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Short Communication

Determining the Extent of IBR, BVD and Bovine Brucellosis Based on Abortion History of Dairy Cattle's Reared at College of Wondo Genet Forestry and Natural Resources, Sidama, Ethiopia

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Abstract

The study was conducted in the Wondo Genet district of the Sidama region of Ethiopia to identify the cause of sporadic abortion occurrence in dairy cattle kept in the college. Serum samples were collected for the test from a total of 101 cattle with essential epidemiological data. Disease investigations were carried out on IBR gB ELISA for BoHV-1 antibody detection, BVD for antibody and antigen detection ELISA, and Rose Bengal plate test for Bovine brucellosis antibody detection. Of 101 serum samples examined for these diseases; IBR was found 28.7% (29/101) seropositive for bovine herpesvirus-1 antibody detection and the other two diseases (i.e. bovine brucellosis and BVD) showed negative (0%). Out of, 16 cows with a history of abortion, 10 (62.5%) were positive for the antibody detection of BoHV-1 which was statistically significant when compared to non-aborted groups (p=0.003). The farm had used bulls for breeding purposes and was positive upon examination for IBR. So that the seropositivity of this bull had a direct causal effect on the breeding cows on the farm as the disease was majorly transmitted through the reproductive tract. The result of the present study revealed that IBR is the most important disease in the area which is causing a significant economic loss on the dairy farm. Therefore, it requires further detailed studies on the level of antigen detection using some sophisticated test methods like real-time PCR.

Keywords: IBR; BVD; Bovine brucellosis; ELISA; Rose Bengal plate test

Introduction

Reproductive disorders have been found to be a major reason for decreased reproductive efficiency in cattle; and consequently reproductive efficiency is the major determinant of lifetime productivity of cows [1]. Emphasis has increasingly shifted to economically important diseases to the dairy producers and animal health problem stands out as the most prominent [2]. When the function of the reproductive system is impaired, cows fail to produce calves regularly [3]. Among the major reproductive problems that have direct impact on reproductive performance of dairy cows, abortion covers a significant economic implication which has infectious and non-infectious causes [4]. The exact proportion of cases due to infectious agents is not known, but in 90% of cases in which an etiologic diagnosis is achieved, the cause is infectious [5]. Based on available research evidence, nearly half of the cases of abortion/stillbirth worldwide are caused due to infectious agents [6], including Bovine Viral Diarrhea (BVDV), *Brucella species,* and Infectious bovine Rhinotracheitis (IBR) [7-9]. These pathogens can result in extensive economic losses, indicating the need for control measures to prevent infection or disease [10].

Upon closer examination of reproductive processes in the dairy cattle, the post-partum period is the most varied and vulnerable to problems and that incidentally coincides with the peak of milk production, uterine involution, and resumption of ovarian activity, conception and greater risk to infection [11]. These results in considerable economic loss to the dairy industry due to slower uterine involution, reduced reproductive rate, prolonged inter-conception and calving interval, negative effect on fertility, increased cost of medication, drop in milk production, reduced calf crop and early depreciation of potentially useful cows [12]. It is very difficult to diagnose those problems by one particular disorder or symptom because there is interrelation between predisposing factors such as management at calving, hygiene and parity, stage of gestation, nutrition and environment [2]. Therefore, the aim of this report was to determine and investigate abortion causing infectious disease at the studied farm.

The present study was conducted on identification of abortion causing agents in a large production system of dairy farm at Sidamaregion, Wondo Genet district. It is located atlatitude of 7°5'37"N and 38°37'48"E longitude. According to Natural Resource Management and Regulatory Development of the Ministry of Agriculture and Rural Development [13], the agro-ecological region of the area is characterized with an altitude of 1723 meters above sea level having Tepid humid mid highland. The climate of the area is also characterized by two rainy seasons: a long rainy season from July to September and a short rainy season from February to April. The mean annual rainfall and temperature at the area is 1372mm and

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Table 1: Association of selected risk factors with IBR occurrence.

Variables	Total no. of animal tested	No. of positive (%)	X^2	p-value
Sex			0.4517	0.502
Female	99	28(28.3%)		
Male	2	1(50%)		
Age			21.5382	<0.001
<=2years	33	0(0%)		
2-5years	34	12(35.3%)		
>5years	34	17(50%)		
Parity			13.5148	0.001
Non	58	12(20.7%)		
Primiparous	13	1(7.7%)		
Pluriparous	30	16(53.3%)		
Abortion history			11.3681	0.003
Non aborted	83	18(21.7%)		
Aborted	16	10(62.5%)		
Bulls	2	1(50%)		

19°C, respectively.

To assess the sequel of abortion, following abortion history in the farm, blood sample was collected using10 ml plain vacutainer tubes from nearly all animals in the farm (n=101) with appropriate animal and farm level data. The collected blood samples were placed for an overnight period to separate serum and decanted into cryovials of 1.8ml volume. The samples weretransported into the National Animal Health Diagnostic and Investigation Center, now called Animal Health Institute, using cold chain facilitiesand stored at -20°C until the test conducted. Three abortion causing diseases were defined for the test (IBR, BVD and Brucellosis).

IBR was tested using gB Competitive enzyme linked immune sorbent assay (C-ELISA) for Bovine herpes virus-1(BoHV-1) antibody detection based on the manufacturer recommendation. Similarly, BVD and Brucellosis were also examined based on the manufacturer's instruction. Both antibody and Antigen detection ELISA were performed for BVD test due to the fact that persistently infected cows were unable to induce antibodies and aresero-negative for their lifetime and those cows which are infected at the time of gestation (viremic) were prone to manifest the antibody and in both cases the disease can cause abortion in cows [14-17]. Rose Bengal plate test was applied for brucellosis screening [18].

Based on the current study that causes abortion in the dairy farm, sero-positivity of BoHV-1 was 29/101 (28.7%). Of the total cows with the history of abortion (n=16); 10 (62.5%) were positive for IBR antibody. Because of latent infection induced by BoHV-1, detection of antibodies using IBRgB ELISA test could be sufficient for the determination of the BoHV-1 status of individual animals [19] and is indicative for the circulation of the causative agent, so that these animals were able to be a potential risk for disease transmission in the population.

Of the two bulls tested for IBR in the farm, the one which was actively contributing for breeding was sero-positive 1/2 (50%) for the disease. The semen of an infected bull may contain BoHV-1, and the virus can, thus be transmitted by natural mating and artificial in semination [20]. This bull was expected to spread the disease as the farm was exclusively using natural mating for breeding [21].

In the current study, age was significantly associated (P<0.001) with BoHV-1 sero-positivity. As age increasesthe chance of getting the disease was also increased as shown in table 1.This finding was in line with previous reports [22,23], that showed higher BoHV-1 sero-positivity in adults than young animals. This result could be attributed either to continuous exposure for mating of adult animals than young's, so that disease transmission through reproductive tract might be easily established or due to the effect of animal management practice where aged animals reared in a herd and calves were isolated and managed separately so that nearby contact for inhalational disease spread for aged animals might occur through shedding of the virus via various body secretions and excretions [24].The significance of the disease in the old age group is also contributed by the development of carrier states as age goes [25].

Regarding the association of parity and IBR disease, the antibody detection of the disease is significantly higher (p=0.001) in pluriparous cows (53.3%) than primiparous cows (7.7%) and non parturated heifers and calves (20.7%).This result was in agreement with previous reports [26] that showed disparity in IBR antibody detection prevalence among multiparous (33.5%) and primiparous (14.9%) in dairy cattle. This might be due to the repeated exposure for breeding where by the disease transmission can occur from the breeding bull.

On the basis of abortion history, a significant variation was observed among the aborted and non-aborted groups (p=0.003). Of sixteen cows with the history of abortion, 10 (62.5%) were tested positive for BoHV-1 antibody detection and only 18/83 (21.7%) were sero-positive from non-aborted animals in the farm. This variation illustrates that, abortion was one of the main indicator for IBR disease which is in agreement with reports of [27] in Southern India where 100% of aborted animals were tested sero-positive for the disease.

Regarding BVD and bovine brucellosis, the farm was apparently free of these diseases based on both antibody and antigen detection ELISA test for BVD, and RBPT for brucellosis examination in the current study.

In general, the result of the study revealed that BoHV-1 infection is one of the most important problems that could cause economic losses due to aborted offspring in the dairy sector. Further in-depth epidemiological study should be carried out to clearly define the status and economic implication of the disease in the dairy sector in general. Indeed, to implement appropriate control and prevention of viral spread and transmission among the population; isolation and/or culling of positive animals from the herd of such farms should be highly recommended.

References

1. Lobago F, Bekana M, Gustafsson H, Kindahl H. Reproductive performances of dairy cows in smallholder production system in Selalle, Central Ethiopia. Tropical Animal Health and Production. 2006; 38: 333-342.

2. Msangi BSJ, Bryant MJ, Thorne PJ. Some Factors Affecting Variation in Milk Yield in Crossbred Dairy Cows on Smallholder Farms in North-East Tanzania. Tropical Animal Health and Production. 2005; 37: 403-412.

3. Arthur GH, Noakes DE, Pearson H, Perkinson TJ. Veterinary Reproduction and Obstetrics. Theriogenology (4th edn), Bailliere Tindal Great Britain, UK. 1996; 291-301.

4. Hovingh E. Abortions in dairy cattle. Common causes of abortions.Virginia Coop. Virginia Polytechnic Institute and State University, Blacksburg. 2009.

5. Parthiban S, Malmarugan S, Murugan M, Johnson S, Rajeswar J, Pothiappan P Review on Emerging and Reemerging Microbial Causes in Bovine Abortion. Int J Nutr Food Sci. 2015; 4: 1-6.

6. Givens MD. A clinical, evidence-based approach to infectious causes of infertility in beef cattle. Theriogenology. 2006; 66: 648-654.

7. Grooms DL. Reproductive consequences of infection with bovine viral diarrhea virus. The Veterinary clinics of North America. Food animal practice. 2004; 20: 5-19.

8. McDermott JJ, Arimi SM. Brucellosis in sub-Saharan Africa: epidemiology, control and impact. Veterinary microbiology. 2002; 90: 111-134.

9. Dubey JP, Schares G. and Ortega-Mora LM. Epidemiology and control of neosporosis and neosporacaninum.Clinical Microbiology reviews. 2007; 20: 323-367.

10. Baker JC. The clinical manifestations of bovine viral diarrhea infection. The Veterinary clinics of North America. Food animal practice. 1995; 11: 425-445.

11. Robert S J. Veterinary Obstetrics and genital diseases. Theriogenology (5th edn). Edwards' Brothers, Inc., Michigan. 2000; 48-104.

12. Erb HW, Martin SW. Interrelationship between production and reproductive disease in holstain cows. J dairy Sci. 1980; 63: 1911-1917.

13. NRMRD-MOARD. Natural Resource Management and Regulatory Development of the Ministry of Agriculture and Rural Development, Addis Ababa, Ethiopia. 2005.

14. Brownlie J. Clinical aspects of the bovine virus diarrhea/mucosal disease complex in cattle. In Practice, 1985; 7: 195–202.

15. Duffell SJ. andHarkness JW. Bovine virus diarrhoea-mucosal disease infection in cattle. Vet. Rec.1985; 117: 240–245

16. Moennig V, Liess B. Pathogenesis of intrauterine infections with bovine viral diarrhea virus. The Veterinary clinics of North America. Food animal practice. 1995; 11: 477-487.

17. Morgan WJ, MacKinnon DJ, Lawson JR, Cullen GA. The rose bengal plate agglutination test in the diagnosis of brucellosis. Veterinary Record. 1969; 85: 636-641.

18. OIE.OIE terrestrial manual chapter 3.4.11-infectious bovine rhinotracheitis/ infectious pustularvulvovaginitis. 2018. 140.

19. Parsonson IM, Snowdon WA. The effect of natural and artificial breeding using bulls infected with, or semen contaminated with, infectious bovine rhinotracheitis virus. Australian veterinary journal. 1975; 51: 365-369.

20. Romero-Salas D, Ahuja-Aguirre C, Montiel-Palacios F, Garcia-Vazquez Z, Cruz-Romero A, Aguilar-Dominguez M. Seroprevalence and risk factors associated with infectious bovine rhinotracheitis in unvaccinated cattle in Southern Veracruz, Mexico. Afr J Microbiol Res. 2013; 7: 1716– 1722.

21. Chettri S, Ahmed K, Bora DP, Dutta LJ, Bora M, Sharma DK. Reproductive Status in Bovine Herpes Virus 1 (BHV-1) sero-positive Dairy Cattle. Ind J Ani Repro. 2016; 36.

22. Samrath D, Shakya S, Rawat N, Gilhare VR, Singh F, Khan FF. Seroprevalence of bovine herpes virus type 1 in cattle and buffaloes from Chhattisgarh. Jani Res. 2016; 6(4): 641-644.

23. Takiuchi E, Médici KC, Alfieri AF, Alfieri AA. Bovine herpesvirus type 1 abortions detected by a semi-nested PCR in Brazilian cattle herds. Research in veterinary science. 2005; 79: 85-88.

24. Dhand NK, Singh G, Sharma DR, Sandhu KS. Seroprevalence of IBR in Punjab. Indian J Anim Sci. 2002; 72: 850-852.

25. Tadeg WM, Lemma A, Yilma T, Asgedom H. and Amare A. Seroprevalence of infectious bovine rhinotracheitis and brucellosis and their effect on reproductive performance of dairy cattle. Journal of Veterinary Medicine and Animal Health. 2021; 13: 106-113.

26. Krishnamoorthy P, Patil SS, Shome R, Rahman H. Seroepidemiology of infectious bovine rhinotracheitis and brucellosis in organised dairy farms in southern India. Indian Journal of Animal Sciences. 2015; 85: 695-700.