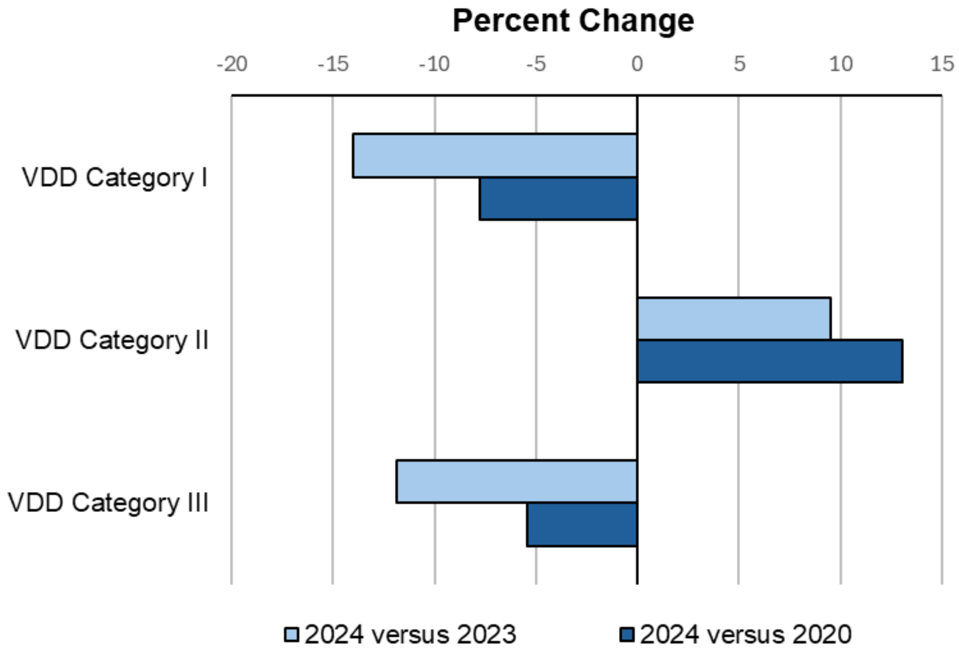
Roughly equal distribution of steers and heifers. Most cattle were sourced from auction market.





Health Canada's Categorization for AMU by all routes of administration
Category I antimicrobials contribute <1% of all AMU, 2019-2024

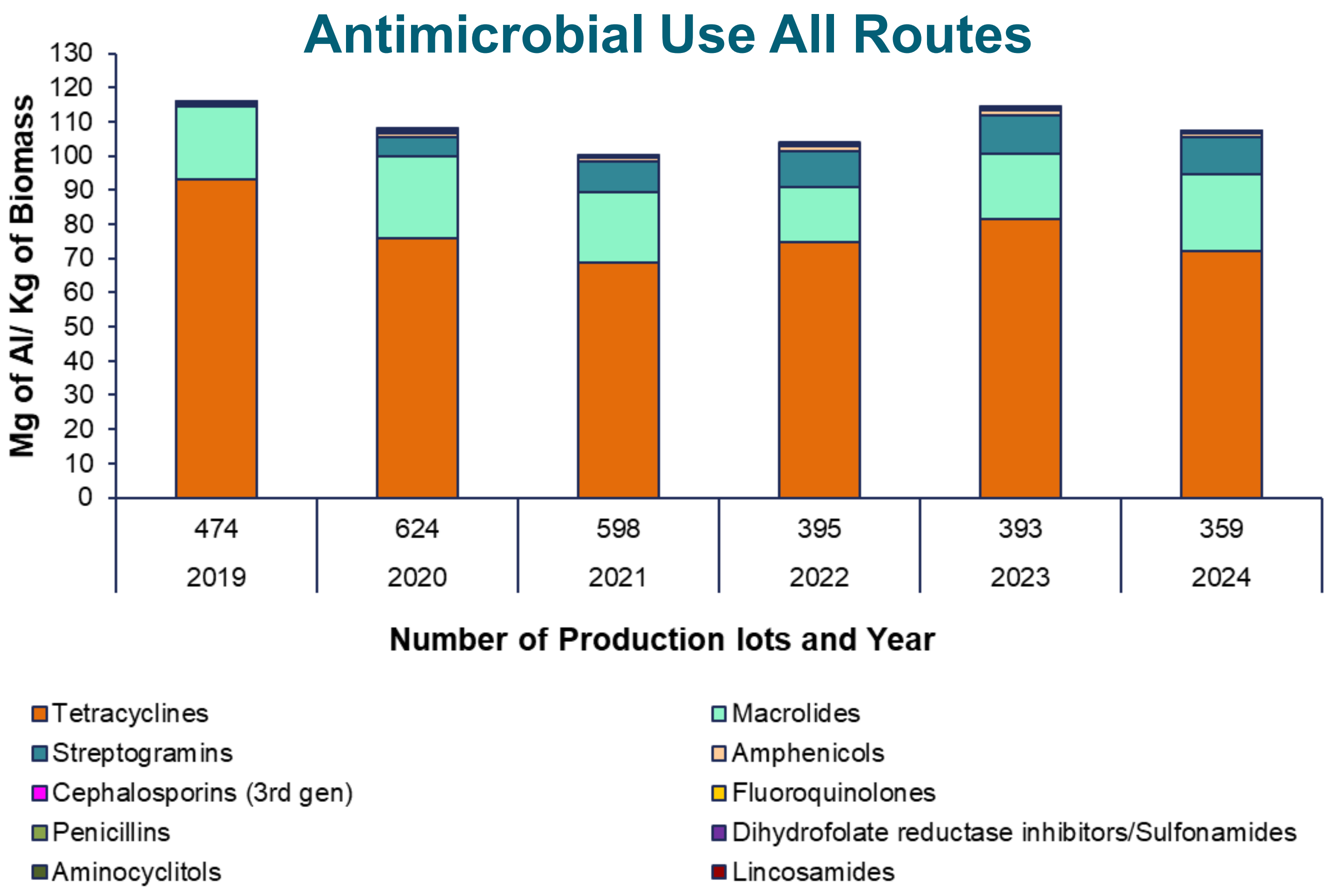


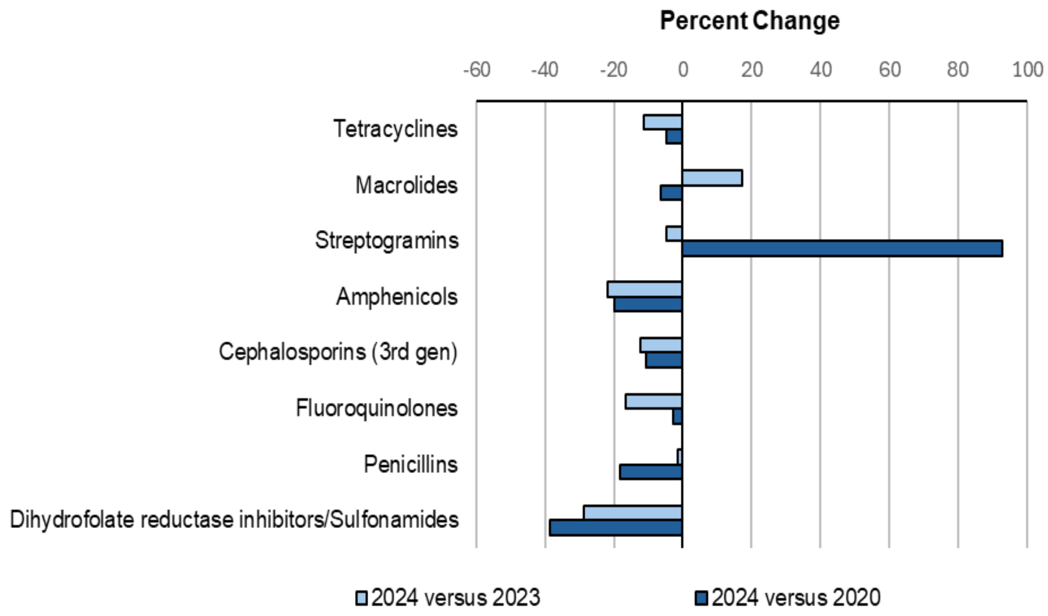


Percent change=(current year-historic year)/historic year *100

Antimicrobial Use by All Routes, 2019-2024

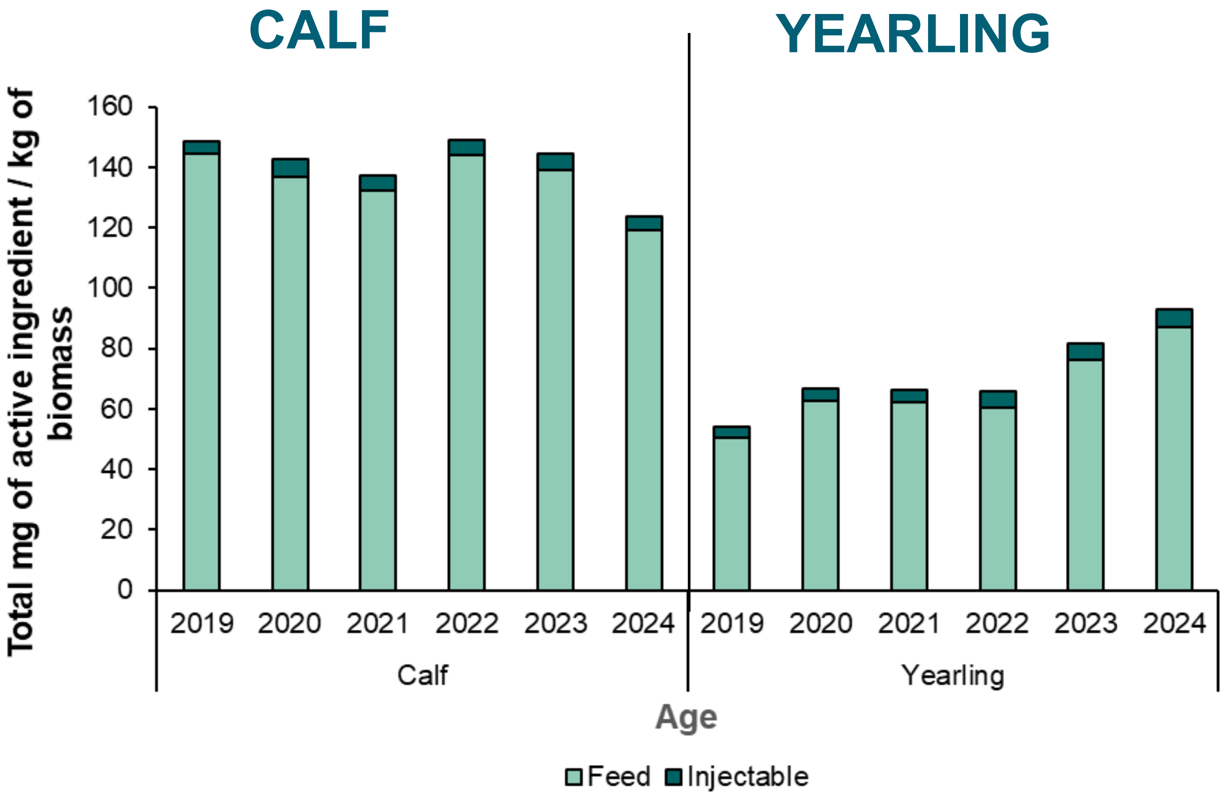
Tetracyclines are the major (> 67%) contributor to antimicrobial use

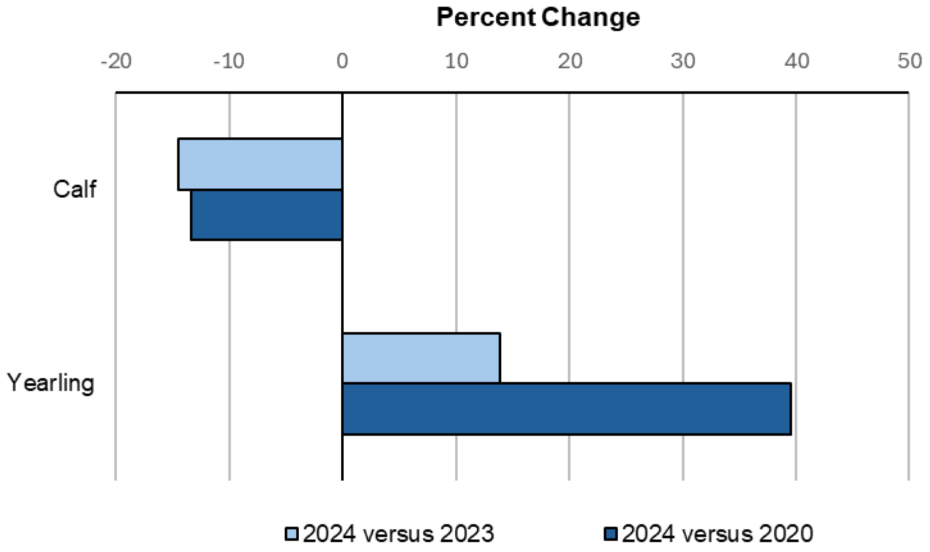




Percent change=((current year-historic year)/historic year *100

Antimicrobial Use by Age Category: 2019-2024

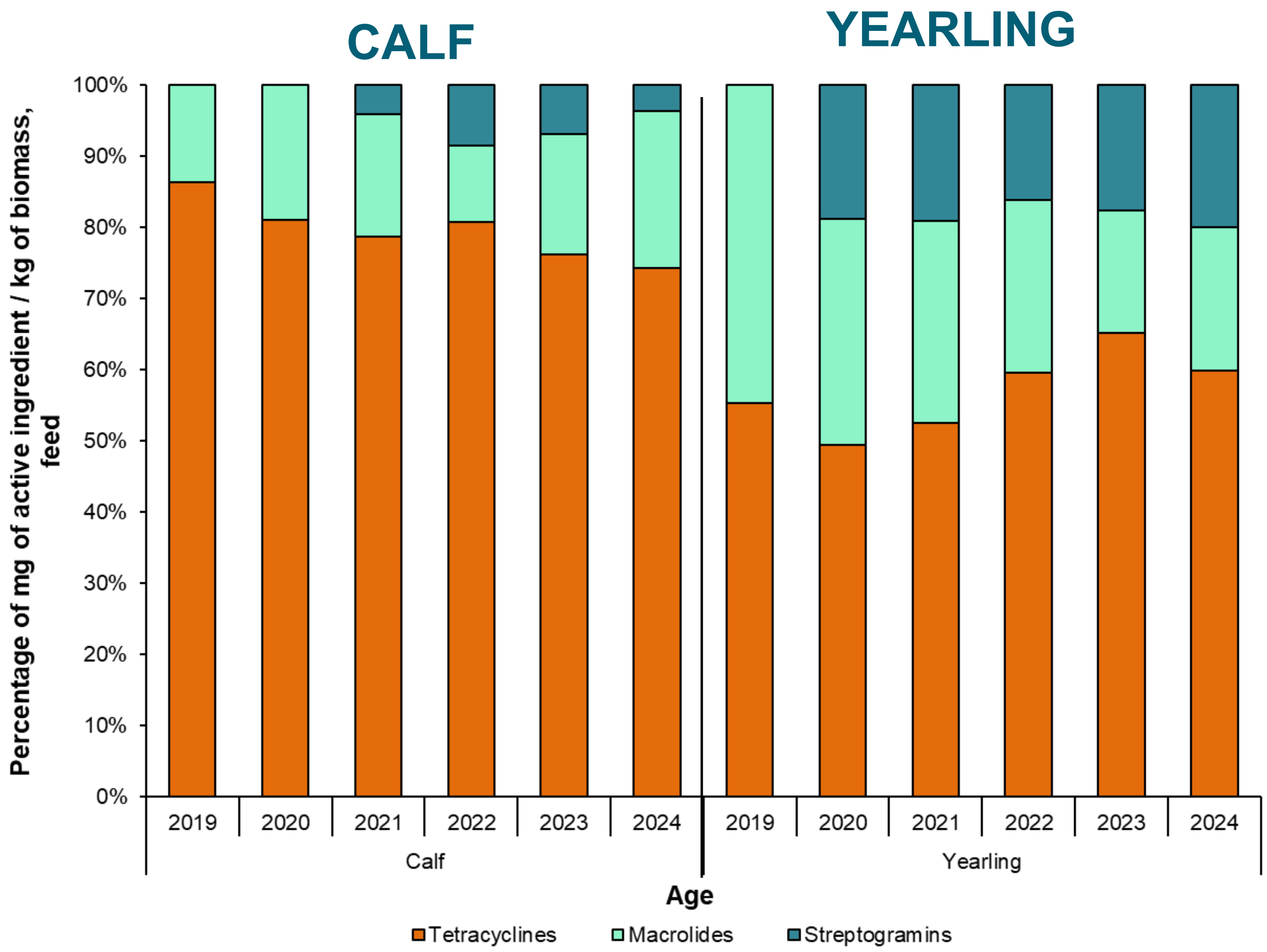




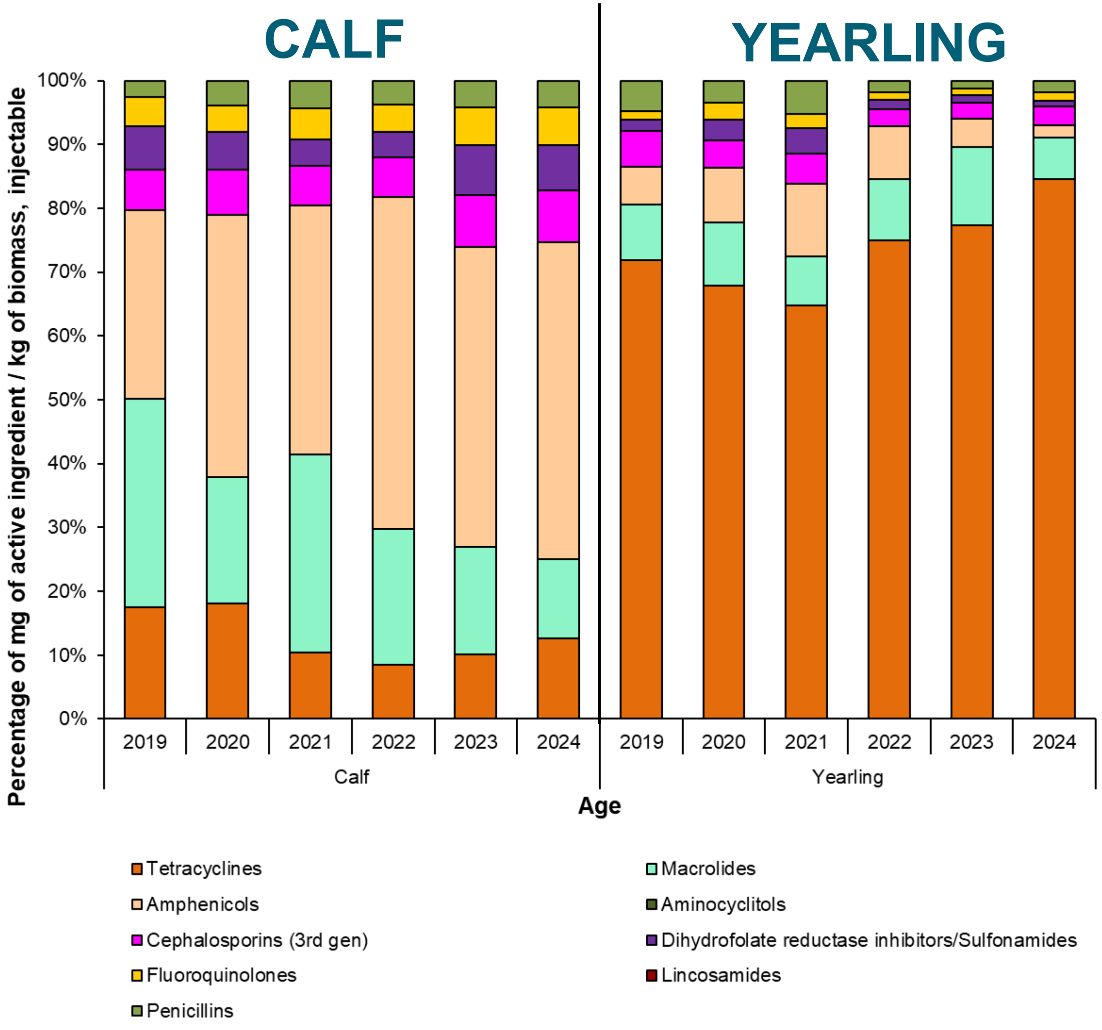
Percent change=((current year-historic year)/historic year *100

Route of administration	Milligrams of active ingredient per kilogram of biomass									
	Calf					*Yearling*				
	2019	2020	2021	2022	2023	2019	2020	2021	2022	2023
Feed	144.31	136.86	132.17	144.04	139.04	50.65	62.87	62.16	60.25	76.06
Injectable	4.28	5.63	5.03	5.08	5.41	3.57	3.73	4.04	5.56	5.54

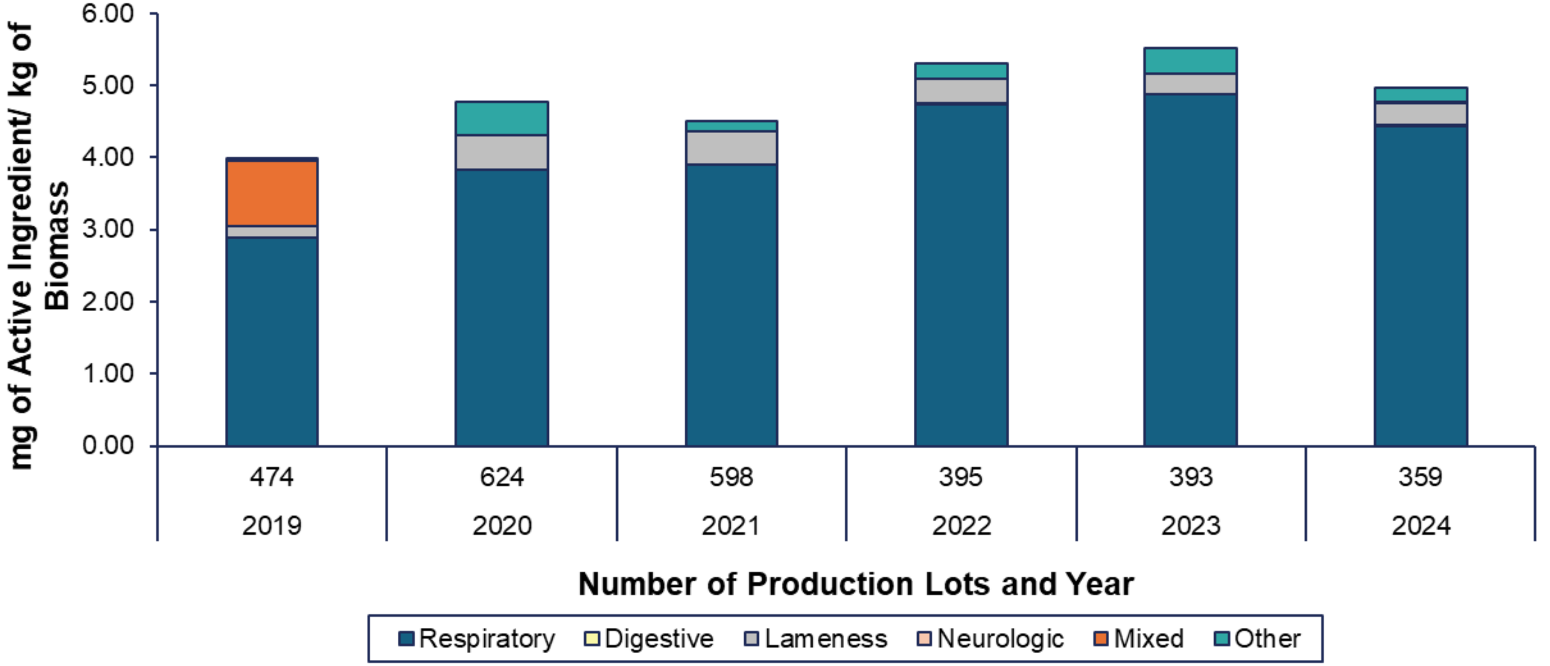
In-feed tetracycline AMU was more common in calves than yearlings
Macrolide and streptogramin use in feed predominated in yearlings over calves



Amphenicols and macrolides were the main antimicrobial classes used by injection for calves, while tetracyclines were more commonly administered to yearlings.

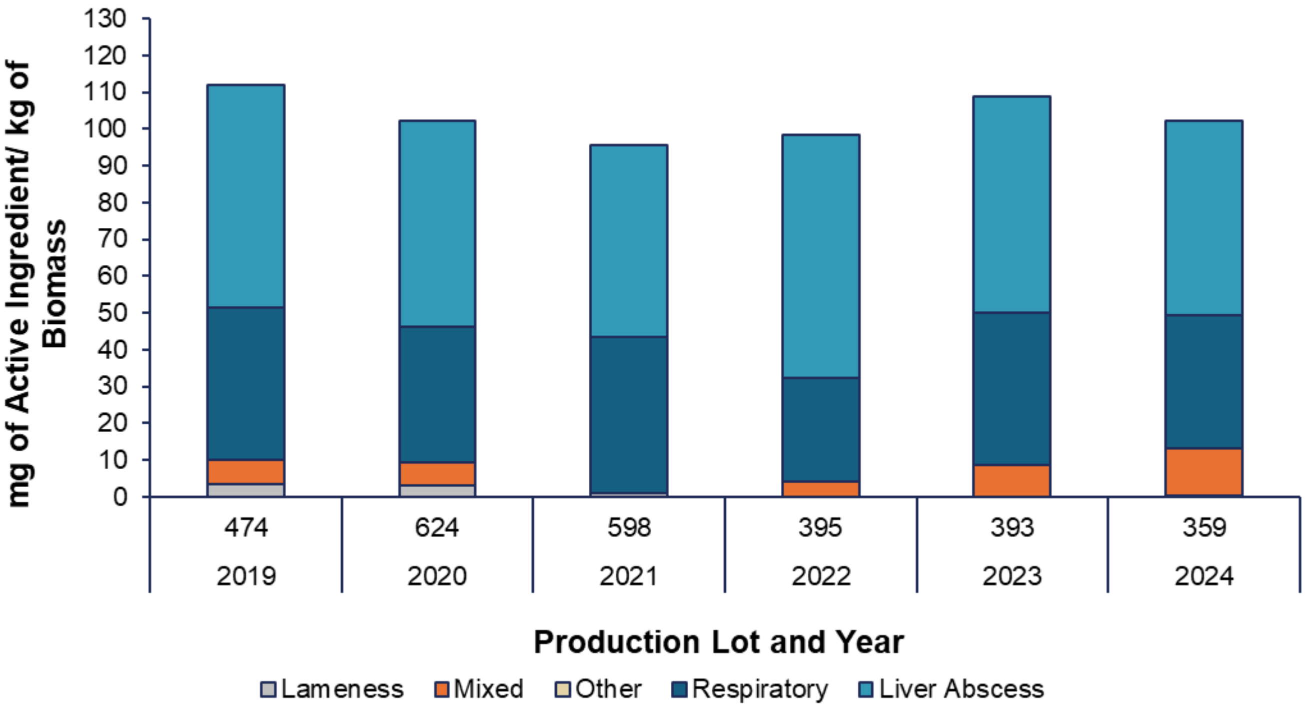


Respiratory disease was the main reason for AMU by injection, 2019-2024



- **Lameness**-related AMU peaked in 2020 and 2021 but has declined since 2022
- **Digestive and neurologic** conditions have remained uncommon reasons for AMU via injection

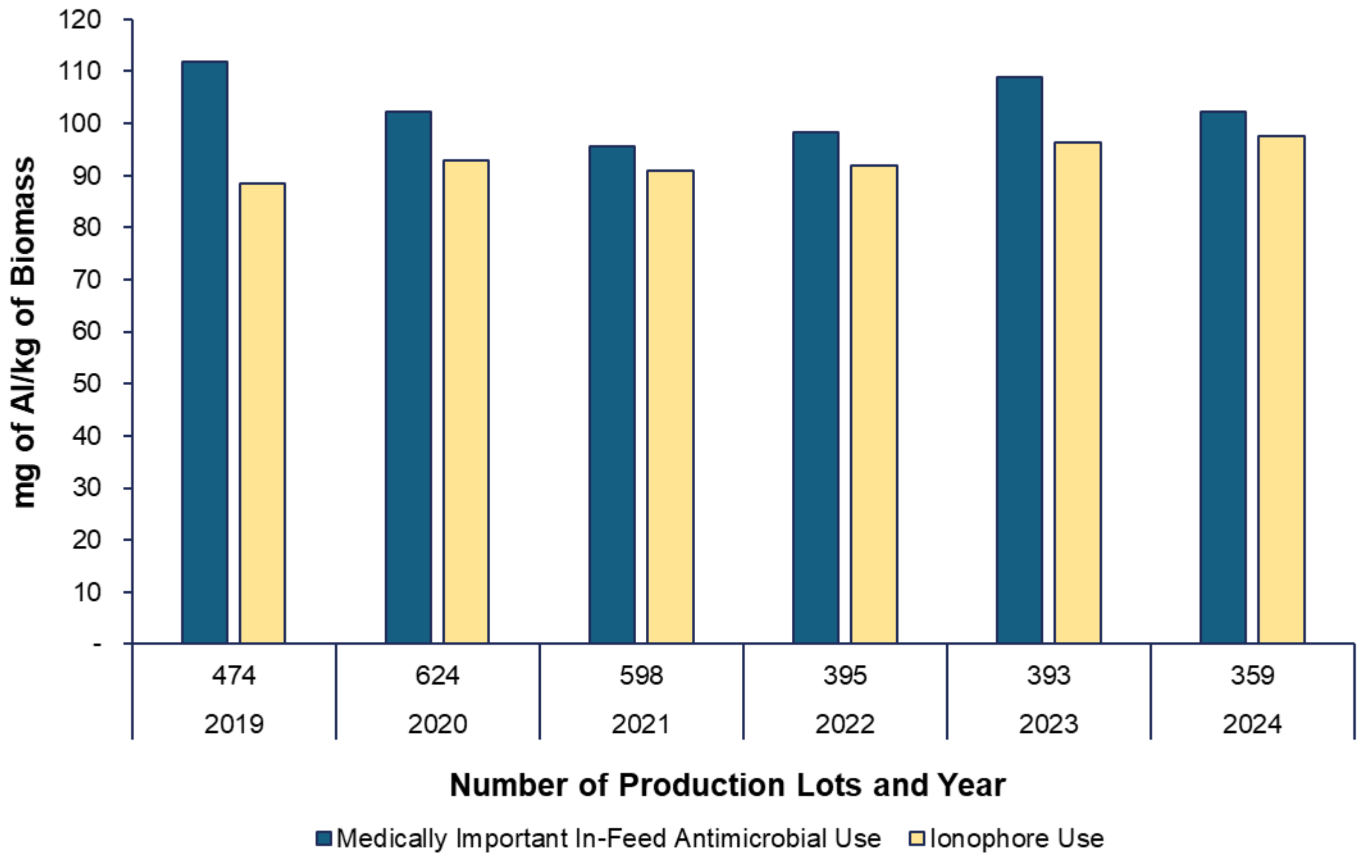
Liver abscesses and respiratory disease were the major reasons for AMU in feed, 2019-2024



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

Use of Medically Important Antimicrobials (MIA) Versus Ionophores in Feed

Ionophore use relatively stable 2020-2022, and 2023-2024



- Ionophore use lowest in 2019, similar between 2020-2022, increased but similar between 2023 and 2024
- MIA use more variable over time

Key Takeaways - AMU Comparisons

- AMU in calves (>123 mg/kg biomass) **decreased from more than doubled** that of yearlings (<93 mg/kg biomass) to 1.3 times that of yearlings between 2023 and 2024
- Consistent with the **feedlot production cycle**, calves are often fed for **longer periods and have different risk factors for disease**
- The use of antimicrobials in mg of active ingredient per kg of animal biomass has **increased for yearlings** (54 to 93 mg/kg biomass; 2019 and 2024 respectively)

Key Takeaways - AMU Comparisons

- **Tetracyclines dominate in-feed AMU**, especially in **calves** (>74%).
- In 2024, higher percentage of **streptogramins** were administered in feed to **yearling cattle** (20% yearlings vs. 4% calves).
- In 2024**, Tetracyclines** contributed 85% of the **injectable AMU** for **yearlings**, followed by macrolides (6%) and/or amphenicols (2%).
- In contrast, **amphenicols** comprised the majority of **injectable AMU** (50%) in **calves** and predominated over the use of macrolides (12%) and tetracyclines (13%).

Key Takeaways- 2024 AMU

- 95% of AMU administered through feed
- **89%** of all AMU in fed cattle is for **respiratory disease and liver abscess** prevention and control
  - AMU for **respiratory disease** including histophilosis contributes to **36%** of all AMU
  - AMU for **liver abscess** prevention and control contribute to almost **52%** of the total AMU
- Industry challenged to reduce AMU without better answers to controlling liver abscesses and respiratory disease

Acknowledgements

- Veterinarians and producers who make the program possible
- Funding Agencies

Saskatchewan

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

Canadian Agricultural Partnership – Innovate. Grow. Prosper.

Alberta

Canada

BCRC – Beef Cattle Research Council

Canadian Agricultural Partnership – Innovate. Grow. Prosper.

Ontario

Canada

Alberta Cattle Feeders' Association

Beef Farmers of Ontario

National Cattle Feeders' Association / Association Nationale des Engraisseurs de Bovins

SCFA – Saskatchewan Cattle Feeders Association

Bayer Animal Health

Vetoquinol – Achieve More Together

Questions?