Managing *Salmonella* in Equine Populations

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KEYWORDS

• Equine • *Salmonella* • Infection control

KEY POINTS

- Veterinary practitioners have an ethical obligation to appropriately manage risks related to *Salmonella* in animal populations and their environments.
- The goal of infection control is to eliminate sources of potentially pathogenic microorganisms and to disrupt infectious disease transmission.
- Congregating animals from multiple sources increases the risk for transmission of infectious agents such as *Salmonella*.
- Practitioners should be aware of the different *Salmonella* testing methods available because this can affect test results and interpretations relative to disease control efforts.
- Managing *Salmonella* in populations can be particularly challenging because of the diversity in clinical consequences of infection and intermittent shedding.

INTRODUCTION

Congregating animals from multiple sources, as occurs at veterinary hospitals, racetracks, equestrian events, and boarding and training facilities, increases the risk for transmission of infectious agents such as *Salmonella*.[1] This article provides equine practitioners with details relevant to effectively managing *Salmonella* in these populations. It begins by focusing on the agent, *Salmonella enterica*, to develop an appreciation of its key features, including the nuances of organism detection and test interpretation. It then considers the fundamentals of veterinary infection control with the intent of developing a foundation that can be applied to both hospital and field settings. In addition, the article discusses how infection control principles and understanding of the epidemiology of *S enterica* can facilitate managing transmission risks related to this organism in hospital populations and field settings. Detailed

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descriptions of bacteriology, pathophysiology, and treatment are beyond the scope of this article.

IMPORTANCE OF *SALMONELLA* IN EQUINE POPULATIONS

Salmonella is one of the most common causes of epidemic disease in veterinary hospitals[2] and an agent frequently associated with on-farm contamination.[3] Significant efforts are made to control its transmission among animals, especially within equine hospitals. However, these efforts are predominantly based on first principles because many prevention methods have not been critically evaluated in clinical studies. Regardless, outbreaks known to be attributable to *Salmonella* can come at a great cost, not only in terms of morbidity and case fatality to affected animals but also in terms of direct financial costs; they also present a clear risk to veterinary patients and personnel working with these animals.[4,5] Veterinary practitioners have an ethical obligation to appropriately manage risks related to *Salmonella* in animal populations and their environment. There is a recognizable standard of practice with respect to infection control and due effort must be given to control and prevention of infectious disease transmission within animal populations and facilities.[6]

When *Salmonella* spreads among patients, environmental contamination is predictably present, whether as cause or effect.[4,7–9] Although concerns about management are typically focused on clinically affected animals, subclinical infection and shedding in the absence of disease is more common than clinical infections, which can greatly exacerbate environmental contamination before the scope of the problem is recognized.[8,10] However, testing strategies for relevant veterinary samples (ie, fecal and environmental samples) for the presence of *Salmonella* is variable among laboratories and current testing methodology generally lacks in sensitivity, likely because of the intermittent nature and low level of organisms shed in animal feces. Therefore, testing strategies generally require testing of multiple samples and lengthy enrichment steps, and it can often take 3 to 5 days to obtain results. In that time, significant environmental contamination and disease transmission can occur. As a result, risk recognition and the ability to rapidly identify these patients are critical to the effective management of populations and their environments.

SALMONELLA: THE BASICS

S enterica, a member of the family Enterobacteriaceae, is a gram-negative facultative anaerobic bacterium found colonizing the small intestine, cecum, and colon of both cold-blooded and warm-blooded vertebrates. There are more than 2400 serotypes, which are distinguished by the presence of differing O-antigen (polysaccharide portion of lipopolysaccharide) and H-antigen (filamentous portion of flagella or flagellin) on the surface of the bacteria. *S enterica* subspecies *enterica*, the focus of this article, accounts for approximately 59% of all serotypes and is responsible for approximately 99% of clinical and subclinical *Salmonella* infections in warm-blooded animals.[11,12]

S enterica is considered an opportunistic pathogen that is more likely to cause clinical disease in situations of high exposure or patients that have an increased susceptibility, such as neonates and patients with severe systemic illness. Transmission occurs by the fecal-oral route and can result in enterocolitis (ie, diarrhea), bacteremia, or subclinical infection, with infection depending on the infective dose, host susceptibility, and the infecting serotype. As such, identifying subclinical fecal shedding, managing contacts among patients, and practicing effective personal and environmental hygiene are critical for protecting animals and people.