



BOVINE RESPIRATORY DISEASE (BRD) PATHOGEN SUMMARY ANTIMICROBIAL RESISTANCE (AMR) INFORMATION

What are BRD pathogens?

- Many different types of bacteria can cause **bovine respiratory disease (BRD)** in cattle
- These include *Mannheimia haemolytica*, *Pasteurella multocida*, *Histophilus somni*, and *Mycoplasma bovis/dispar*.

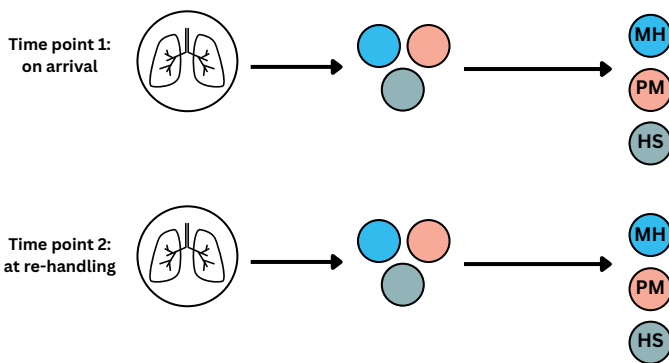
What is AMR?

- **Antimicrobial resistance (AMR)** happens when microbes, such as bacteria, have evolved so that antimicrobials are not able to control or kill them
- Rising rates of AMR make it harder to treat infections and increase the risk of disease spread, illness, and death in people and animals

Processed samples (2019 - 2021)

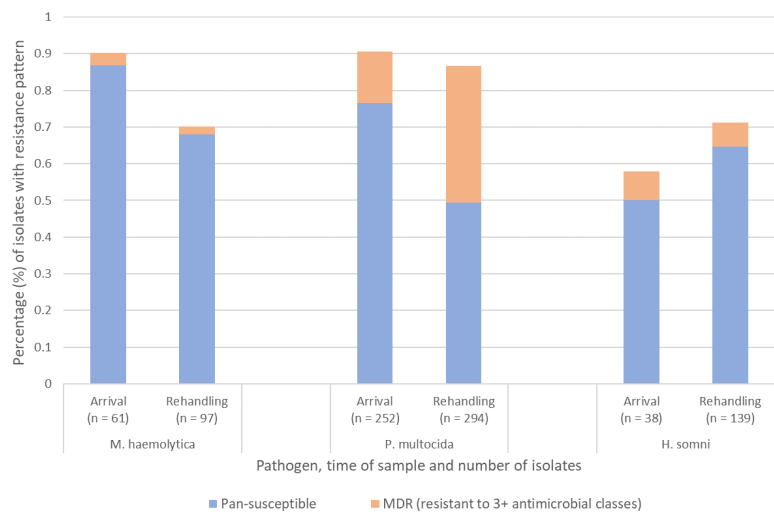
PDS in Saskatoon, SK

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



Pathogens were isolated and antimicrobial susceptibility testing was performed at arrival and rehandling (average 60 DOF post arrival). Pathogens included **MH** (*Mannheimia hemolytica*), **PM** (*Pasteurella multocida*), and **HS** (*Histophilus somni*).

BRD pathogens with resistance pattern at arrival and rehandling



Pasteurella multocida has shown the most differences between arrival and rehandling, with significantly increased resistance to macrolides between arrival and rehandling.

THERE WERE NO SIGNIFICANT YEARLY DIFFERENCES IN ANTIMICROBIAL RESISTANCE (AMR) FROM 2019 TO 2021.

Information collected from 2019 to 2021 showed that pathogens that were multidrug resistant (MDR) were most resistant to these drug classes from arrival to rehandling (60 DOF):

Macrolides

Tetracyclines

Antimicrobials with the most resistance increase from arrival and rehandling (with trade name examples):

Macrolides

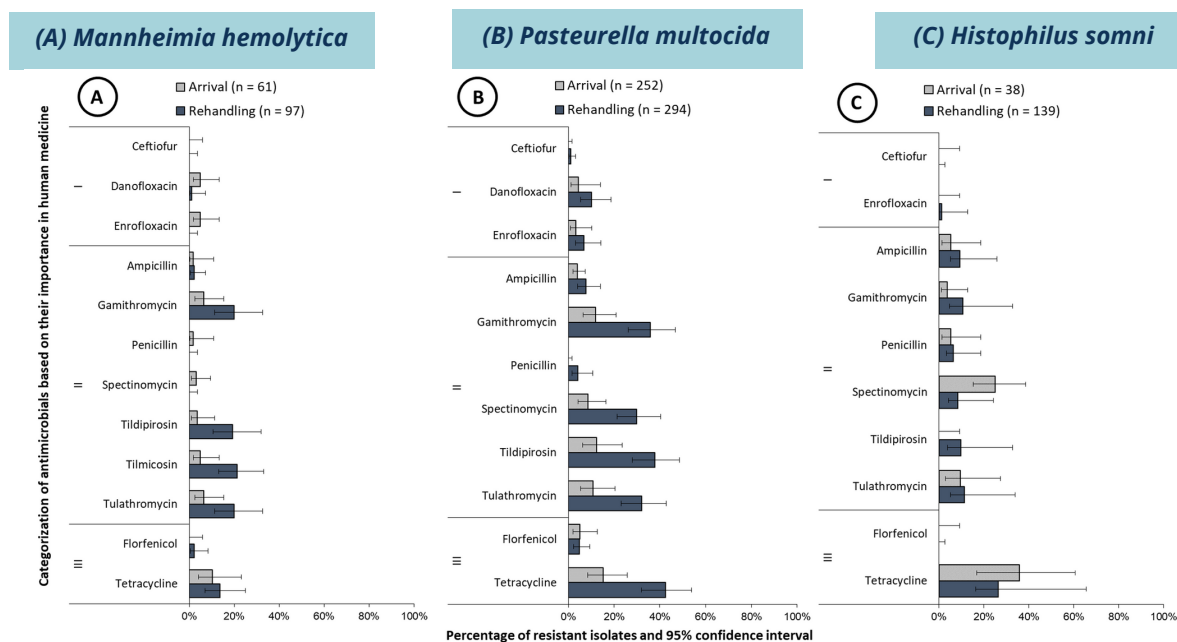
- Gamithromycin (Zactran®)
- Tildopirosin (Zuprevo®)
- Tilmicosin (Micotil™)
- Tulathromycin (Draxxin®)

Tetracyclines

- Tetracycline (Liquamycin LA-200®)

FROM 2019 TO 2021, THERE WAS AN INCREASING TREND IN AMR BETWEEN ARRIVAL AND REHANDLING FOR *M. HEMOLYTICA* & *P. MULTOCIDA*.

BRD pathogens with resistance prevalence at arrival and rehandling (60 DOF)



The plots show the total combined isolates from arrival and rehandling time points from 2019 to 2021. For (A) *Mannheimia hemolytica*, it was difficult to detect differences between arrival and rehandling time points given the low number of isolates recovered per year and comparatively wide confidence intervals. There were increases in resistance to tildopirosin and tilmicosin that were borderline significant. For (B) *Pasteurella multocida*, the confidence intervals for gamithromycin, spectinomycin, tildopirosin, tulathromycin, and tetracycline did not overlap and indicated that resistance was higher at rehandling than at arrival time points ($P \leq 0.05$). For (C) *Histophilus somni*, there were no significant differences detected in resistance between arrival and rehandling time points.

WHAT DOES THIS INFORMATION MEAN FOR YOU AS A VETERINARIAN?

- Each and every time antimicrobials are used, there is an increased risk for AMR development.
- The increase in AMR to macrolides and tetracyclines 60 days post-arrival emphasizes the need to use these antimicrobials prudently to preserve their effectiveness.
- **Work with your feedlot clients** to reduce the risk of infectious disease and thus, the need for antimicrobials, by supporting and educating them on **good animal husbandry and on farm practices**, including:
 - Housing for protection from inclement weather,
 - Appropriate stocking densities,
 - Well-balanced nutrition,
 - Effective vaccination protocols,
 - Low stress cattle handling including transportation,
 - Health and performance monitoring with reviews of vaccination and treatment protocols and records,
 - Improved disease diagnostics, and
 - Staff training



Antimicrobials need to be used in the right animal for the right reason, at the right time, dosage, route, frequency, and duration.

THERE ARE MANY DIFFERENT CAUSES OF BRD TREATMENT FAILURE



Many of the BRD deaths observed in Alberta feedlots over the last few years are chronic pneumonias, not peracute or acute bacterial pneumonias, where there would be concerns of higher virulence of pathogens.

Causes of BRD treatment failure

- **Late pull** where disease is too far advanced
- **Misdiagnosis** of disease
- **Viral disease** that doesn't respond to antimicrobials
- **Use of immunosuppressive steroids**
- **Cattle already sick** on feedlot arrival – disease too far advanced
- **Multiple problems** (e.g., grain overload, off feed)
- **Nutritional deficiencies** affecting immune response
- **Antimicrobial resistance**
 - *Mycoplasma bovis* is intrinsically resistant to penicillin and cephalosporin drugs
 - Previous drug use
 - Inherent bacterial genetic resistance



**QUESTIONS?
EMAIL US!**

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