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CLINICAL REPORT ON OUTBREAKS OF *Peste Des Petits Ruminants* IN GOAT IN NORTH SHEWA, ETHIOPIA

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Abstract. *Peste des petits ruminant (PPR)* is an acute, highly contagious and infectious viral epidemic disease, which cause significant economic losses through morbidity and mortality in small ruminants. The aims of the present study were to determine the morbidity, crude mortality and fatality rate and to screen specific antibody against *PPRV* in goats from July 2 to August 30/2017 in Ataye Boer Nucleus Site; Debre Birhan Agricultural Research Centre, Ethiopia. A total of 60 goats were purchased from Senbete livestock market, Oromia Liyu Zone, Amhara region, Ethiopia for genetic improvement though crossing with Boer goat breed. The goats were quarantined at the Ataye Boer nucleus site, while a typical outbreak of *PPR* was recorded. The infected animals manifested abortion, anorexia, serous to mucopurulent oculonasal discharges, coughing, erosive and necrotic lesions on the gums, dyspnoea, diarrhea, congestion, and death. The morbidity, crude mortality and fatality rate were 45%, 45% and 100% respectively. A total of 15 serum samples were collected from suspected animals and screened for specific antibody against *PPR virus* by using c-ELISA test. Antibody against *PPRV* was detected from all sampled goats. This report showed that *PPRV* was the principal cause of goat morbidity, mortality and fatality in the study site. Also this result reviled that virulent strain of *PPRV* was circulating with in animals in the lowland areas of Oromia Liyu Zone and north Shewa in Amhara region, Ethiopia. Hence, strategic vaccination campaigns, proper bio-security, movement control, risk analysis and early diagnosis need to be implemented for the control of PPR in the country.

Keywords: *ELISA, morbidity, mortality, PPR outbreak.*

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1. Introduction

Peste des petits ruminants virus (PPRV) causes a severe disease in sheep, goats and small wildlife ruminants. The virus belongs to the genus *Morbilli virus,* family *Paramyxoviridae,* together with *rinderpest virus (RPV), canine distemper virus (CDV), measles virus (MV)* and *Phocine distemper virus (PDV). Peste des petits ruminants (PPR*), also known as goat plague, kata and pseudo-enteritis complex (Otte, 1960; Rowland *et al*., 1969; Rowland & Bourdin, 1970; Hamdy *et al*., 1976) is similar clinically to *rinderpest*. The disease is characterized by high fever resulting in depression, anorexia, ocular and nasal discharge, pneumonia, necrosis and ulceration of mucous membranes and inflammation of the gastrointestinal tract leading to severe diarrhoea. Morbidity and mortality rates vary but may reach 90-100% (Lefe Ovre & Diallo, 1990; Taylor *et al*., 1990).These rates are usually lower in endemic areas, where mortality may be 20% or less, and serosurveillance is sometimes the only indicator of infection. The seroprevalence rate in sheep and goats rises with age, the symptoms

increasing in severity when associated with infections such as sheep and goat pox, and being rapidly fatal in young animals.

Morbilli viruses are rapidly inactivated at environmental temperature by solar radiation and desiccation. Transmission of PPRV occurs primarily by droplet infection but may also occur by ingestion of contaminated feed or water. PPR is a contagious trans-boundary disease that is widely distributed across the Sub-saharan Africa, Middle East, Arabian Peninsula and the Indian subcontinent (Odo, 2003; Diallo, 2006). The disease causes serious economic losses and remains a major deterrent to a successful development of small ruminant production in the countries where it occurs (Dhar *et al*., 2002; Diallo, 2003; Yener *et al*., 2004).

Peste des petits ruminants (PPR) was clinically suspected for the first time in Ethiopia in 1977 in a goat herd from Afar region, eastern part of the country (Pegram & Tereke, 1981). Clinical and serological evidence of its presence has been reported by Taylor (1984) and later confirmed in 1991 with cDNA probe in lymph nodes and spleen specimens collected from an outbreak in a holding near Addis Ababa (Roeder *et al*., 1994). Based on the reported morbidity and mortality of the infection and the size and structure of the small ruminant sector, it is likely that *PPR* became one of the most economically important livestock diseases in the country (Abraham, 2005).

Screening disease occurrence on a study area is the accumulation of valuable information and allowing animal attendants and veterinarians to confidently determine priorities to design preventive measures which consequently leads the prevention of economic losses associated with diseases (Faccini, 2008). Histories of animal origin is necessary for prediction of diseases occurrence, to know the potential associated risk factors of clinical diseases of animals, to point out the epidemiology of diseases, and to gate useful information on disease pattern and thus can be used in preventing diseases as well as formulating policies for future management to prevent diseases (Zegeye *et al.,* 2013; Zegeye *et al.,* 2014; Enyiew *et al.,* 2020).

Central Highland Goats were purchased from Senbete livestock market, Oromia Liyu Zone, Amhara region, Ethiopia and quarantined for 45 days at the Ataye Boer Nucleus Site Debre Birhan Agricultural Research Centre, Ethiopia, while a typical outbreak of disease was recorded. Signs observed were indicators of *PPRV* infection in the flock. The affected animals manifested abortion, dullness, restlessness, serous to mucopurulent oculonasal discharges, coughing, and crust on the lips, erosive and necrotic lesions on the gums, dyspnoea, diarrhea, congestion, and death. There was necessary to identify the principal cause of goat morbidity and mortality. The present study was conducted to determine the morbidity, crude mortality and fatality rate due to *PPR* out break and to screen specific antibody against *PPRV* in the study site.

2. Materials and methods

Description of the study areas and animals

The study was conducted at the on-station Ataye Boer Nucleus Site; Debre Birhan Agricultural Research Center, north Shewa, Ethiopia. The site is found 5km far from Ataye town, Eastern Amhara Regional state of Ethiopia. The site located 250 km from Addis Ababa. It is located at an elevation of 1,468 meters above sea level. Its coordinates are 10°21'0" N and 39°55'60" E in DMS (Degrees Minutes Seconds) or 10.35 and 39.9333 (in decimal degrees). Its UTM position is FM04 and its Joint Operation Graphics reference is NC37-07. Ataye's climate is classified as tropical. The

climate is characterized by bimodal rainfall consisting of the long rainy season (June-September), short rainy season (February-May), and dry season (October-January). In a year, the average rainfall is 1085 mm (Fekadu, 2015). At an average temperature of 25.4°C, June is the hottest month of the year. December has the lowest average temperature of the year. It is 18.7°C.

The study animals were Central Highland Goat breed which were purchased from Senbete livestock market, Oromia Liyu Zone, Amhara region, Ethiopia for genetic improvement though crossing with pure Boer goat breed, which were recently imported from South Africa. The flock was quarantined for 45 days at the Ataye Boer Nucleus Site Debre Birhan Agricultural Research Centre, Ethiopia, and managed intensively until they finished their quarantine time. They were provided ad libitum grass hay, chopped pasture (Napier grass, *Desmodium* species and vetch), and concentrated supplement based on their body weight. Clinical cases of PPR were treated with broad-spectrum antibiotics like oxytetracycilin and pen-strip for secondary bacterial complication (Wosu, 1989).

Study design, data collection and serological examination

Clinical case and serological investigation on economic importance diseases, *PPR* was conducted from July to August 2017 in Ataye Boer Nucleus Site; Debre Birhan Agricultural Research Center, Ethiopia. Diagnosis was conducted based on clinical and serological examination.

Blood samples were collected directly from the jugular vein of suspected animals. Sterile vacutainer tubes and needles were used for each animal and about 5 ml of blood was taken. Each sample from each animal was labeled by using codes describing the specific animal. The tubes were kept overnight at a room temperature to allow clotting. Next morning the serums were separated from the blood and collected into 1.8 ml cryo-vial and were preserved at -20ºC in deep refrigerator until they were processed.

The serum samples were tested for the presence of specific antibody against *PPR* using c-ELISA. The test was performed according to the manufacturer`s manual. Serum samples that have competitive percentage <= 50% were considered positive. Those >60% were negative. While competitive percentage between 50% and 60% were considered doubtful. The samples were analyzed in National Animal Health Diagnostic and Investigations Center, Sebeta, Ethiopia.

Data management and statistical analysis

All data collected for this study were entered in Ms-Excel spread sheet, arranged and analyzed using SPSS version 20.0 software. Descriptive statistic was used to determine the rate of morbidity, crud mortality and fatality due to *PPR* outbreak and to estimate the frequency of specific antibodies against PPRV in the study area.

Result: clinical and serological finding

A typical outbreak of PPR was recorded; the affected animals manifested abortion, dullness, restlessness, serous to mucopurulent oculonasal discharges, coughing, and crust on the lips, erosive and necrotic lesions on the gums, dyspnoea, diarrhea, congestion, and death. Out of 60 goats purchased; the morbidity, crud mortality and fatality rate were 27 (45%), 27 (45%) and 27 (100%) respectively. A total of 15 serum samples were collected from suspected animals and screened for specific

antibody against *PPRV* by using c-ELISA test. Antibody was detected from all sampled goats.

3. Discussion

Peste des petits ruminants (PPR) is an acute or sub acute viral disease of goats and sheep characterized by pyrexia, erosive stomatitis, conjunctivitis, gastroenteritis and pneumonia. During the past decades, *PPR* was reported in different localities in Ehiopia; Gelagay (1996) 14,6% in the High Land of North Shewa, Abraham *et al*. (2005) 9% in goats and 13% in sheep in different parts of Ethiopia, Abraham (2005) 14.6% of sheep sampled along 4 roads from Debre Berhan to Addis Ababa, Afera *et al*. (2014) 43.6% in Goats of South Parts of Tigray Region and Getachew *et al.* (2017) 48.43% in sheep and goat in East Shewa and Arsi Zones, Oromia Region. This reports point out the circulation of *PPRV* across different parts of the country.

In the present study a typical outbreak of *PPR* with pronounced mortality and fatality was recorded. The morbidity, crud mortality and fatality rate were 45%, 45% and 100% respectively. Antibody against *PPRV* was detected from all sampled goats. The reason for the outbreak of the disease with pronounced clinical symptoms and fatality rate could be due to subjection of the animals to stress during transport, susceptibility of goat to *PPRV*, and/or the exposure of goats to the virulent strain of *PPRV*. Outbreaks of *PPR* were also reported in Ethiopia; Roeder *et al.* (1994) reported an outbreak in a near Addis Ababa. Similarly, Taylor (1984) reported up to 100% of seropositive individuals in groups of adult male sheep and animals that survived suspected outbreaks.

Over a period of several years, outbreaks of *PPR* with different level of morbidity, mortality and fatality rate in sheep and goats were reported in different country, viz. in Southern Nigeria (Opasina & Putt, 1985), India (Shaila *et al*., 1989), Arabian peninsula (Abu Elzeid *et al*., 1990), Isreal (Anon, 1993), Turkey (Yener *et al*., 2004), Pakistan (Ahmad *et al*., 2005), Congo (OIE, 2006), Iran (Abdollahipour *et al*., 2006), Iraq (Dosky *et al*., 2006), Tajikistan (Kwiatek *et al*., 2007), etc. Out breaks of the disease are characterized by fever, erosive stomatitis, nasal and ocular discharges, pneumonia, diarrhea and death. These signs may not all be exhibited by infected animals during an outbreak, as symptomless infections have been reported (Diop *et al*., 2005; Couacy-Hymann *et al*., 2007a & 2007b).

The morbidity rate in this study was comparable with findings of Housawi *et al.* (2004) 43% in Al-Hasa province of Saudi Arabia and Ali *et al.* (2014) 31.4% in El-Damer city at River Nile State, Sudan. However the morbidity rate in this study was lower as compared to the previous findings of Dhar *et al.* (2002) who reported morbidity of 100%, Rita *et al*. (2008) 66.7% in Tamil Nadu, India, El-Yuguda *et al.* (2009) 63% in an Unvaccinated Sahel Goat Farm in Maiduguri, Nigeria, and Ali *et al.* (2014) 100% in a sheep flock at the southern part of the State (Soba) in Khartoum, Sudan.

The crud mortality rate in this study was lower than the finding of Dhar *et al*. (2002) 90%, Housawi *et al.* (2004) 100% in Al-Hasa province of Saudi Arabia and Ali *et al.* (2014) 100% in a sheep flock at the southern part of the State (Soba) in Khartoum, Sudan. However the crud mortality rate in this study was higher as compared to the previous findings of Rita *et al*. (2008) 16.67%, El-Yuguda *et al.* (2009) 17%, and Ali *et al.* (2014) 17.1% in El-Damer city at River Nile State, Sudan.

The variation in morbidity and mortality among different country could be due to different sensitivity of the different goat and sheep breeds to *PPRV* infection, age of the susceptible animal, managemental practice/ measurement to control the disease, and the circulated virulent strain of *PPRV*.

4. Conclusion and Recommendations

Based on clinical and serological finding, the principal cause of goats morbidity mortality and fatality was *PPRV*. This finding reviled that virulent strain of *PPRV* was circulated in the lowland areas of Oromia Liyu Zone and North Shewa in Amhara region Ethiopia so; strategic vaccination campaigns based on the epidemiology of the disease, proper bio-security, movement control, risk analysis and early diagnosis need to be implemented for the control of *PPR* in the country.

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