



Original Article

A cost-benefit analysis and the potential trade effects of the bovine viral diarrhoea eradication programme in Styria, Austria

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ABSTRACT

This study evaluated the voluntary and compulsory implementation of a bovine viral diarrhoea virus (BVDV) eradication programme in the Austrian Federal State of Styria, Austria, from an economic point of view using ex-post assessment of costs and benefits (disease losses avoided). An economic net benefit (benefit:cost ratio, BCR = 1.18) of the programme was demonstrated during the voluntary programme phase (January 1998–July 2004). The break-even point was reached in 2003. If investments in the compulsory programme (August 2004–December 2016) were taken into account, a net economic loss (BCR = 0.16) was demonstrated. In contrast to on-going annual testing of all cattle herds, annual testing in accordance with a revised sampling scheme could reduce total surveillance costs by more than 77%. A Bayesian structural time series model was applied to analyse a hypothesised positive impact of the compulsory BVDV programme on the Styrian cattle export market. The average number of exported cows and bulls increased significantly by 42% ($P = 0.03$) and 47% ($P = 0.01$), respectively, and the producer price increased by 14% ($P = 0.00$) and 5% ($P = 0.16$), respectively, during the compulsory programme period compared with the period prior to intervention. This equates to an average revenue increase of €29,754 for cows and €137,563 for bulls per month. These results justify the implementation of eradication programmes, which initially may not appear to be economically viable, particularly if trade effects are not included in the calculations.

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Introduction

Bovine viral diarrhoea virus (BVDV) is an important pathogen in most cattle-producing countries worldwide (Greiser-Wilke et al., 2003; Moennig et al., 2005; Truysers et al., 2010). Infection with BVDV can result in major economic losses, either directly through decreased productive performance in cattle herds, or indirectly through expenses for control and/or eradication programmes (Pinior et al., 2017). Worldwide reviews of the economically assessed production losses and intervention activities incurred by BVDV infection have been published by Richter et al. (2017) and Pinior et al. (2017), respectively.

Although BVDV infections are often transient (Baker, 1995), infection during gestation may lead to the birth of persistently infected (PI) calves (Lindberg et al., 2006), which are

immunotolerant to BVDV antigen (Brownlie et al., 1987). PI animals play a key role in the transmission of BVDV, since they shed large amounts of the virus throughout their lives and are the primary source of production losses (Houe, 1999, 2003; Häslér et al., 2012). Thus, prevention and/or eradication of PI animals are the main aims of BVDV control and eradication programmes (Houe, 2003).

In order to minimise the risk of virus introduction to national cattle herds from abroad, countries within the European Union (EU) are permitted to implement import restrictions. Thus, the driving forces behind many disease eradication efforts is a continued access to livestock export markets (Otte et al., 2004). Economists are particularly interested in analysing the impact of intervention measures on trade revenues (Ramsay et al., 1999), but such investigations are limited by data access and the complex interactive dynamics of multiple market impact factors (Leslie and Upton, 1999).

The aims of this study were: (1) to perform an ex-post cost-benefit analysis of the voluntary and compulsory BVDV eradication

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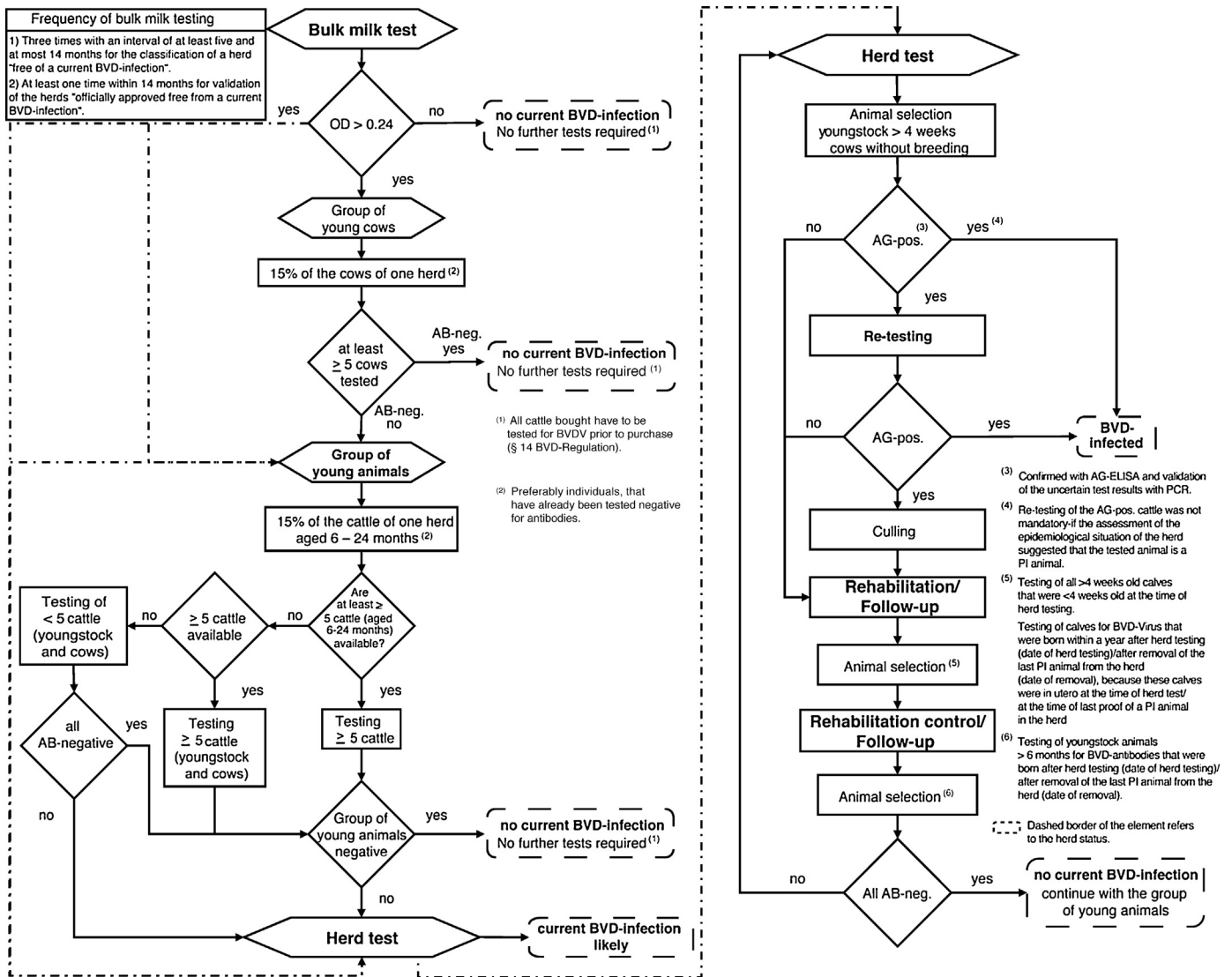


Fig. 1. Bovine viral diarrhoea virus (BVDV) eradication scheme in Styria, Austria.

programme operated in Styria, Austria, from 1998 to 2016, in order to investigate whether the implemented intervention programme was economically beneficial; (2) to analyse alternative testing strategies in order to determine the least-cost BVDV surveillance option; and (3) to analyse a hypothesised positive economic association of the compulsory BVDV programme on the Styrian cattle export market.

Materials and methods

Description of the BVDV eradication programme in Styria, Austria

A small-scale voluntary eradication project at farm level with 138 participating herds was initiated by the Styrian cattle health service in 1998 (1999: 603 participating herds; 2000: 1225 participating herds; total from 1998 to 2000: 1599 different participating herds).¹ Subsequently, a voluntary eradication programme without vaccination was introduced in Styria in 2001, which was made

compulsory at national level in Austria in August 2004.² At the beginning of the compulsory BVDV eradication programme, the Austrian cattle sector consisted of approximately 2.01 million cattle, out of which 16% ($n = 330,156$ cattle in 16,269 cattle herds; dairy herds: $n = 14,687$; beef herds: $n = 1582$ with 460 beef finisher herds) were located in Styria.³ Approximately 25% ($n = 4412$) of all Styrian cattle herds participating in the voluntary programme from January 2001 to August 2004. The cattle population was classified according to the Scandinavian model as 'currently BVD-infected' or 'currently not BVD-infected' herds using different serological diagnostic methods for antibody or antigen detection. After classification of the cattle population, infected herds were cleared through removal of PI animals and non-infected herds were monitored through repeated annual sampling (control testing). An overview of the eradication scheme in Styria is shown in Fig. 1. A

¹ See: http://www.verwaltung.steiermark.at/cms/dokumente/11731873_79958253/34dae90d/veterinaerbericht_gesamt.pdf (accessed 27 September 2017).

² The eradication programme was made compulsory for all cattle holdings except for specialised fattening farms such as beef finishing herds (without breeding) see: <https://www.ris.bka.gv.at> (accessed 27 September 2017).

³ The cattle population decreased to approximately 1.95 million head of cattle in 2016. See: http://www.statistik.at/web_de/statistiken/wirtschaft/land_und_forstwirtschaft/viehbestand_tierische_erzeugung/viehbestand/034246.html (accessed 27 September 2017).

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