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Editorial: Symposium on Bovine Respiratory Disease Complex (BRDC) in this issue

Despite extensive research for over 50 years, BRDC remains the economically most important disease of beef cattle. The substantial losses that occur are attributed primarily to treatment and prevention costs and mortality. This issue features a Symposium on Bovine Respiratory Disease Complex (Shipping Fever). The symposium was suggested by the Editorial Board and was intended to bring together in a single issue reviews on various aspects of this interesting and important disease complex by the leading researchers in this field. This is a journal symposium, independent of any meeting. It is intended to provide a forum through which students, teachers and researchers can find in one issue of *Animal Health Research Reviews* a collection of outstanding reviews on a fascinating and complex series of interactions among several infectious agents, the environment and the animal host.

I am grateful to the authors who embraced the notion of this symposium and devoted the time and thought needed to make this venture a success. I also appreciate the efforts of the many reviewers of the manuscripts who provided valuable comments and insights that guided revisions.

BRDC is indeed complex. Several bacterial and viral agents take advantage of their complementary features and an environment created by a particular system of management of beef cattle. Our reviews sought to focus on the major bacteria and viruses that are implicated in the disease and did not attempt to discuss all the agents that are associated with the disease complex. Thus, parainfluenza type 3 virus, bovine viral diarrhea virus, bovine respiratory coronaviruses (RBCV) and *Arcanobacterium pyogenes* were not included. The involvement of RBCV appears to be a relatively recent development, indicating the evolving nature of this disease (Storz *et al.*, 1996, 2000a, b) and/or our understanding of it.

Shipping fever in cattle seems to have been recognized as early as the late 19th century or the early 20th century (Yates, 1982), yet there is still a great deal of vagueness about the term 'shipping fever'. Yates (1982) considered that shipping fever was 'an entity within the bovine respiratory disease complex' and that it was a pneumonic disease of multifactorial but undetermined origin, usually associated with *Mannheimia* (*Paseturella*) *haemolytica*, or less frequently, with *Pasteurella multocida*. Although much remains to be understood about BRDC, we have come a long way since Adams and co-workers (1959) defined shipping fever as an acute infection of cattle that was characterized by dyspnea, fever and fibrinous pneumonia and was of unknown cause. The major agent of the disease appears to be *Mannheimia haemolytica*, but BRDC is not a single agent disease. The involvement of several infectious agents that may be found in healthy animals and the substantial impact of stresses on susceptibility to disease make it impossible to fulfill Koch's postulates. Nonetheless, intensive studies on the natural and experimental disease have advanced our knowledge considerably and some of the critical events in the disease process are now being understood at the molecular level.

Important themes in pathogenesis are evident in the series of reviews in this issue of *Animal Health Research Reviews*. Several of the major types of virulence factors of Gram-negative bacterial pathogens are at work in BRDC. The less subtle ones are the powerful leukotoxin of *M. haemolytica*; the polysaccharide capsules of *M. haemolytica* and *Pasteurella multocida*; the cell wall lipopolysaccharide of *M. haemolytica*, *P. multocida* and *Histophilus somni*; and the iron acquisition mechanisms of all three bacteria. Less is known about the mechanisms by which *Mycoplasma bovis* causes lung damage, possibly because this organism is not as readily isolated from animals and manipulated in the laboratory as the other bacteria. However, surface proteins appear to play critical roles in adherence to and colonization of the mucosal surface.

The importance of bacterial–viral synergism in BRDC has been recognized for a long time. It seems clear that viral-induced immune suppression is a significant factor that permits both viruses and bacteria to establish in the lungs, and there is increasing understanding of the details of the underlying mechanisms that are involved. The host's immune system is important in both protection against disease and causing disease. This has significant implications for vaccines, which could alleviate or exacerbate disease. Experts in the field explore all these themes in this symposium.

Carlton Gyles

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