Research

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EDITORIAL

Eradicating bovine viral diarrhoea virus

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BOVINE viral diarrhoea virus (BVDV) causes widespread infection of cattle populations worldwide and, even though the majority of infections go unnoticed, is an important disease (Brownlie and others 2000). BVDV infection impacts on animal welfare and causes significant economic losses (Ridpath 2010). Approximately 1 per cent of cattle are persistently infected with BVDV and are the major source of infection within a herd. Persistently infected cattle can be clinically normal yet shed high titres of infectious virus (Nettleton 2013). BVDV naive animals may succumb to acute infection, usually due to contact with a persistently infected animal. By contrast, the spread of the virus by animals with acute infection may be quite inefficient (Niskanen and others 2000). After acute infection, the virus is detected in blood and secretions for one to two weeks, and infection has been shown to induce suppression of specific immune responses for approximately two weeks (Charleston and others 2001). After resolution of acute infection, animals are usually immune for a number of years. It is the timing of these acute infections that is responsible for the wide range of possible associated diseases.

Broadly, there are three important consequences of BVDV infection. First, the period of immunosuppression is likely to cause increased susceptibility to other infections. Clinical studies have identified BVDV as an important component of the bovine respiratory disease complex (Stott and others 1980). Furthermore, experimental investigations have shown increased susceptibility of calves to respiratory disease, for example, bovine herpesvirus type 1 (Risalde and others 2013). Also, enteric infections, such as bovine rotavirus, are enhanced by BVDV infection (Kelling and others 2002). There are numerous other examples in the peer-reviewed literature. Second, a spectrum of effects on reproductive performance, including infertility and abortion, have been described and extensively reviewed (Grooms 2004). Third, new persistently infected animals are generated by being infected as a fetus during the first third of pregnancy. This is crucial for the maintenance of the virus in a population.

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Research in Veterinary Record

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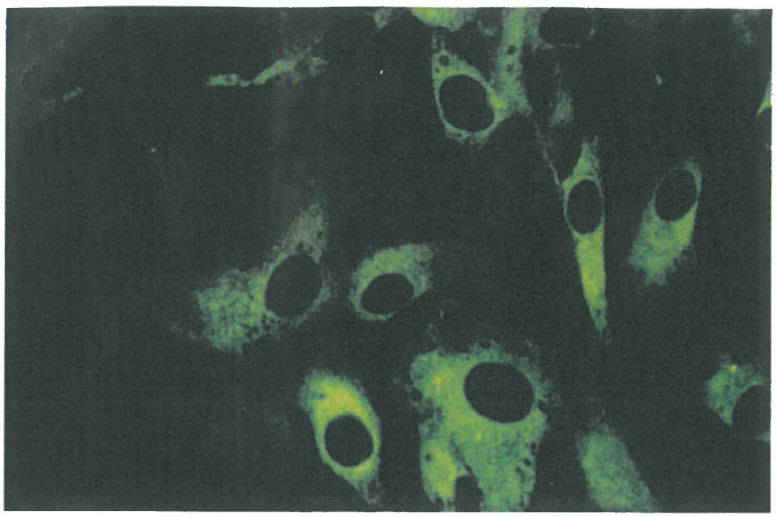
Describing and reproducing the effects of BVDV on susceptible animals is one thing, but does BVDV infection result in significant clinical and economic losses in farmed livestock? Various studies have estimated the economic impact of BVDV infections (Gunn and others 2005, Stott and others 2012), but the most compelling evidence comes from analysing the benefits of successful national control campaigns. The latest report describing the eradication of BVDV from Norway, summarised on p 661 of this week's *Veterinary Record* (Loken and Nyberg 2013), clearly shows the cost-benefit of a national campaign. This report also confirms that the major aim of an eradication campaign is to identify and remove persistently infected animals; this policy can be straightforward at a herd level but careful thought needs to be given to deliver a national campaign. In countries such as England and Wales, where BVDV prevalence is high, farmers need to be cautious about BVDV eradication on their farms because of the need for excellent biosecurity and the cost of maintaining freedom from the disease (Gunn and others 2005). Farmers who have undertaken BVDV control rarely regret their decision. However, the introduction of BVDV into a naive herd can have immediate and expensive consequences and preventive measures can result in ongoing costs. Such costs are unnecessary when whole regions are declared free from infection.

The lesson from countries such as Norway is that eradication can be achieved and that there are significant benefits associated with removing a virus that causes widespread immunosuppression. Furthermore, due to this immunosuppresion, the specific immune response to attenuated *Mycobacterium bovis* (Bacillus Calmette–Guérin) is suppressed during acute BVDV infection of calves (Charleston and others 2001), BVDV may exacerbate *M bovis* infection (Kao and others 2007). It is widely accepted that bovine TB is a complex problem, but successful control may, to borrow a phrase from Sir Dave Brailsford, be 'an accumulation of marginal gains'. The national eradication of BVDV may be one component of the solution.

There are very complex logistical issues that must be resolved in order to mount a successful national eradication campaign, and coordination of resources is a major challenge, but, as other countries have shown, we have sufficient knowledge of this virus to eliminate the sources of infection.



Bovine viral diarrhoea virus infection of cells detected by indirect immunofluorescence

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Research recently published online

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Investigation into the susceptibility of cattle to the oral exposure to scrapie-affected sheep tissue

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