



# Prescribing Practices of Veterinarians in the U.S.



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**public health**



# How do veterinarians prescribe AMDs? What influences prescribing practices?

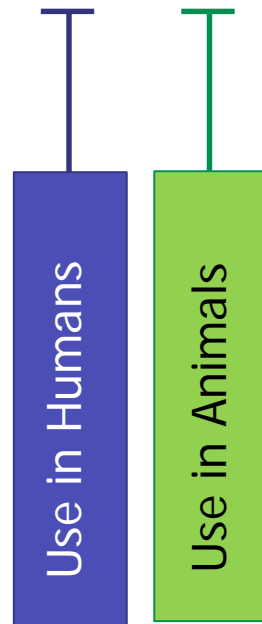
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- What do we know?
  - Mostly statistics based on sales data
- Limited objective information is available about:
  - Reasons for treatment
  - Appropriateness of treatment choices
  - Factors influencing prescribing behavior
  - etc.

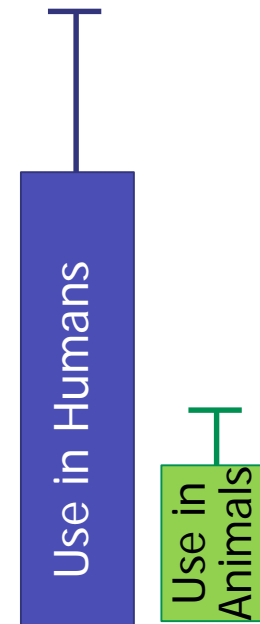


# How do veterinarians prescribe AMDs? What influences prescribing practices?

## Attribution and Concern about AMR



## Research Funding





# How do veterinarians prescribe AMDs? What influences prescribing practices?

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- Excellent previous input applies to veterinarians
  - Examples from Sep 2017: Drs. Szymczak, Mangione-Smith, and Linder
- Sociological Factors Affecting Prescribing
  - Relationships among Clinicians
  - Risk, Fear, Anxiety, and Emotion
  - (Mis)Perception of the Problem
  - Contextual and Environmental Factors
- Client expectations (surrogate parent / economic)
- Use of diagnostics doesn't really change sociological influences



# How do U.S. veterinarians prescribe AMDs?

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- 2001 Mail Survey
- AVMA veterinarians randomly selected from throughout U.S. from 7 Self-declared practice categories
  - Large animal exclusive - LGANEXC
  - Large animal predominant - LGANPRED
  - Other private practice - OTHER
  - Mixed - MIXED
  - Equine exclusive - EQUINE
  - Small Animal predominant - SMANPRED
  - Small Animal exclusive - SMANEXC
- Response = 4,652 / 12,955 (35.4%)
- Three Sections: Opinions about AMR, General AMD Prescribing Practices, and Empirical Prescribing in Specific Hypothetical Scenarios

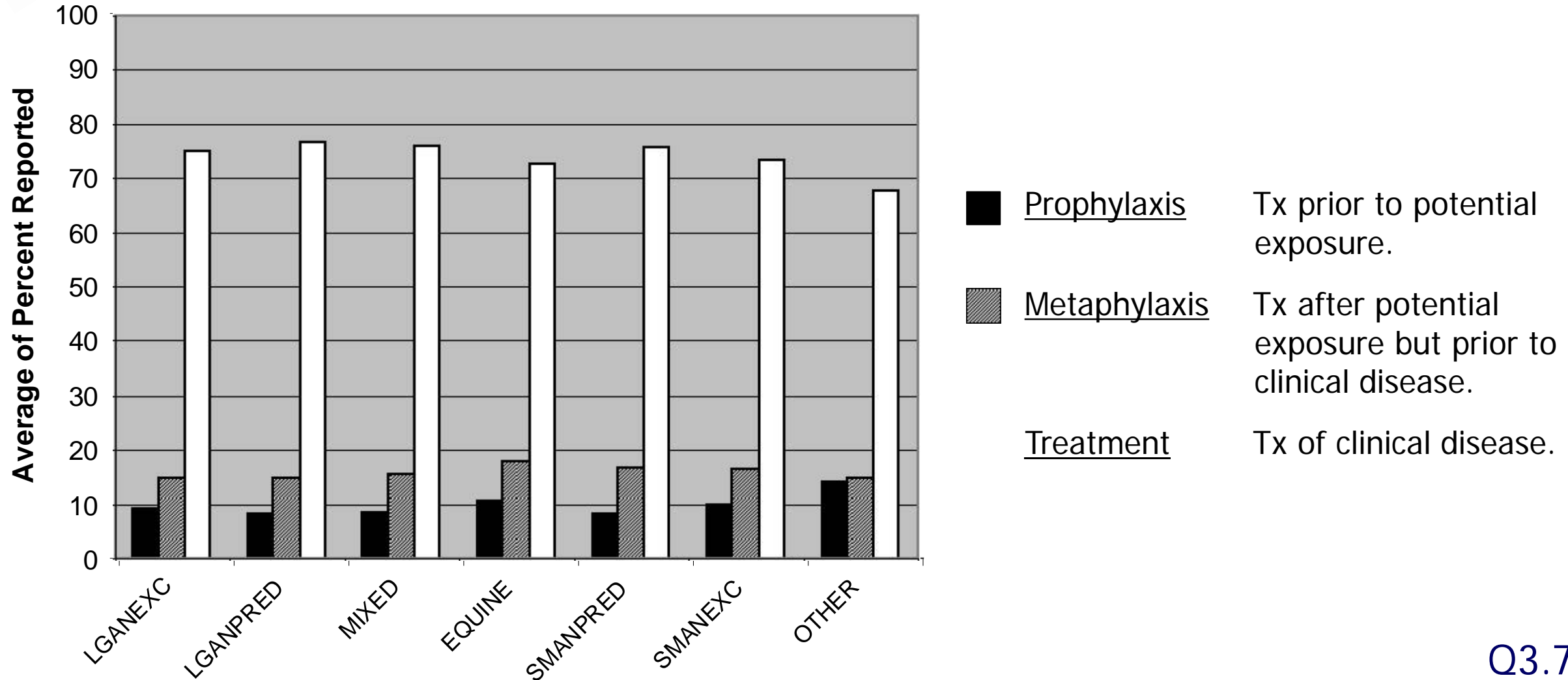


# Let's Look at a Few Prescribing Patterns

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# Reasons for Antimicrobial Drug Prescriptions (past 12 mo)





# Pick One Species: How Commonly Did You Treat With AMDs for Problems in These Body Systems During the Past Year?



Average Rank	Bovine-Beef	Bovine-Dairy	Equine	Canine	Feline
Rank 1 (Most Common)	Respiratory Tract	Mammary Gland	Respiratory Tract	Integument/Skin	Urinary Tract
Rank 2	Digestive Tract	Respiratory Tract	Reproductive Tract	Ear and Eye	Respiratory Tract
Rank 3	Reproductive Tract	Reproductive Tract	Integument/Skin	Urinary Tract	Integument/Skin
Rank 4	Mammary Gland	Digestive Tract	Musculoskeletal System	Digestive Tract	Ear and Eye
Rank 5	Ear and Eye	Musculoskeletal System	Ear and Eye	Respiratory Tract	Digestive Tract
Rank 6	Musculoskeletal System	Urinary Tract	Digestive Tract	Musculoskeletal System	Musculoskeletal System
Rank 7	Urinary Tract	Ear and Eye	Neurological System	Reproductive Tract	Reproductive Tract
Rank 8	Neurological System	Integument/Skin	Urinary Tract	Mammary Gland	Mammary Gland
Rank 9 (Least Common)	Integument/Skin	Neurological System	Mammary Gland	Neurological System	Neurological System



Digestive Tract



Mammary Gland



Reproductive Tract



Ear and Eye



Musculoskeletal System



Respiratory Tract



Integument/Skin



Neurological System



Urinary Tract














Pick One Species: How Common Would You Expect to Find With AMDs for Problem? The Year?

Take Home Message:

Diseases / Reasons for Prescribing are Very Different for Different Species



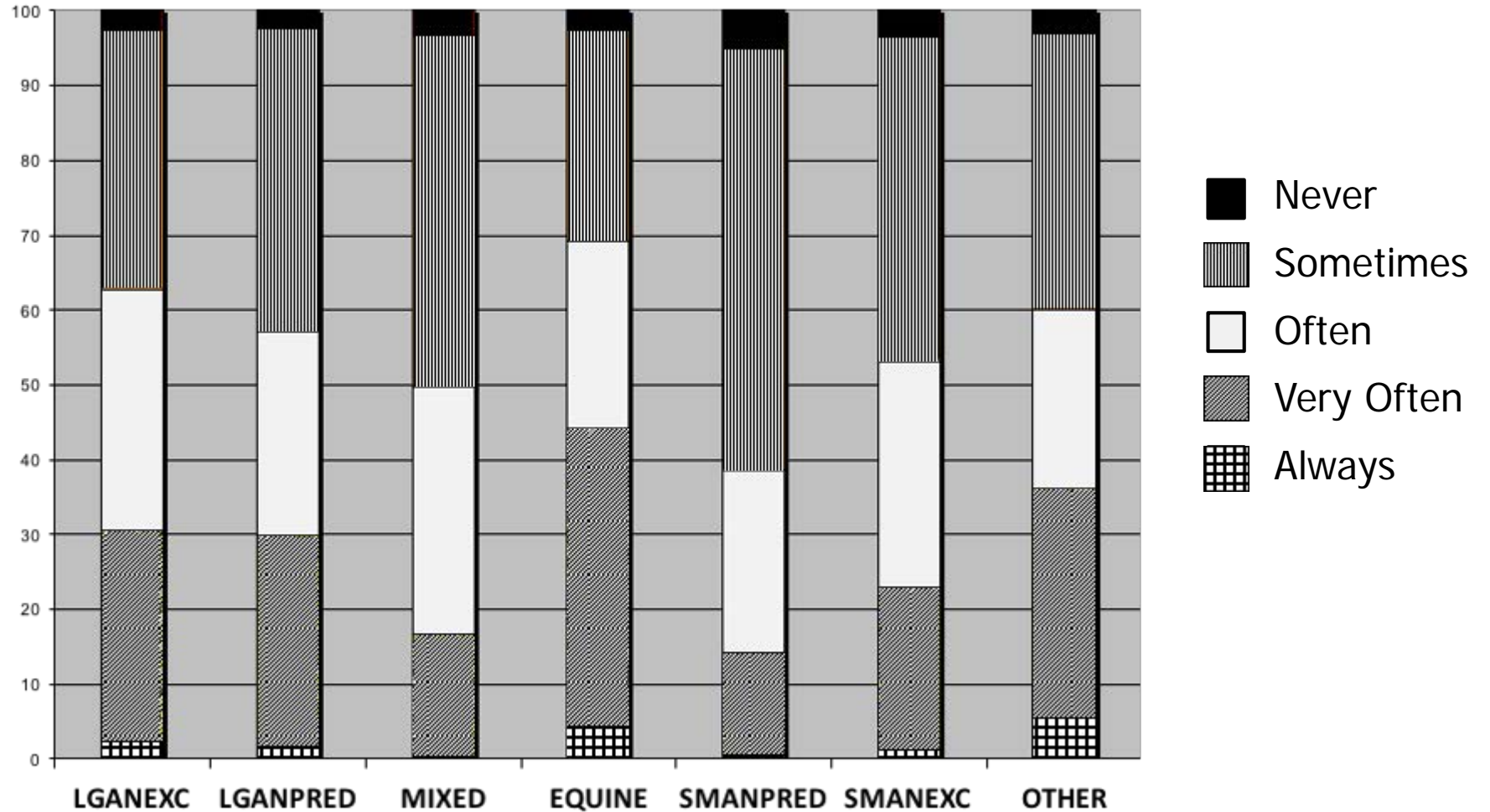
Average Rank		Feline
Rank 1 (Most Common)		Urinary Tract
Rank 2		Respiratory Tract
Rank 3		Integument/Skin
Rank 4		Ear and Eye
Rank 5		Digestive Tract
Rank 6		Musculoskeletal System
Rank 7		Reproductive Tract
Rank 8		Mammary Gland
Rank 9 (Least Common)		Neurological System

 Digestive Tract	 Mammary Gland	 Reproductive Tract
 Ear and Eye	 Musculoskeletal System	 Respiratory Tract
 Integument/Skin	 Neurological System	 Urinary Tract



# How Often Were Samples Submitted for Bacteriology In the Previous 12 Months?

Less Use of Culture to Guide Prescribing in Mixed Practices?





# Empirical Prescribing Scenarios

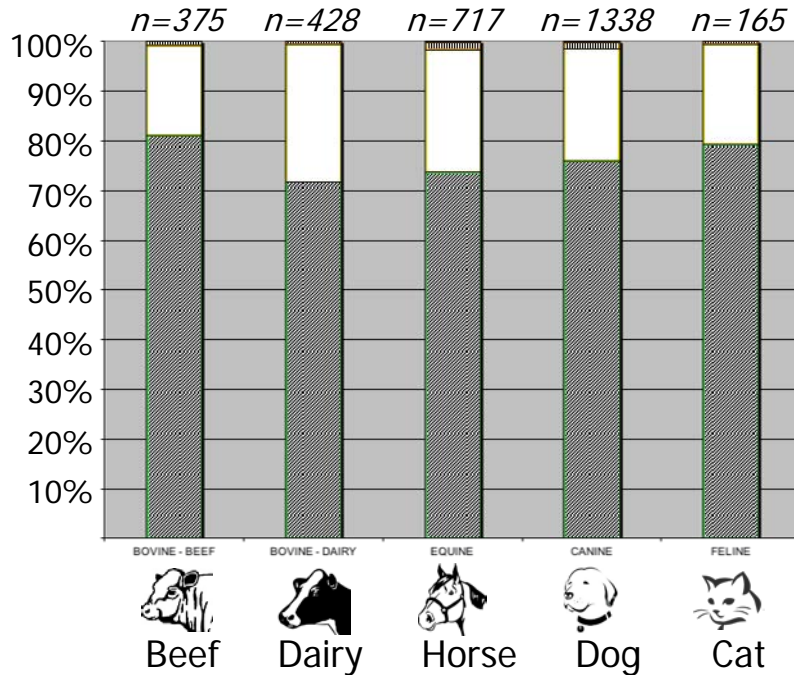
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- Participants must have prescribed AMDs in the past year.
- Select one species as context for answering questions about empirical prescribing in hypothetical scenarios:
  - *Young adult with pneumonia of primary bacterial etiology.*
  - *Young adult with viral upper respiratory infection without secondary infection or pulmonary involvement.*
  - *Juvenile with acute viral diarrhea and no fever.*
  - *Intestinal obstruction requiring surgery.*
  - *Abscess of skin, subcutis, or underlying muscle.*
  - *Bacterial cystitis.*
- Asked to provide specific drug, route, & dosage (open ended)

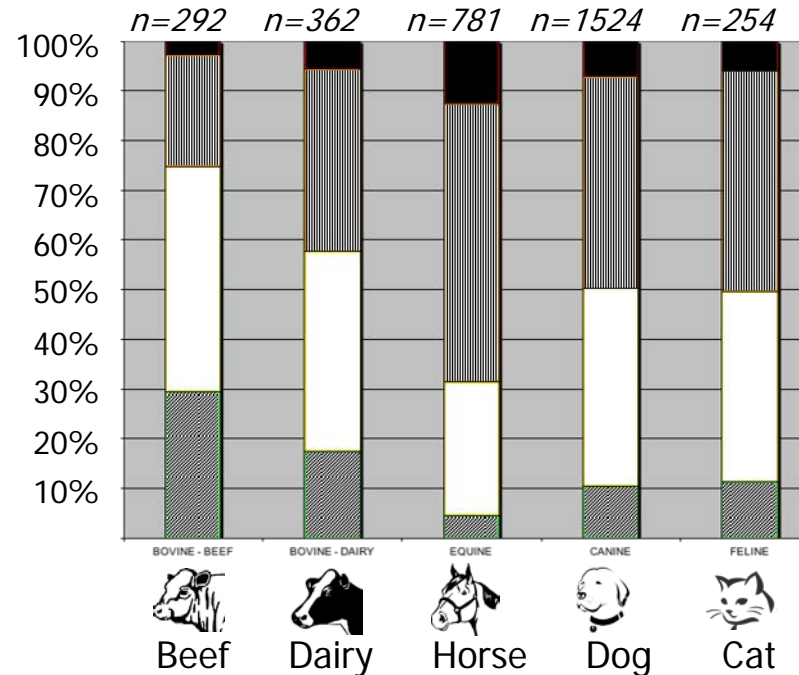


# *If this type of case was seen in the past 12 months...* How Likely Were Vets to Treat with AMDs?

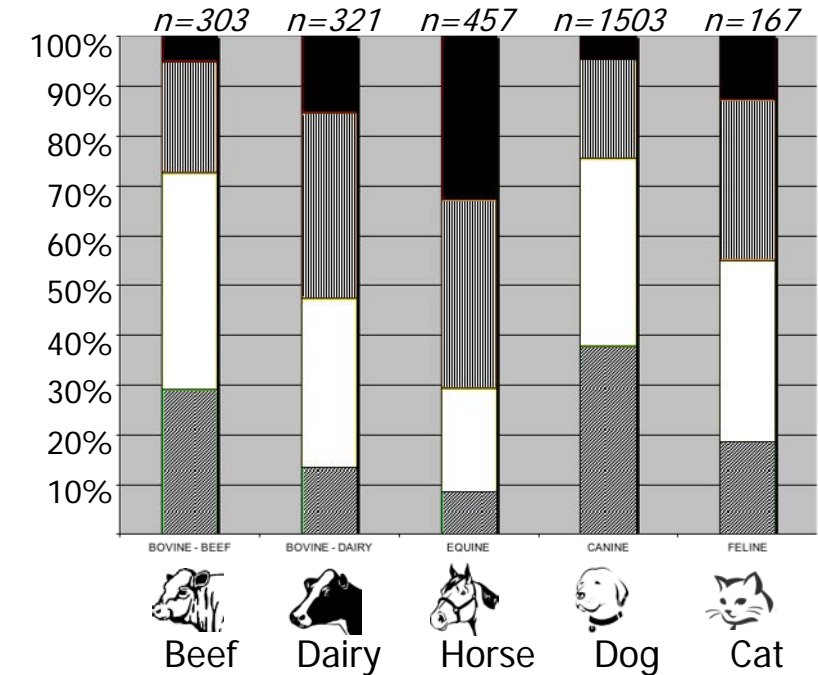
### Primary Bacterial Pneumonia



### Uncomplicated Viral Upper Respiratory Disease



### Acute Viral Diarrhea Without Fever



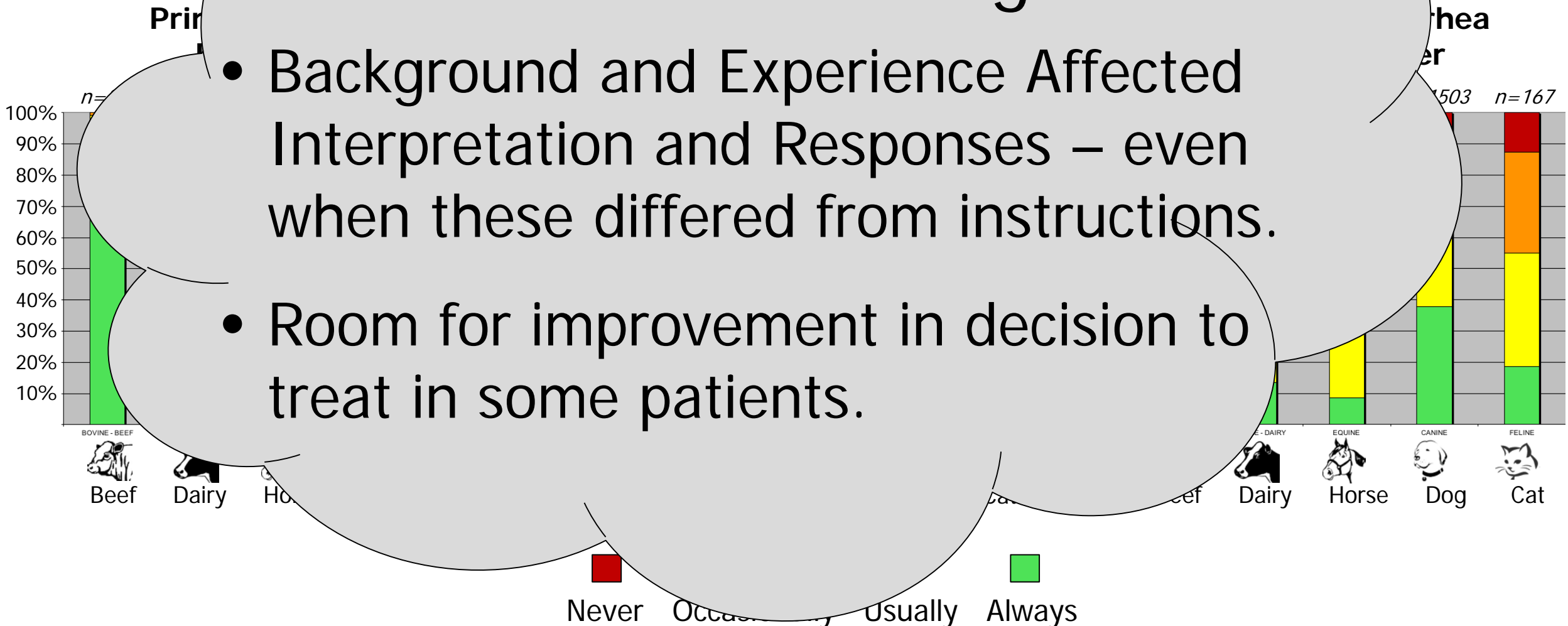
Never
  Occasionally
  Usually
  Always



If this type of case occurs every 6 months...  
How often do you treat these patients?  
VMDs?

## Take Home Messages:

- Background and Experience Affected Interpretation and Responses – even when these differed from instructions.
- Room for improvement in decision to treat in some patients.





# What About Patterns in Drug Selection?

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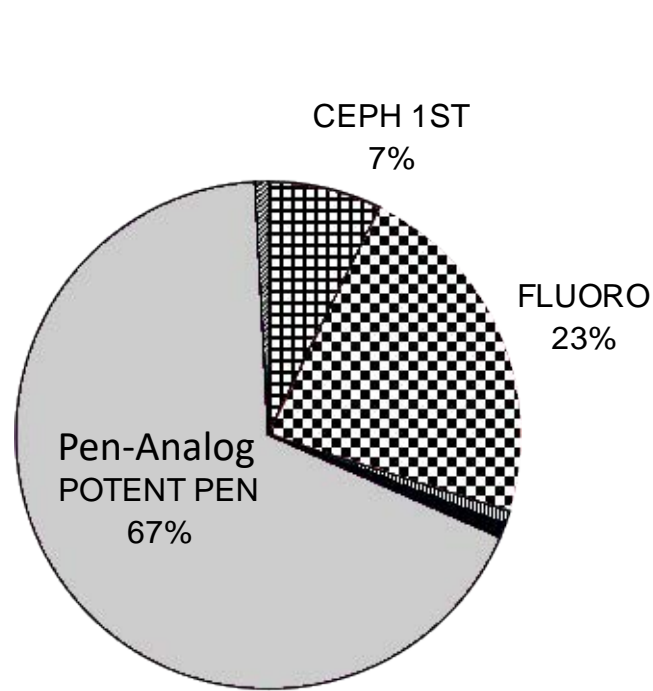




# Cat – Empirical Treatment Scenarios

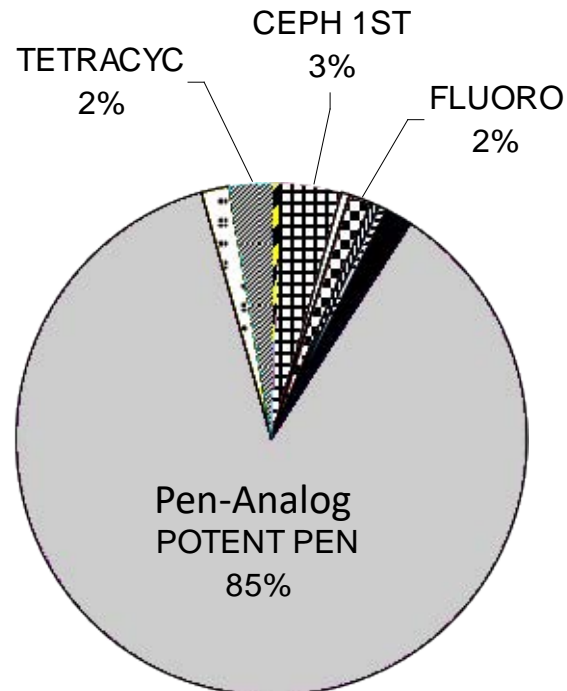


**Pneumonia with Primary Bacterial Etiology (n=254)**



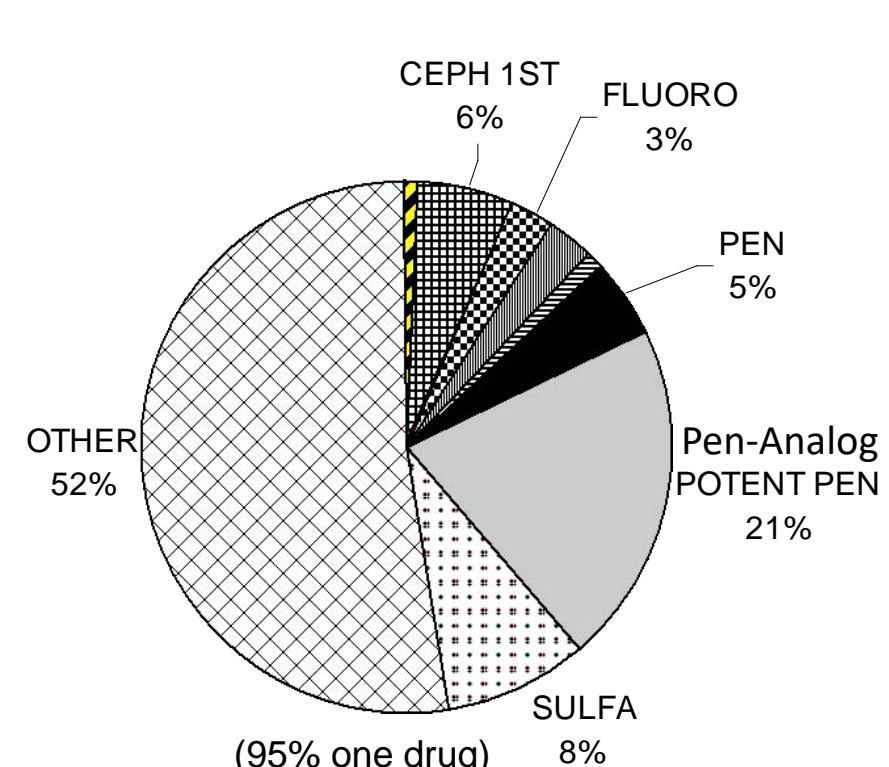
(93% one drug)

**Uncomplicated Viral Upper Respiratory Disease (n=186)**



(97% one drug)

**Acute Viral Diarrhea Without Fever (n=191)**



(95% one drug)





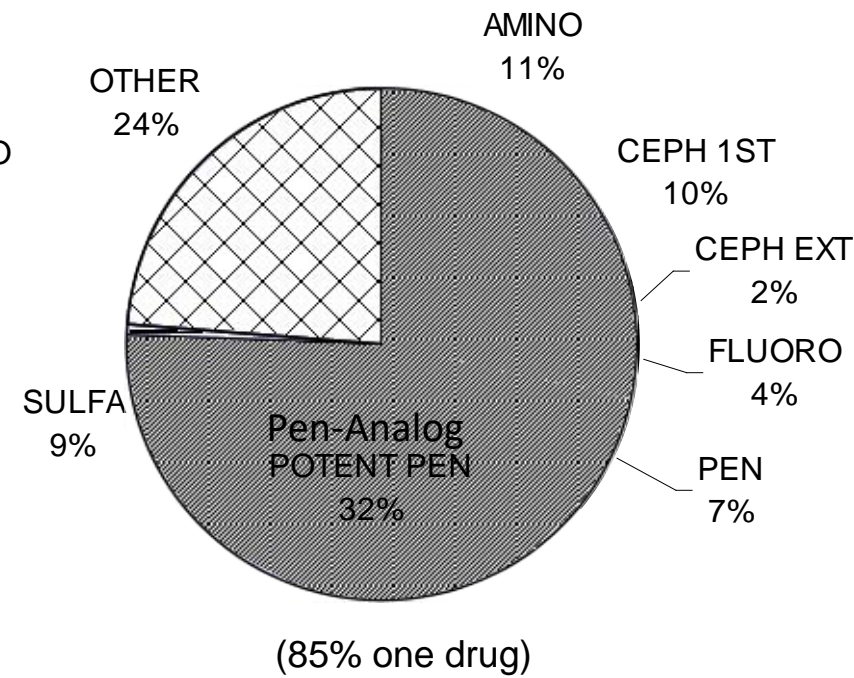
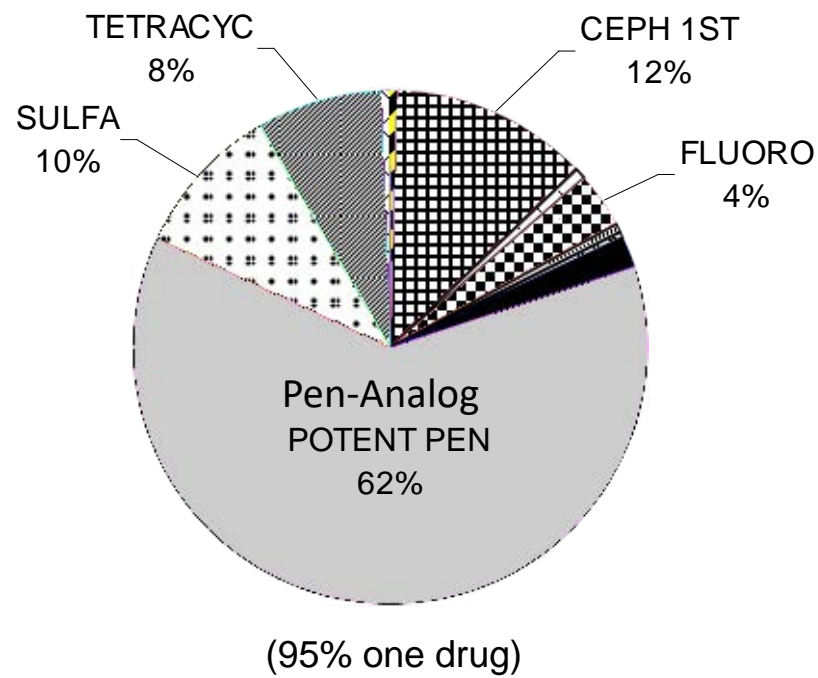
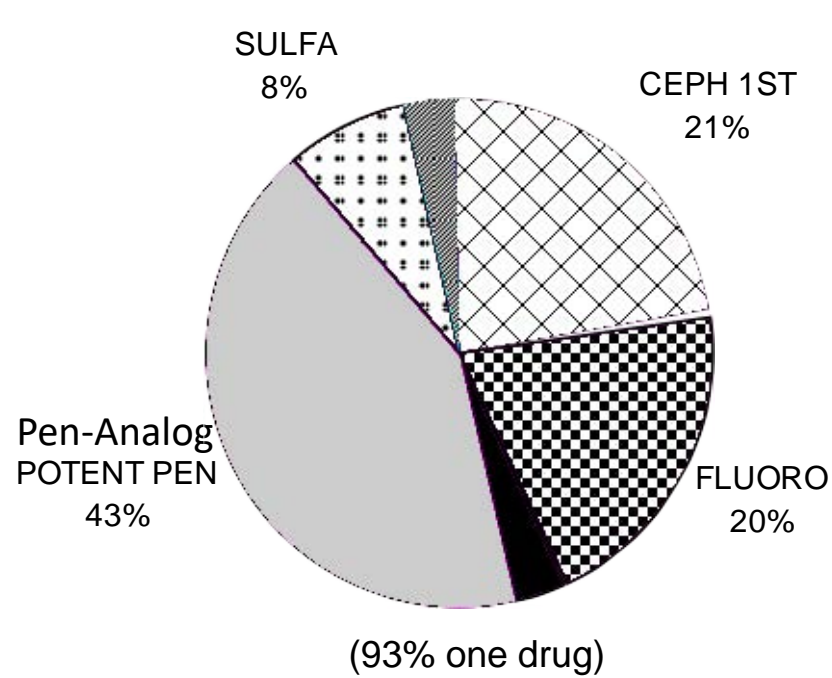
# Dog – Empirical Treatment Scenarios



**Pneumonia with Primary Bacterial Etiology (n=254)**

**Uncomplicated Viral Upper Respiratory Disease (n=186)**

**Acute Viral Diarrhea Without Fever (n=191)**

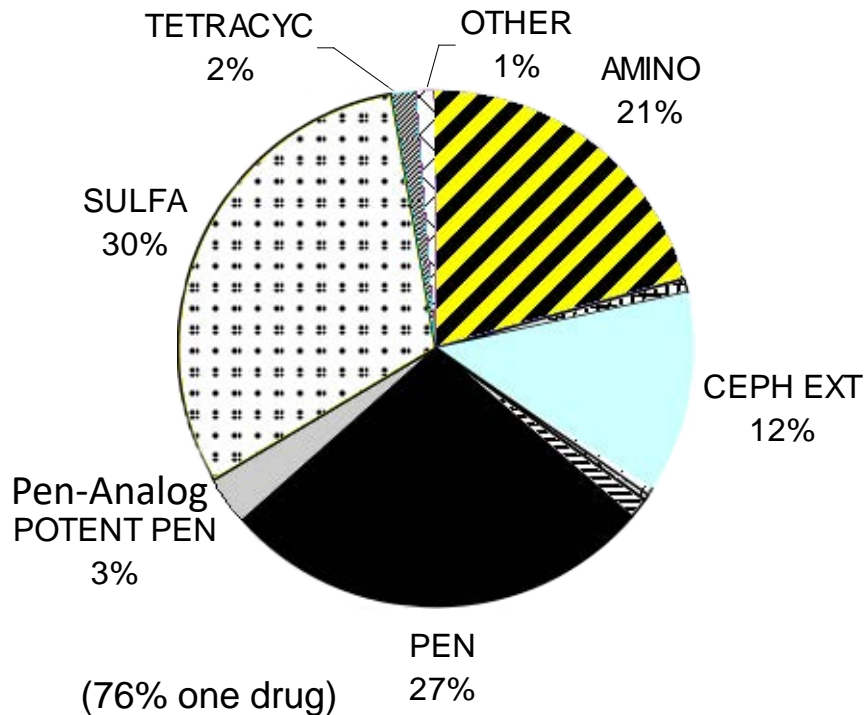




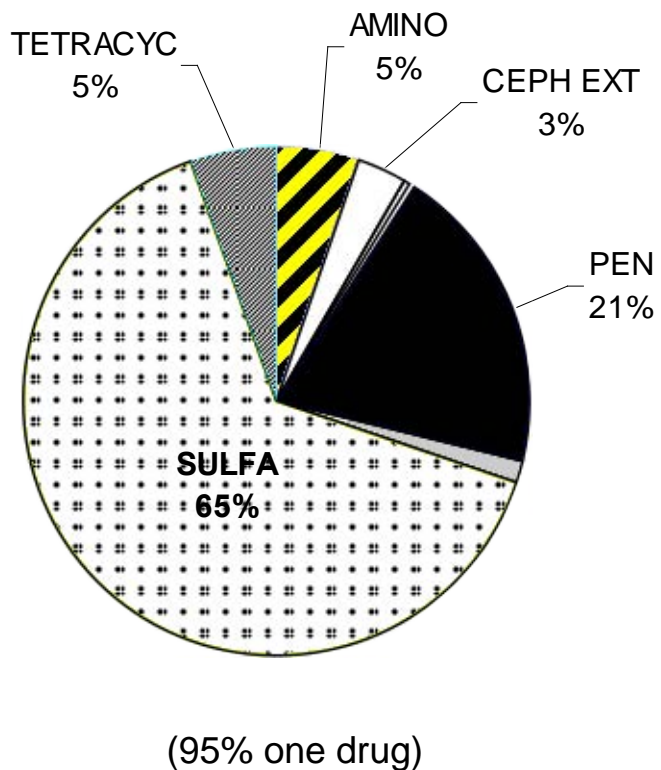


# Horse – Empirical Treatment Scenarios

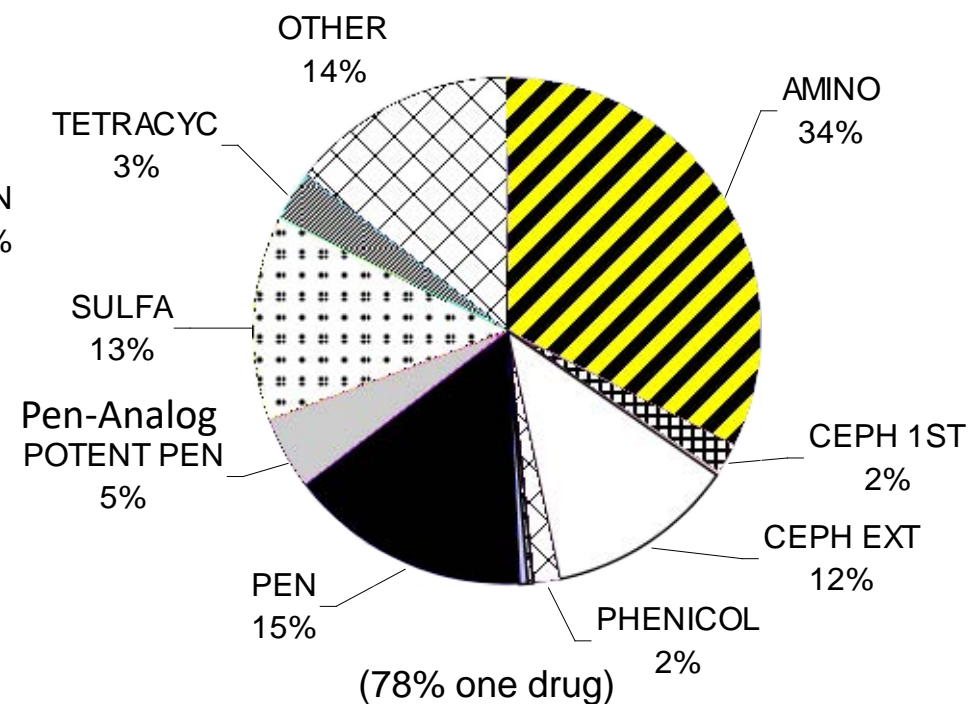
**Pneumonia with Primary Bacterial Etiology (n=254)**



**Uncomplicated Viral Upper Respiratory Disease (n=186)**



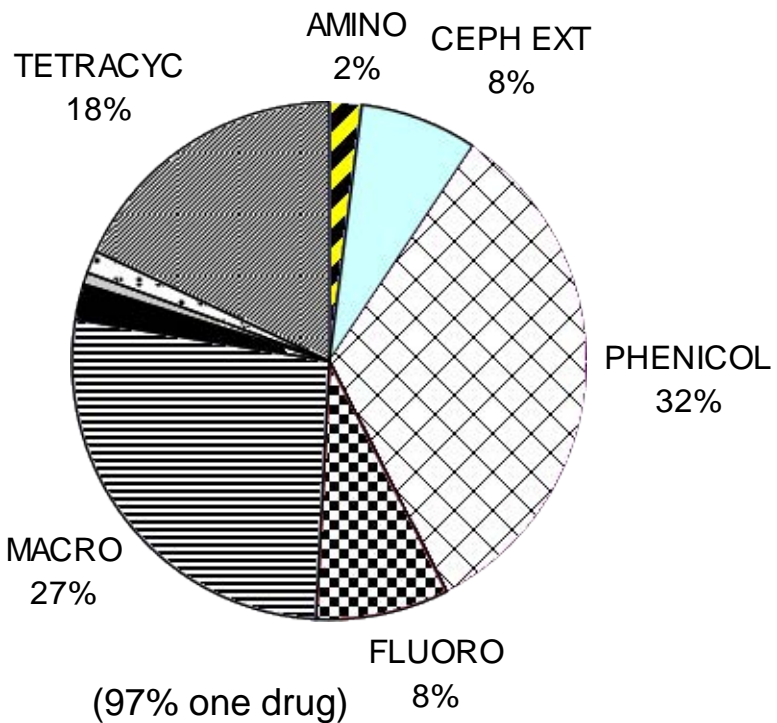
**Acute Viral Diarrhea Without Fever (n=191)**



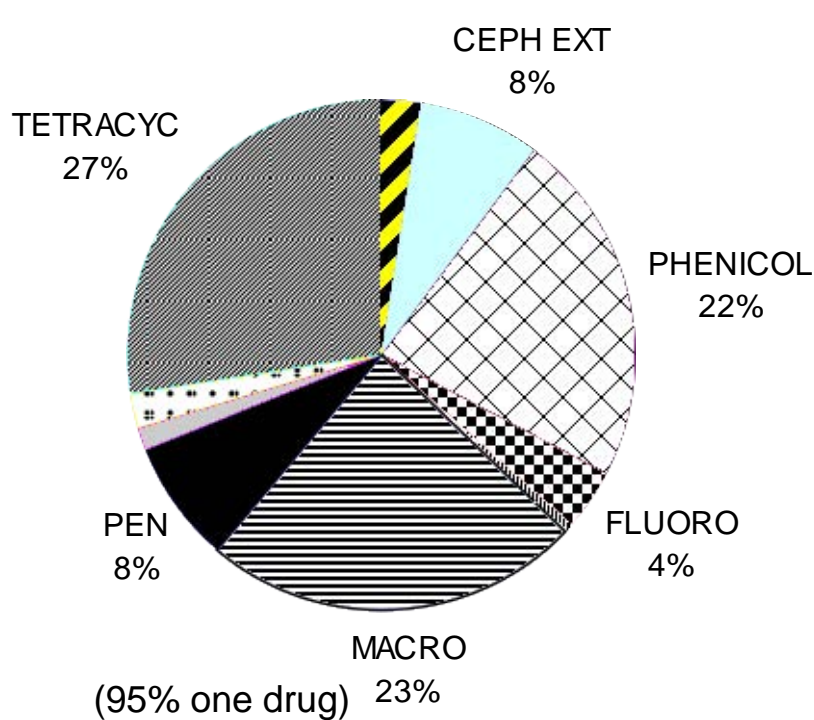


# Beef Cattle – Empirical Treatment Scenarios

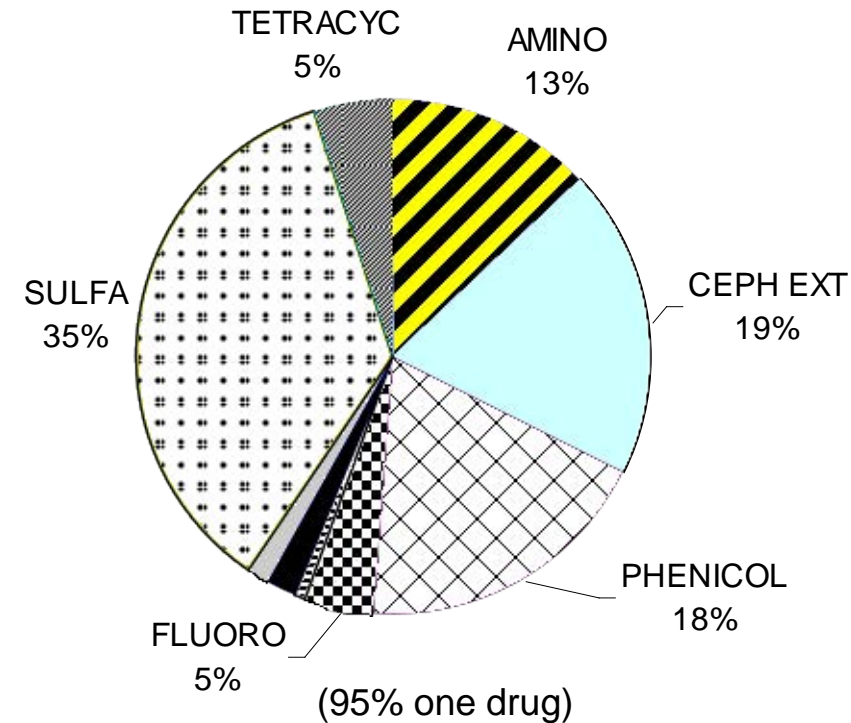
**Pneumonia with Primary Bacterial Etiology (n=254)**



**Uncomplicated Viral Upper Respiratory Disease (n=186)**



**Acute Viral Diarrhea Without Fever (n=191)**





# Selection of Drugs – Additional conclusions and suppositions:

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- In addition to perceived efficacy of treatment:
  - **Convenience / ease of use is a critical driver of product choice.**
    - Drug formulations providing multiple-day therapy from single dose.
    - Oral forms that are acceptable to companion animals in outpatient situations.
    - All else being equal, cost is a critical factor.
  - Question: What types of AMDs and formulations more likely to be developed and marketed for veterinary use?
- Differences among vets treating different species:
  - **Peer-related, and Risk/Anxiety-related influences have strong impact.**



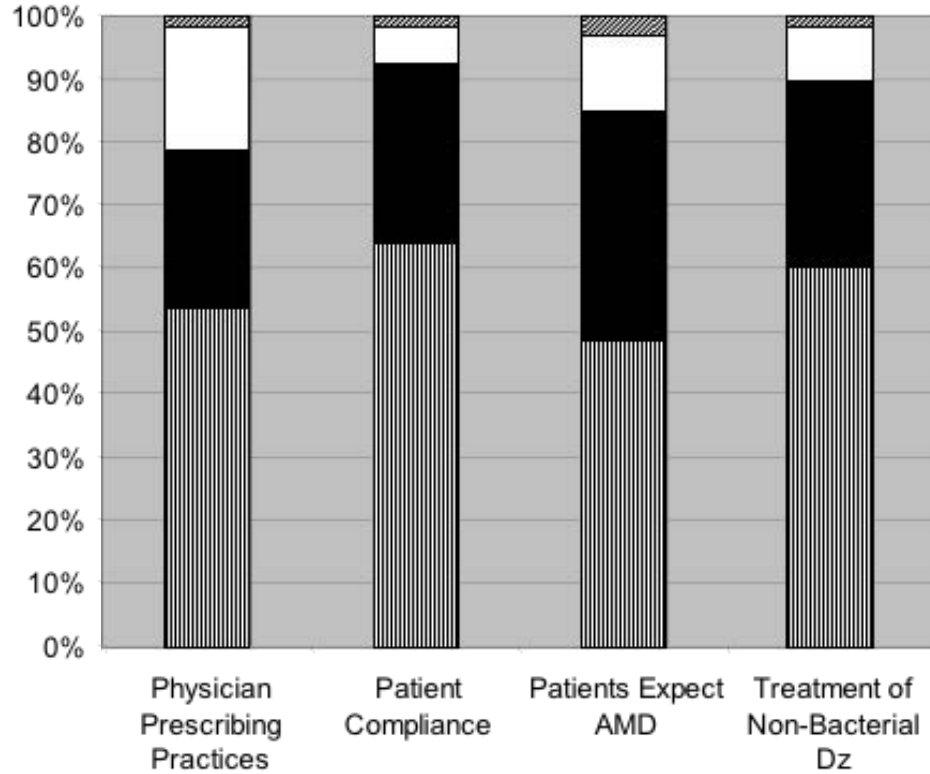
# Veterinarian's Opinions About AMR

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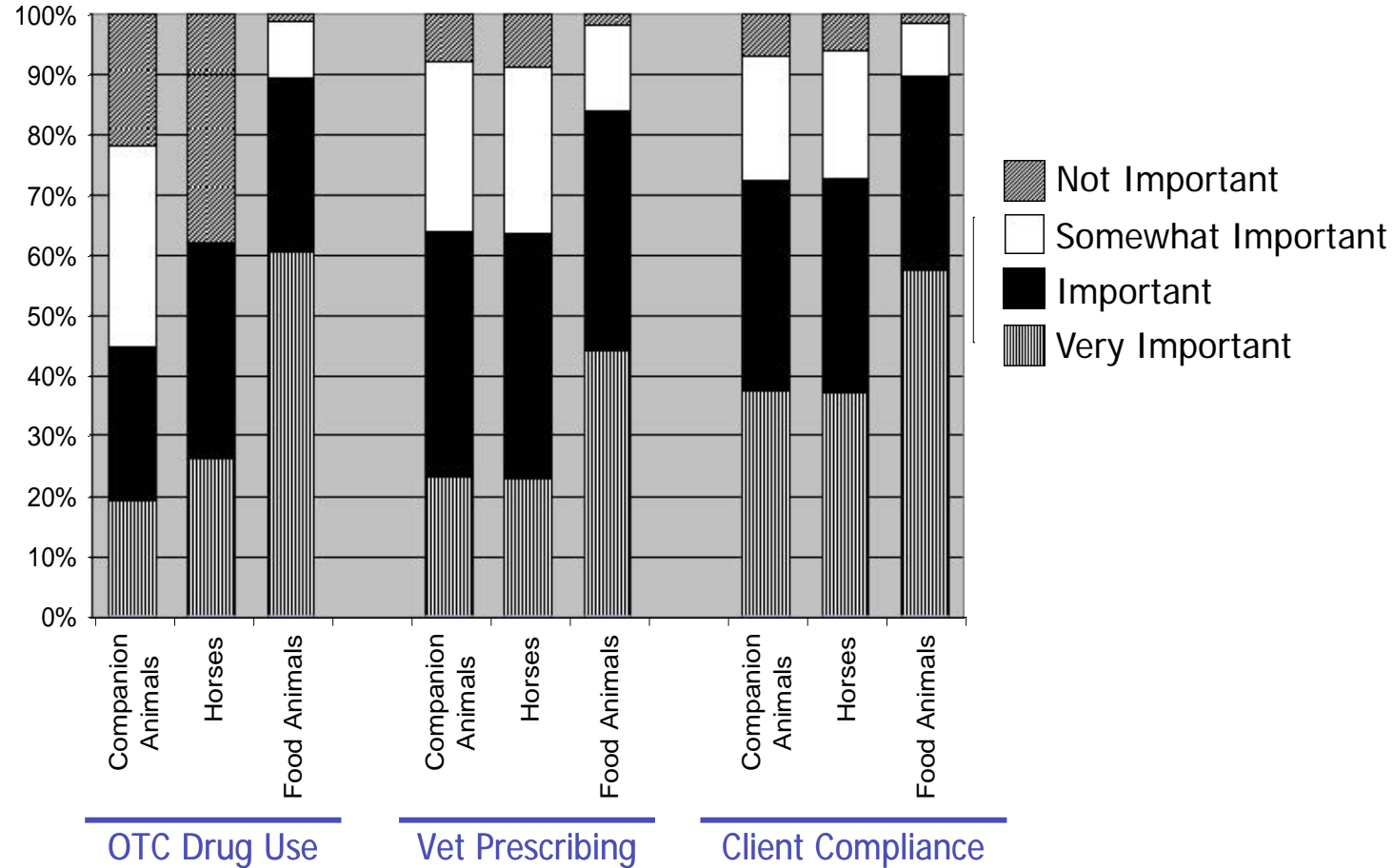


# How important are these aspects of AMD use as contributors to AMR?

## Use in Humans



## Use in Animals

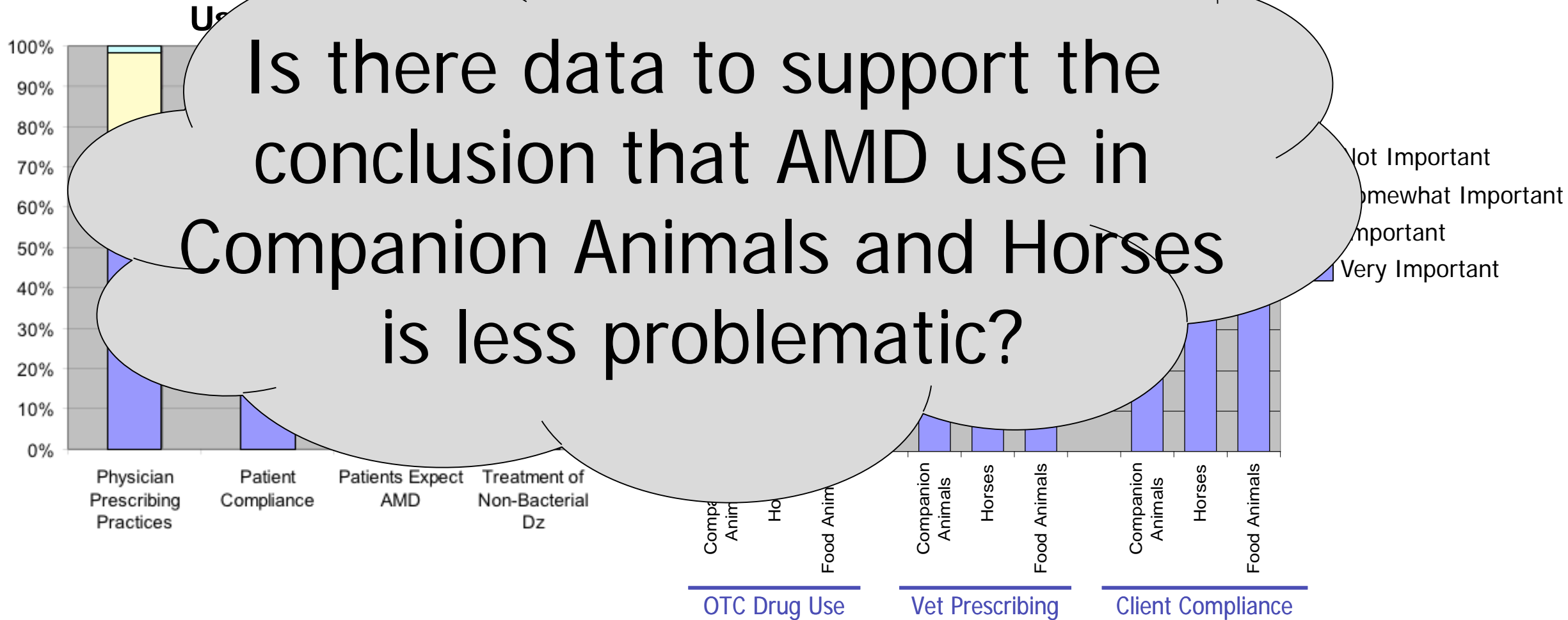






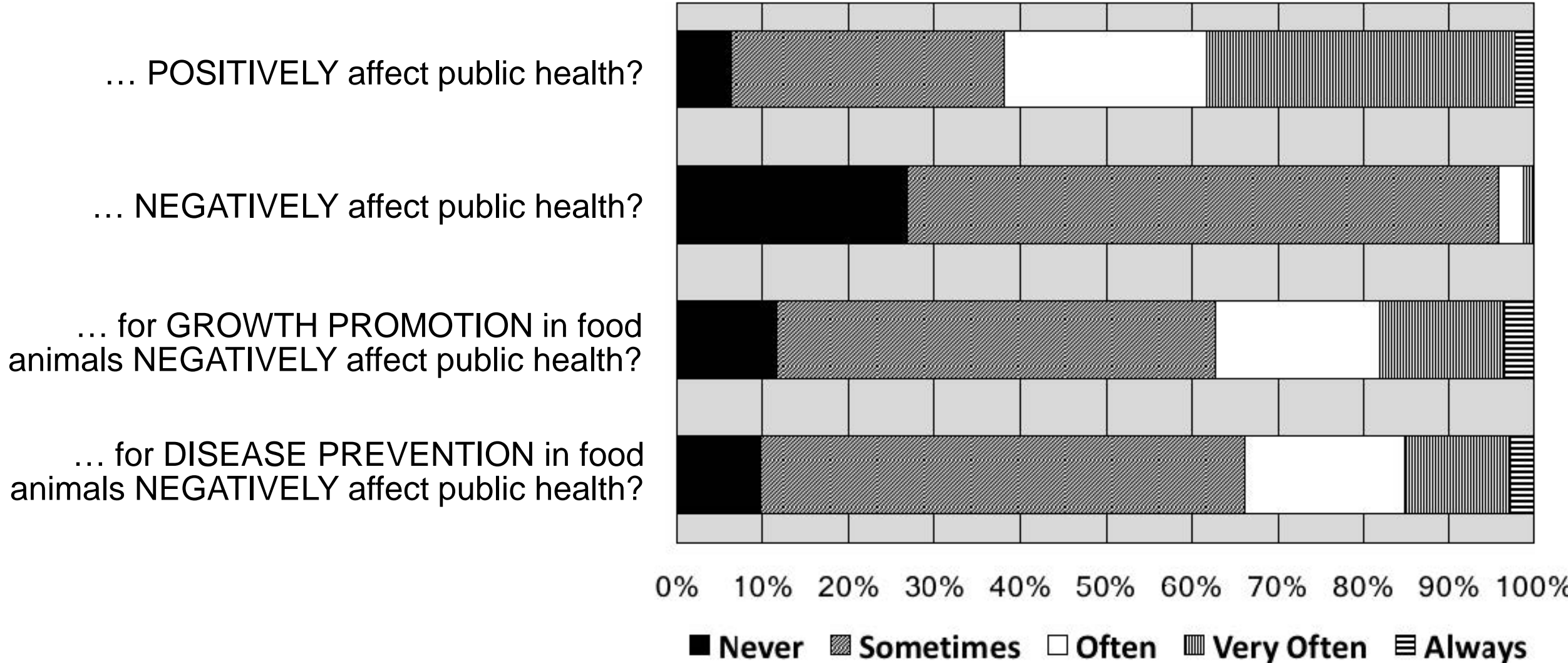
# How important are these aspects of AMD use as contributors to AMR?

Is there data to support the conclusion that AMD use in Companion Animals and Horses is less problematic?





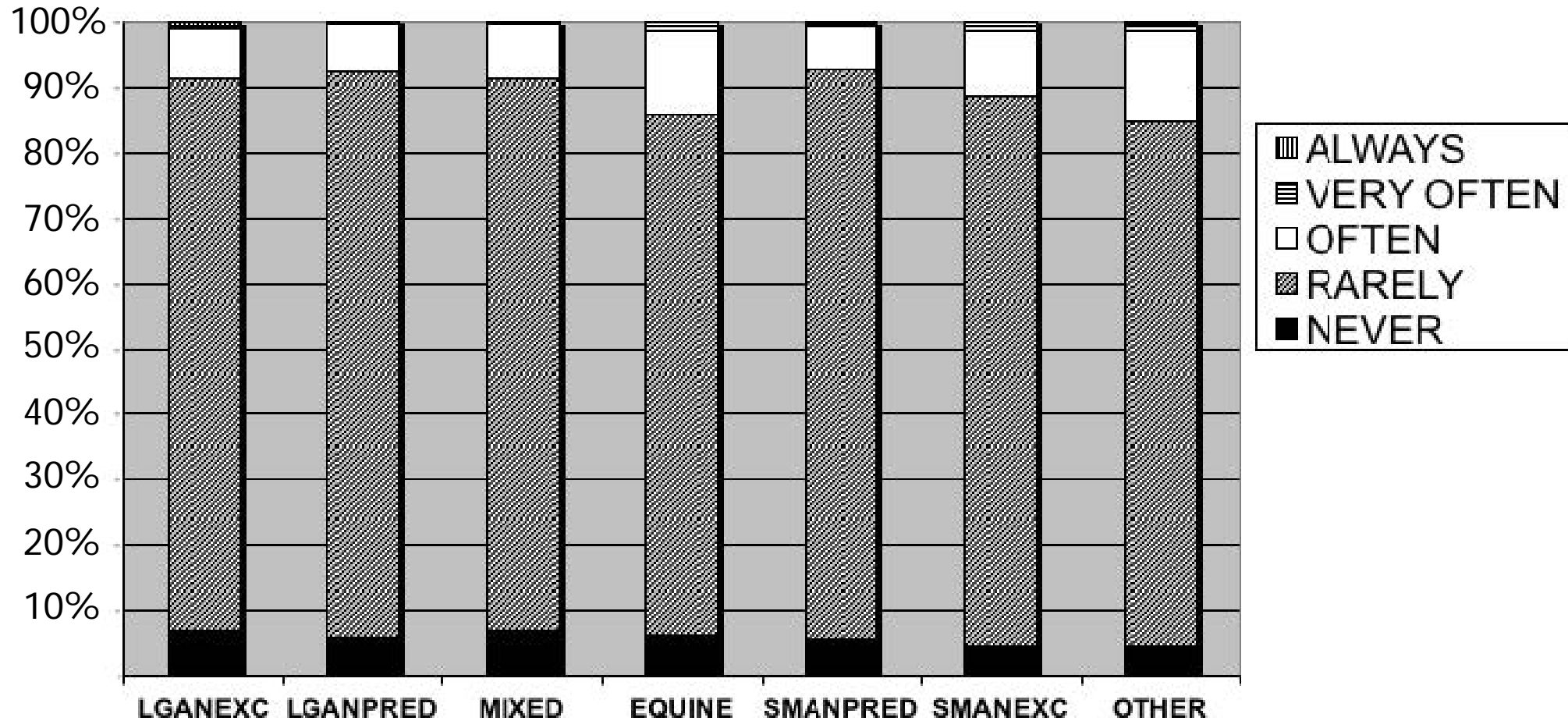
# Impact of AMD Use in Animals on Public Health: *"Does AMD Prescribing by Veterinarians ..."*





# *"Do Your AMD Prescribing Practices Lead to the Development of Antimicrobial Resistant Bacteria?"*

~80% Said Rarely or Never







# 2017-2018 Study: Veterinary Prescribing of Antimicrobial Drugs in Food Producing Animals

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- Dan Taylor, Jennifer Martin, Keith Belk, Paul Morley, Elaine Scallan
  - Colorado School of Public Health
  - Colorado State University
- Beef Cattle, Dairy Cattle, Growing Pigs, Turkeys
- Targeting veterinarians prescribing in populations
- Responses about Empirical Use in Standardized Scenarios
- Evaluate Prediction/Correlation With Actual Prescribing Using Electronic Diaries



# Thank You



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