

The Dirty Dozen: Twelve Bacteria Every Small Animal Veterinarian Should Know

Stephen D. Cole, VMD, MS, DACVM
Assistant Professor of Microbiology, PennVet

Background

Many bacteria that companion animal veterinarians will encounter on reports from clinical microbiology laboratories are normal flora of pets. This can sometimes make interpretation of results difficult. Below you will find a list of 12 of the most common bacteria that can be found when specimens are submitted to the clinical microbiology lab and some basic information on these organisms. If cytologic examination has also been performed on an infection site, then correlation with culture can be helpful in determining clinical relevance, so in cases where cytologic appearance may be helpful this has also been included.

The Dirty Dozen

1. Gram +: *Staphylococcus pseudintermedius*

- Cytologic appearance: Cocci in clusters.
- The most important infectious agent in small animal medicine (S. Cole opinion).
- Normal flora of canine and feline skin and mouth.
- The most common agent of skin and soft tissue infections (SSTI),
- Produces urease and is associated with struvite urolithiasis.
- Methicillin-resistant variants are resistant to ALL veterinary beta lactam drugs.

2. Gram +: *Enterococcus spp.*

- Formerly Group D *Streptococcus*
- Cytologic appearance: Oblong often in pairs or short chains
- Common finding in subclinical bacteriuria and polymicrobial UTI.
- Intrinsically resistant to cephalosporins, macrolides, TMS, aminoglycosides (low dose) +/- fluoroquinolones

3. Gram +: *Streptococcus canis*

- Group G Streptococcus or "Beta Hemolytic *Streptococcus*"
- Cytologic appearance: Chains of cocci
- Common cause of joint, respiratory and SSTI (necrotizing fasciitis) in companion animals.
- Also completely NORMAL flora
- Penicillin/Amoxicillin continues to be drug of choice, Clindamycin another option, NEVER fluoroquinolones

4. Gram +: *Corynebacterium spp.*

- "Diphtheroids"
- *Corynebacterium auriscanis* is normal flora of the canine skin but may play a role in opportunistic infections (Tetracyclines, Chloramphenicol, Amikacin).
- *Corynebacterium ulcerans* is normal flora of a dogs mouth but certain strains produce a "diphtheria-like toxin" and may be an emerging pathogen in animals and people.

5. Gram +: *Mycobacterium spp.*

- Divided into rapid growing and slow growing mycobacteria
- Slow growing- *M. avium* group
 - Lymphadenopathy, splenomegaly, fever, lethargy
 - Diarrhea, gastrointestinal manifestations
 - Respiratory
- Rapid-growing mycobacteria (5-9 days) should be consider for every cat with non-healing wounds
- Can typically be cultured using extended holding of standard aerobic methods (talk to your lab!)
 - Susceptibility can be performed in some special cases
 - Pradofloxacin is current drug of choice

6. Gram -: *Escherichia coli*

- Unbelievably complex species of bacteria.
- Normal flora and many are beneficial (vitamin K!)
- Most famous for diarrheal illness caused by of pathotypes (EHEC, ETEC, STEC, Probably underdiagnosed in dogs in dogs)
- Characterized by the toxins and virulence factors they possess
- Extraintestinal pathogenic *E. coli*
 - UTI, Aspiration Pneumonia, Cholangiohepatitis, Bite Wound Infection, Anal Gland Abscess, Meningitis, Post-Surgical Infections...
 - Wide variety of virulence factors that define subclasses

7. Gram -: *Proteus mirabilis*

- UTI (struvite urolithiasis)
- Otitis
- Resistant to polymixin B
- Predictably sensitive to most antibiotics still (but getting worse!)

8. Gram -: *Klebsiella pneumoniae*

- Secondary pneumonias
- Can be very drug resistant
- Large capsule involved in resistance.

9. Gram -: *Enterobacter cloacae*

- Complex organism group
- Emerging pan-resistant strains

10. Gram -: *Pseudomonas aeruginosa*

- Gram negative rod
- Normal inhabitant of water/moist areas
- Causes a variety of opportunistic infections.
 - Respiratory
 - Surgical
 - Dermatologic
- Intrinsic resistance: Penicillin/Amoxicillin, Most Cephalosporins, Macrolides, Phenicol, Tetracyclines, TMS, RAPID resistance to FQ

11. Gram - : *Bordetella bronchiseptica*

- Infectious tracheobronchitis in dogs
- Otitis media in cats
- Only clinical breakpoints established in swine
- Reliably susceptible to tetracyclines and fluoroquinolones

12. Gram - : *Pasteurella multocida*

- Bite wound infections
- Major secondary respiratory pathogen
- Amoxicillin is drug of choice.
- Maintains predictable susceptibility pattern.
- Occasionally some beta lactamase activity.