Bovine Corona Virus and Bovine Respiratory Syncytial Virus Infections in Dairy Herds in the North-eastern Thailand during Year 2000–2004

การติดเชื้อ ไวรัสโคโรนาและไวรัสรHOUSEPLACEHOUSEレーซิสโหนกเอียในโค บุฟฟองstraint in the North-eastern Thailand during Year 2000–2004

Abstract

The important causative agents of bovine respiratory disease, Bovine Corona Virus (BCV) and Bovine Respiratory Syncytial Virus (BRSV) cause economical losses in cattle industry worldwide. Studies of the infections among dairy cattle in the North-eastern Thailand were carried in three consecutive 46 bulk tank milk samples; collected in year 2000, 2003 and 2004. Evidence of infection at individual level was done in 319 sera from 10 dairy herds which were visited in 2004. A commercial indirect ELISA was used to capture specific antibodies to each virus in milk and sera. Prevalence of BCV and BRSV in year 2000 decreased from 97.8% to 87.0% (p<0.05) and 84.8% to 52.2% (p>0.05), respectively, in year 2004. Approximately 92.1% of cattle older than 2 years had antibodies against BCV, while 38.1% of young stocks had the antibodies ($\chi^2=103.3$, p=0.000). Similar to BRSV infection, only 8.1% of cattle younger than 4 years had antibodies to BRSV while the prevalence greater than 21.8% in the older groups ($\chi^2=11.9$, p=0.001). The results implied the low active infections of the viruses among the studied population. However, this study was carried out in banked samples; up-to-date investigation should be done to gain the present impact of the infections in Thai dairy cattle.

Keywords: Bovine Corona Virus, Bovine Respiratory Virus, Dairy Cattle, Thailand

1 Faculty of Veterinary Medicine, Khon Kaen University, Thailand
2 The National Veterinary Institute, Uppsala, Sweden
3 Department of Clinical Sciences, Swedish University of Agricultural Science, Uppsala, Sweden
Introduction

Infections with Bovine corona Virus (BCV) and Bovine Respiratory Syncytial Virus (BRSV) are often subclinical, but may also cause varying degrees of respiratory clinical signs (Stair et al., 1972). BCV has been associated with calf diarrhea and is a major causative agent of winter dysentery in adult cows (Travén, et al., 2001). Moreover, BCV is also involved in shipping fever and has been significantly associated with Bovine Respiratory Disease (Storz, et al. 2000, Kapil and Basaraba, 1997). Both viruses appear to be spread throughout the world (Hasoksuz et al., 2005; Travén et al., 1999; Baker et al., 1986; Inaba et al., 1972). Studies of the infections among dairy cattle in Thailand are limited. Prevalence of BRSV in bulk milk samples was 63% in Muaklek (Aiumlamai et al., 1992); but was 84.7% in the North–eastern dairy herds (Virakul et al., 1997). Aiumlamai et al. (1992) also reported prevalence of BCV at 93% in Muaklek area.

Purpose of the present study was gaining the more epidemiological information of BCV and BRSV infections among dairy cattle in the North–eastern Thailand by using a well–kept sample bank.
Materials and Methods

Sample collection & storage

The study was carried out in a -20°C stock samples which were long-term investigated the epidemiology of Bovine Viral Diarrhoea Virus (BVDV) and Bovine Herpesvirus type 1 (BHV-1) in dairy cattle of three provinces in North-eastern Thailand (Kampa et al., 2008) Vaccination against BCV or BRSV had not been practised in the region. Frozen bulk tank milk (BTM) samples from 46 herds which repeat collected in 2000, 2003 and 2004 from 6 milk collection centres, were randomly selected. Frozen 319 serum samples of all cattle which older than 6 months in 10 herds in Khon Kaen province, collected in 2004, were selected. All milk and blood samples had been kept at -20 °C at the National Veterinary Institute (SVA), Uppsala, Sweden until re-analysed.

Indirect ELISAs for detection of antibodies to BCV and BRSV

All samples were analysed for specific antibodies to BCV and BRSV by indirect ELISA (SVANOVA biotech AB, Uppsala, Sweden). Methodology and interpretation of results were followed recommendations of the manufacturer. ELISA tests were done at the National Veterinary Institute, Uppsala, Sweden in May 2008.

Data analysis

Fisher’s exact and Pearson’s Chi-square test was used to analyze the difference in prevalence of BCV and BRSV antibody positive herds, respectively, between repeated BTM samples. On the individual level, the data was stratified into five categories based on age, and individual BCV and BRSV seroprevalence within each age category were calculated. The Pearson’s Chi-square test was used for the analysis. P-values 0.05 were considered statistically significant.

Results and Discussion

Results from BCV and BRSV analyses of the BTM and serum samples are given in Table 1 and Table 2, respectively.
Table 1 Prevalence of Bovine Corona Virus (BCV) and Bovine Respiratory Syncytial Virus (BRSV) antibody in bulk tank milk samples from 46 herds, collected from 6 milk collection centres in Prevalence of antibodies to the BCV in BTM decreased significantly from year 2000 to 2004.

<table>
<thead>
<tr>
<th>Sample collection</th>
<th>BCV</th>
<th>BRSV</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N° of positive</td>
<td>Prevalence (%)</td>
</tr>
<tr>
<td>2000</td>
<td>45</td>
<td>97.8</td>
</tr>
<tr>
<td>2003</td>
<td>43</td>
<td>93.5</td>
</tr>
<tr>
<td>2004</td>
<td>40</td>
<td>87.0</td>
</tr>
</tbody>
</table>

Values within the same columns without common superscripts differ significantly (p < 0.05)

Table 2 Distribution by age of BCV and BRSV seropositive individuals among animals older than six months, in 10 dairy herds in the Khon Kaen province, Thailand, 2004

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>N° of animals (N° of positive)</th>
<th>BCV</th>
<th>Prevalence (%)</th>
<th>BRSV</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 8</td>
<td>22 (21)</td>
<td>95.5</td>
<td>7</td>
<td>31.8</td>
<td></td>
</tr>
<tr>
<td>6-8</td>
<td>29 (27)</td>
<td>93.1</td>
<td>6</td>
<td>26.7</td>
<td></td>
</tr>
<tr>
<td>4-6</td>
<td>45 (42)</td>
<td>93.3</td>
<td>8</td>
<td>17.8</td>
<td></td>
</tr>
<tr>
<td>2-4</td>
<td>68 (61)</td>
<td>89.7</td>
<td>5</td>
<td>7.4</td>
<td></td>
</tr>
<tr>
<td>0.5-2</td>
<td>155 (69)</td>
<td>44.5</td>
<td>13</td>
<td>8.4</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>319</td>
<td>220</td>
<td>69</td>
<td>39</td>
<td>12.2</td>
</tr>
</tbody>
</table>
Prevalence of BRSV in year 2004 was lesser than the report of Virakul et al. (1997). At individual levels, most of young stocks were seronegativity to the viruses. Approximately 90% of cattle older than 2 years had antibodies against BCV, while 44.5% of young stocks had the antibodies ($\chi^2=103.3$, $p=0.000$). Similar to BRSV infection, only 8.1% of cattle younger than 4 years had antibodies to BRSV while the prevalence greater than 21.8% in the older groups ($\chi^2=11.9$, $p=0.001$). The distribution of seropositivity of BCV and/or BRSV in individual of the 10 herds was similar to BVDV and BHV−1 infections (Kampa, et al. 2008). The evidence, both at herd- and individual−level, revealed the non−active infections of BCV and BRSV among cattle in the North−eastern. Even the prevalence of BCV was high but Cho et al. (2001) suggested the infection is self limiting.

Although BCV/BRSV vaccination is widely practice in many countries, but before initial−izing costly vaccination program against bovine respiratory virus infections, it is important to gain all impact of infections; prevalence, incidence rates, economic impact and animal welfare and compare costs vs. benefits of vaccination. However, this study was a historic data; an up−to−date investigation should be done to gain all the impacts of BCV and BRSV infections among Thai dairy cattle as basic information for preventive program in the future.

Acknowledgement

We thank Dr. Aran Chanlun for his skillful sample collection.
References


