Fecal Gram Stain - simple, useful in sickness but not always in health.

The fecal Gram stain and wet preparation on **fresh** feces are simple, inexpensive tools for routine disease investigation in psittacine medicine. Fecal wet preparation is a rapid screening test to identify worm eggs, coccidia and flagellates. If the feces are not fresh, this can decrease the visibility of motile bacteria or protozoa. A fecal Gram stain is useful to distinguish gram-positive from gram-negative bacteria and allows for easier and more accurate identification of budding *Candida spp* and *M. ornithogaster* than using a wet preparation alone. Unlike raptors, the normal gastrointestinal tract microflora of psittacine birds and passerine birds is composed predominately of gram-positive bacteria (excluding *Clostridium* aside from in raptors).

Commonly isolated gram-positive organisms from psittacine birds are *Bacillus*, *Corynebacterium*, *Staphylococcus*, *Streptococcus*, and *Lactobacillus species*; these bacteria are generally nonpathogenic.

Interestingly, some gram negative bacteria can be isolated from apparently healthy psittacine birds based on a small number of studies looking at Hispanolian amazon parrots, Cockatoos and other wild Brazilian parrots. In the study of 21 healthy Hispanolian amazon parrots, *E. coli* was cultured from 7 of the 21 birds. Yet *E.coli* can also be a pathogen in other situations. The importance is the big picture.

Due to advanced sequencing techniques we are also learning more and more about the diversity of human, mammalian and avian microbiome. The Gram stain would be considered a crude test when it comes to normal microbiome or flora assessment in a healthy individual.

Sample size and slide preparation will impact a Gram stain from a technical aspect. Changes in the proportions and densities of fecal microbiota may represent digestive tract colonization of a primary pathogen, such as pathogenic *Salmonella*, *Clostridium* or *Campylobacter species*; overgrowth of yeast, such as *Candida spp*. or *Macrorhabdus ornithogaster*; or reflect pathology in another organ system or undesirable management practices, including poor hygiene, food or water contamination and malnutrition.

Given that multiple factors may drive the presence of different species of bacteria in the gastrointestinal system, fecal Gram stain results should be evaluated in context with the patient's history, husbandry, physical examination findings, and other related complimentary diagnostic test results such as fecal culture, fecal cytology, and CBC/differential when possible.

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