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Prevalence of bovine viral diarrhoea virus antibodies in bulk tank milk of industrial dairy cattle herds in suburb of Mashhad-Iran

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Abstract

Bulk milk for the presence of antibodies against bovine viral diarrhea virus (BVDV) from 38 industrial dairy cattle herds complexes with 250–3000 Holstein dairy cows in suburb of Mashhad-Iran was tested. None of the herds were vaccinated against BVDV. Commercial indirect ELISA-kit for the detection of specific antibodies was used. The result could be read visually where the optical density (OD) was measured at 450 nm. The percent positivity (PP) values ≥ 7 and <7 interpreted positive and negative, respectively. According to this study the apparent and the true prevalence of BVDV antibody-positive herds was 89.47 and 93.98%, respectively. The range of PP was 1.59–107.66 among the herds. The OD in 52.63% bulk milk of the herds was very high. It is concluded that exposure to BVD virus was widely distributed in the dairy cattle herds in suburb of Mashhad-Iran.

Keywords: BVDV; Bulk-tank milk; Prevalence; Dairy cattle herds; ELISA; Iran

1. Introduction

Bovine viral diarrhoea virus (BVDV), a member of Pestivirus genus, is an important pathogen of dairy cattle. It causes multiple clinical syndromes including bovine viral diarrhoea, mucosal disease and fetal infection.

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The implementation of a programme to control the infection must be based on, first, the identification of animals and herds either free of infection or presence of active infection, secondly, the clearance of virus shedder(s) from the infected herds and thirdly, control measures to prevent the transmission of the virus within and between herds (Bitsch and Ronsholt, 1995). For prevalence studies at the animal level ELISAs applied to samples of serum or milk (Westerbrink et al., 1986; Niskanen et al., 1989; Mars and Van Maanen, 2005) are widely used, because they are easy to apply to large numbers. Bulk milk testing for detection of antibodies is a cost-effective and non-invasive method that is easy to apply and valuable in the control programmes for BVDV in dairy cattle herds (Lindberg and Alenius, 1999). It can be used as the first step in a control strategy to evaluate the possibly infected and non-infected dairy herds. The presence of only one or a few lactating individual milking cows with high antibody titers to BVDV within a herd of otherwise seronegative cows will give rise to positive bulk milk test (Niskanen, 1993). The level of antibodies to BVDV in bulk tank milk is recognized as a valuable tool for estimating the prevalence of positive animals in a herd (Niskanen, 1993).

The aims of the present study were to determine: (1) the investigation status of bulk milk BVDV prevalence in industrial dairy cattle herds in suburb of Mashhad-Iran. (2) to evaluate the level of bulk milk samples antibodies of the dairy cattle herds.

2. Materials and methods

2.1. Geographical region, study population and management of the herds

Mashhad Suburb in Khorassan Razavi province is a major producer of livestock in North-East of Iran and the second centre of dairy production in Iran. Samples were taken true randomly using a lottery mechanism in the dairy cattle herds. It was demonstrated that the prevalence of BVD/MD in dairy cattle herds of Tehran (the capital) was 100% using a serum neutralization (SN) test (Kargar et al., 1995). The sample size required estimating the prevalence of bulk milk tank BVDV in the population of herds, with level of confidence of 95%, desired absolute precision 10% and an expected prevalence of 90%, the minimum required sample size was 35 dairy herds using the following formula (Thrusfield, 2005).

$$\text{Required sample size } (n) = \frac{1.96^2 P_{\text{exp}}(1 - P_{\text{exp}})}{d^2}$$

Where P_{exp} = expected prevalence; d = desired absolute precision; 1.96^2 = multiplier for level of confidence 95%. Therefore, substituting these values in the above formula:

$$n = \frac{1.96^2\, 0.90(1 - 0.90)}{0.01} = 35$$

Two production (strata) are described for dairy cattle in suburb of Mashhad-Iran. One of them is small farmers owning about 35% of the cattle. Herd size is about 2–10 animals per farms with a low technology level and milk production (mean = 10 Kg/day/cow). The second group is the commercial stratum with an average herd size of 110 cows. The commercial industrial herds use more advanced technology with average milk production about 6800 Kg/cow/year. For this study, we included only farm of the commercial industrial stratum which processed a bulk milk tank. The industrial dairy cattle herds are the major producer of milk in this area and farmers export milk to somewhere else in Iran. Samples of bulk milk tank were obtained