

Epidemiological aspects of concomitant BHV-1 and BVD-MD virus infections in dairy cattle herds in Poland

KRZYSZTOF RYPUŁA¹, JAROSŁAW KABA², KATARZYNA PŁONECZKA-JANECZKO¹,
MICHAŁ CZOPOWICZ², ALEKSANDRA KUMALA¹

¹Division of Infectious Diseases and Veterinary Administration, Department of Epizootiology with the Clinic for Birds and Exotic Animals, Faculty of Veterinary Medicine, Wrocław University of Environmental and Life Sciences, Wrocław

²Division of Infectious Diseases and Epidemiology, Department of Large Animal Diseases with the Clinic, Faculty of Veterinary Medicine, Warsaw University of Life Sciences – SGGW, Warsaw

Abstract

Case-control studies were carried out in 19 dairy cattle herds where infectious bovine rhinotracheitis and bovine viral diarrhoea-mucosal disease were present and 9 herds free from both diseases. To confirm the disease appropriate number of cows (by expected prevalence 30%, level of confidence 95%) older than 24 months were bled in each herd and serologically tested to BHV-1 and BVDV infections using ELISA tests. Questionnaires on the occurrence of main clinical signs of BHV-1 and BVDV infections in cattle were also conducted. Analysis of clinical presentations reported by the farmers revealed that abortions and fetopathies as well as emaciation both in calves and in adult cattle were significantly ($p < 0.05$) more often observed in seropositive than in seronegative herds.

Key words: BVDV, BHV-1.

(Centr Eur J Immunol 2011; 36 (1): 15-17)

Introduction

Infections with bovine herpesvirus type 1 (BHV-1), causing infectious bovine rhinotracheitis (IBR), and bovine viral diarrhoea virus (BVDV), causing bovine viral diarrhoea-mucosal disease (BVD-MD) are widespread in cattle population all over the world. Both diseases are responsible for substantial production and breeding losses in dairy cattle herds. This situation results from both unlimited transmission among animals and maintenance of these infections in cattle population by latently infected animals in the case of BHV-1 and persistently infected animals in BVD-MD [1-4].

Broad distribution of both infections in Europe as well as diversity of clinical presentations and lack of data on epidemiological situation in Poland were motives for performing epidemiological study evaluating relationship between infection of dairy cattle herds with BHV-1 and BVDV and the type and intensity of clinical presentation.

Material and methods

Serological tests to BHV-1 and BVDV were carried out for routine diagnostic purposes in dairy cattle herds counting more than 1000 cows of Holstein-Friesian breed. No specific immunoprophylaxis against BHV-1 and BVDV was conducted in these herds. Only cattle older than 24 months of age were serologically examined. Blood was collected to dry tubes and sent to the diagnostic laboratory „Epi-Vet” at the Department of Epizootiology with the Clinic for Birds and Exotic Animals, Wrocław Faculty of Veterinary Medicine, where following serological tests were performed: HerdChek BVDV Ab (IDEXX Scandinavia AB, Sweden) and HerdChek BHV-1 gB (IDEXX Scandinavia AB, Sweden). Number of blood samples essential to confirm the disease in each herd was counted using Win Episcope 2.0 software assuming expected prevalence 30% and level of confidence 95%. In this manner 19 herds seropositive to

Correspondence: Krzysztof Rypuła, Division of Infectious Diseases and Veterinary Administration, Department of Epizootiology with the Clinic for Birds and Exotic Animals, Faculty of Veterinary Medicine, Wrocław University of Environmental and Life Sciences, Grunwaldzki 45, 50-366 Poland, e-mail: krzysztof.rypula@up.wroc.pl

Table 1. Occurrence of clinical signs reported by farmers in herds seropositive and seronegative to BHV-1 and BVDV

| Clinical sign | Seropositive herds | | Seronegative herds | | p |
|-----------------------------|--------------------|-------------------------|--------------------|-------------------------|-------|
| | number of herds | percentage of herds [%] | number of herds | percentage of herds [%] | |
| Repeating estrus | 11 | 57.89 | 5 | 55.55 | 0.907 |
| Abortions, fetopathies* | 10 | 52.63 | 0 | 0.00 | 0.007 |
| Mucosal erosions | 11 | 57.89 | 5 | 55.55 | 0.907 |
| Sudden milk yield drop | 11 | 57.89 | 5 | 55.55 | 0.907 |
| Diarrheas in calves | 11 | 57.89 | 5 | 55.55 | 0.907 |
| Diarrheas in adult cattle | 11 | 57.89 | 5 | 55.55 | 0.907 |
| Emaciation in calves* | 10 | 52.63 | 0 | 0.00 | 0.007 |
| Emaciation in adult cattle* | 10 | 52.63 | 0 | 0.00 | 0.007 |
| Respiratory disorders | 11 | 57.89 | 5 | 55.55 | 0.907 |

*statistically significant at the level of significance $\alpha \leq 0.05$

both BHV-1 and BVDV at the same time as well as 9 herds free from both infections were chosen.

Owners of the tested herds were asked to fill in the questionnaire on the occurrence of main clinical signs of BHV-1 and BVDV infections in cattle. Data concerning repeating estrus, abortions, fetopathies, mucosal erosions, sudden milk yield drops, diarrheas and emaciation in calves and adults as well as respiratory disorders were collected. Relationship between the occurrence of clinical signs and serological status of herds with respect to BHV-1 and BVDV was evaluated using chi-square test at the level of significance $\alpha = 0.05$.

The statistical calculations were performed using SPSS 17.0 software.

Results

Analysis of clinical presentations reported by the farmers revealed that abortions and fetopathies ($p = 0.007$) as well as emaciation both in calves ($p = 0.007$) and in adult cattle ($p = 0.007$) were significantly more often observed in seropositive than in seronegative herds (Table 1).

No statistical relationship could be found between the serological status of a herd and other clinical presentation usually recognized as typical for both infections such as diarrheas in calves and adult cattle and respiratory disorders (Table 1).

Discussion

Both IBR and BVD-MD are associated with alimentary, respiratory and reproduction disorders. On the other hand it is not uncommon for both diseases to have very mild or even subclinical course. In the study performed in a large dairy herd with high-quality health status no clinical signs of BHV-1 infection have been

observed apart from a slight bilateral serous ocular discharge in a few cows [5]. In the another study no association between infection with BHV-1 and increased risk of abortion has been demonstrated [6]. It is known that the increase in herd size tends to result in higher risk of the emergence of clinical signs caused by various infectious and non-infectious agents. As herds included in our study differed in terms of production management, hygienic conditions and general health status, it was very problematic to reveal any statistically significant impact of both infections on health status of cows. Nevertheless our study confirmed that concomitant infection with both viruses leads to reproduct disorders. The link between reproductive disorders and simultaneous infections with IBR and BVD viruses has been confirmed previously in dairy cows [7]. Moreover the another study showed that animals seropositive to BVDV-2 at pregnancy testing were at higher risk of abortion in the ongoing gestation. What is more important there was no such association for BVDV-1 and BHV-1 infections [6].

Our study revealed the relationship between concomitant infection with BHV-1 and BVDV and the poor body condition of both calves and adult cows. It is consistent with the study, which demonstrated that calves exposed to BVDV weighed less than calves that had no evidence of exposure [8].

It can be concluded that in large dairy cattle herds economic losses associated with concomitant infection with BHV-1 and BVDV seem to result mainly from reproductive disorders and poor body condition of calves and adult cows.

References

1. Moennig V, Houe H, Lindberg A (2005): BVD control in Europe: current status and perspectives. *Anim Health Res Rev* 6: 63-74.

2. Pasma EJ, Dijkhuizen AA, Wentik GH (1994): A state-transition model to simulate the economics of BVD control. *Prev Vet Med* 20: 269-277.
3. Andrews AH (2004): Calf Respiratory Diseases. In: *Bovine Medicine. Diseases and Husbandry of Cattle*. Blackwell Publishing; 645-651.
4. Cavriani S (2006): Epidemiological data on IBR in Italy and experiences of control in the field. *Procc BoHV-1 Eradication. One step closer*. Berlin 29-30th May 2006, 18.
5. Pritchard GC, Banks M, Vernon RE (2003): Subclinical breakdown with infectious bovine rhinotracheitis virus infection in dairy herd of high health status. *Vet Rec* 153: 113-117.
6. Waldner CL (2005): Serological status for *N. caninum*, bovine viral diarrhoea virus, and infectious bovine rhinotracheitis virus at pregnancy testing and reproductive performance in beef herds. *Anim Reprod Sci* 90: 219-242.
7. Biuk-Rudan N, Cvetnić S, Madić J, Rudan D (1999): Prevalence of antibodies to IBR and BVD viruses in dairy cows with reproductive disorders. *Theriogenology* 51: 875-881.
8. Waldner CL, Kennedy RI (2008): Associations between health and productivity in cow-calf beef herds and persistent infection with bovine viral diarrhoea virus, antibodies against bovine viral diarrhoea virus, or antibodies against infectious bovine rhinotracheitis virus in calves. *Am J Vet Res* 69: 916-927.