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Journal of Veterinary Medicine and Research

Research Article

Retrospective Study Sheep Pox and Goat Pox Disease Outbreaks and Vaccine Distribution in North Showa Zone, Amhara Region, Central Ethiopia

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Submitted: 30 October 2023

Accepted: 30 November 2023

Published: 30 November 2023

ISSN: 2379-948X

Keywords

- Retrospective
- Sheep and Goat Pox
- North Showa Zone
- Vaccine
- Woreda

Abstract

Sheep and goat pox has highly contagious viral infection of sheep and goats caused by the genus Capripox virus. The disease was characterized fever, developing papules, and necrotic lesions in skin and nodular lesions in internal organs. In Ethiopia, there are seroprevalence epidemiological studies on the disease. However, the spatiotemporal clustering of sheep and goat pox incidence has not been investigated. A retrospective study design using the outbreak reported data North Showa Livestock Office from the years 2009 to 2015 was performed to determine the temporal and spatial distribution of sheep and goat pox outbreaks. A total of 95 sheep and goat pox disease outbreaks were reported in all North Showa Woredas. In this study, sheep and goat pox disease outbreaks was reported in all administrative Woredas of North Showa Zone (n = 24). General, the highest number of outbreaks was reported in July (n=17) and August (n=16), followed November (n=13) and September (n=10). Whereas, the lowest in June (n=3), April (n=3) and February (n=3) The incidence of sheep and goat pox outbreaks in 2014 (>100%), whereas the lowest incidence rate recorded in 2015 (15%), followed by 2013 (16%) and 2013(18%), so that the differed between years was lowest in hot dry years and highest in warm and cold moist year. There is a significant difference in the occurrence of sheep and goat pox disease outbreaks between months and years. Therefore, routing surveillance and control strategic method of sheep and goat pox disease should be implementing in all Weredas. At dry cold and rainy season immune status of animal low, so it should be applied appropriate feeding and housing system. Should be improving the disease outbreaks by functional regular monitoring and evaluation. Improving the distribution and vaccination rate of vaccine based on the schedule of the disease occurrences.

INTRODUCTION

Background and Justification

Sheep and goat pox disease is one of the most important diseases of sheep and goats in Africa and a significant loss production and productivity of sheep and goats in Ethiopia [1]. Sheep and goat pox is highly contagious viral disease sheep and goats [1]. Disease is major constraint to the introduction of exotic breeds of sheep and goats and to development of intensive livestock production [1]. The economic loss of sheep and goat pox was decrease the quality production and affects trade of animals and its products [1]. Reason for economic losses of SGP is high mortality, abortions and loss of market value of the affected animals [1]. Morbidity and mortality vary with breed animal, immunity of animal, and strain of virus; however mortality rate is 50% susceptible flock and 100% in young animals [2]. In Africa, among endemic countries high number of SGP outbreak was recorded in Ethiopia [3]. Sheep and goat pox are among the most important diseases of sheep and goats in Ethiopia that affect small ruminant huge economic loss and listed as trans-boundary disease and animal affecting the economy the country [4].

Ethiopia has large livestock population in Africa with sheep and goat populations exceeding 49 million, which largest populations in Africa [5]. Small ruminants were unique role in smallholder farmers because require small investments because faster growth rates, shorter production cycles and greater environmental adaptability compared to large ruminants [5]. Also small ruminants are important protein sources and provide income in the tropics and subtropics farmers [6]. In Ethiopia, sheep and goat are second most important livestock species next to cattle [7]. Sheep and goat play significant role to contribute domestic and export markets, although in national economy of the country [8]. Livestock diseases are important constraints to hinder the development of livestock sector by decreasing

production and hampering trade animal and products [9]. Sheep and goat pox disease was widely distributed in all region of the country, also economic loses [10]. The etiology of the disease was genes Capri-pox viruses; it has host-specific [11]. Sheep and goat pox virus strain was affected both sheep and goats [12].

Sheep and goat pox disease has less common indigenous breeds as compared exotic breeds and transmitted direct contact, indirect contact infected object or fomites and also by insect that can mechanically transmit the diseases [13]. Infection has causes systemic viremia in the host characterized widespread skin eruption, fever, (papules, nodules, vesicles on skin), internal lesions in lungs, respiratory and gastrointestinal mucosa and death [13]. General, imitated has been performed temporal and geographical distribution of SGP disease outbreaks in North Showa Zone Woreda livestock Amhara region. Also understanding where, when and how SGP disease outbreaks occurred and plan appropriate surveillance, preventative and control method in the study area. Therefore, aim of the study to identify different aspects of SGP outbreaks to understand the mortality, incidence, case fatality, spatial and temporal and vaccine distribution in North Showa Zone Woredas Amhara Region based on OIE reported that North Showa Livestock Office Animal Health Department at the time 2009 to 2015 E.C.

MATERIAL AND METHODS

Description of the Area

The study was conducted in all North Showa Zone Woredas. This administrative Zone was total of 24 Woreda. Study area was located North Eastern part of Ethiopia 9°30′ North latitude and 39°30′ East longitude, diverse agro-ecology and found ranging of lowland 1500 and highland 3500 masl, annual rainfall ranging of 900 to1600 mm, the area coverage of study 17,347 km^3, farming system of the area was mixed farming which crop with livestock production, also small ruminate used to income generation and protein source. In the study woredas the marketing system was free market, which important for disease transmission.

Study Population

A total 218,259 number of sheep and goat population was found in the study woredas. Also small ruminate has rearing extensive farming system and the breeds indigenous local goat and sheep, exotic (*Awassi*), cross breed (*Awassi with Menz*) and local (*Menz*) sheep breeds.

Study Design

A retrospective study design was conducted assess temporal and spatial distribution of sheep and goat pox OIE disease outbreaks report and vaccine distribution report in North Showa Zone livestock office of Amhara region Central Ethiopia.

Source of Data

A quantitative primary data was collected from North Showa Livestock Office animal health department, which include SGP pox disease outbreaks, cases, deaths and vaccinations report and the OIE report and vaccine distribution report was submitted by 24 wereda government animal health services the pried 2009 to 2015 E.C.

Dataset Management and Analysis

The data was recorded into Microsoft Excel spreadsheets to manage and draw graphs. Also to calculate frequency of outbreaks, incidence rate, mortality rate, case fatality and vaccination rate of SGP diseases in each month of the year according to standard methods (Thrusfield, 2007). The epidemiological parameters were calculated according to the following formula: - Incidence rate = number of cases/total population X 100, Mortality rate = number of deaths/ total population X 100, Case fatality rate = number f deaths/number of cases and Vaccination rate = vaccinated animals/total number of population X100.

RESULT AND DISCUSSION

The retrospective quantitative data sheep and goat pox disease outbreaks from the past 2009 to 2015 were 95 and clinical /tentatively/ diagnosis by Woreda livestock office animal health teams. The highest number of SGP outbreaks were reported in 2009, followed by in 2010, 2011, 2015 and 2012, whereas smallest number of outbreaks in 2013 showed in Table 1,2.

During the study period the disease outbreaks were occurred all months, but highest number of outbreak was recorded in the month July, while lowest number June, the reason behind outbreak was increased August end of summer and November the time of dry cold season. In general, number of sheep and goat pox disease outbreaks was above average for the months August to November and below average for December to July.

Current finding indicated that the highest number of outbreaks was reported in July (n=17) and August (n=16), followed November (n=13) and September (n=10). Whereas, the lowest in June (n=3), April (n=3) and February (n=3) this result showed Figure 1 below:-

This study finding, the highest number of SGP outbreaks was reported in 2009 (n=34) and followed by in 2010 (n=17), in 2011 (n=16), in 2015 (n=12) and in 2012 (n=10), whereas smallest number of outbreaks and in 2013 (n=3) showed the Figure 2 below:-

The result of the study the largest numbers of animal infected SGP disease was reported in 2009 (n=547) followed by 2010 (n=514). Whereas, the smallest number of animal infected SGP disease in 2013 (n=32) followed by 2012 (n=31), the result indicted the Figure 3 below:-

The current finding showed that a large numbers of animals were infected with SGP disease outbreaks the month July (n=415), followed by August (n=216), but a few number of shoat were infected by the disease in June (n=13), followed by the month April, this result show the Figure 4,5 below:-

Table 1: Yearly distribution SGP disease outbreaks in North Showa Zone from 2009 to 2015

Year	Number of Outbreak	Number of Case	Number of Death	Case fatality	Population at risk	Mortality rate (%)	Incidence rate (%)
2009	34	547	54	0.10	66947	0.08	0.8
2010	17	514	30	0.06	51622	0.06	1.0
2011	16	152	13	0.09	60069	0.02	0.3
2012	10	32	5	0.16	17710	0.03	0.2
2013	3	31	3	0.10	19991	0.02	0.2
2014	3	102	5	0.05	1920	0.26	5.3
2015	12	158	5	0.03	107275	0.00	0.15

Table: 2 Seasonal occurrences SGP disease outbreaks in North Showa Zone at 2009 to 2015

Month	Number Outbreak	Number of Case	Number of Death	Case fatality	Population at risk	Mortality rate (%)	Incidence rate (%)
January	5	55	9	0.16	15388	6	36
February	3	116	9	0.08	4000	23	≧100
March	5	120	4	0.03	18960	2	63
April	3	51	3	0.06	3950	8	≧100
May	4	67	7	0.10	3195	22	≧100
June	3	13	4	0.31	13610	3	10
July	17	415	27	0.07	63051	4	66
August	16	216	14	0.06	35980	4	60
September	10	138	17	0.12	14625	12	94
October	9	141	9	0.06	13152	7	≧100
November	13	150	10	0.07	23148	4	65
December	7	54	2	0.04	9200	2	59

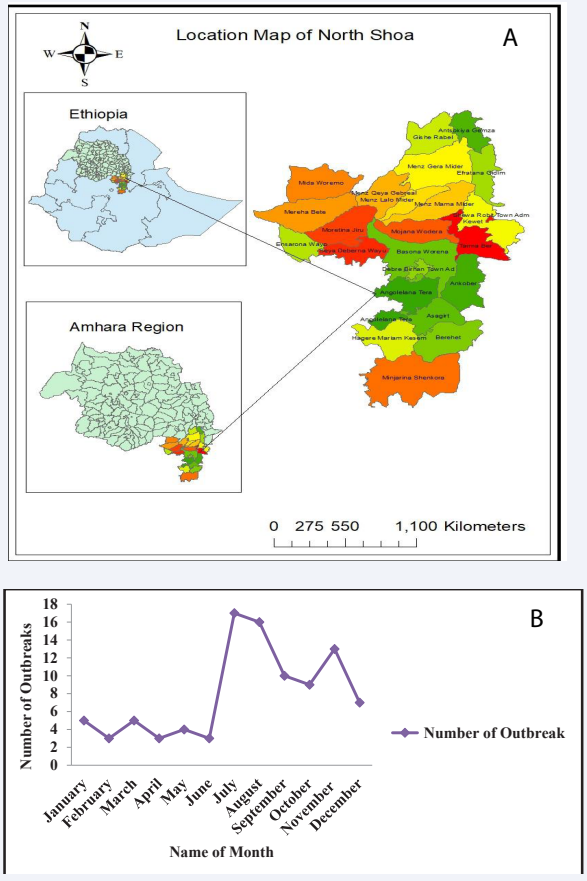

Figure 1 A The map of the study area North Showa Zone Woreda, Amhara Regina. B: Monthly OIE report at 2009 to 2015 in North Showa Zone livestock office

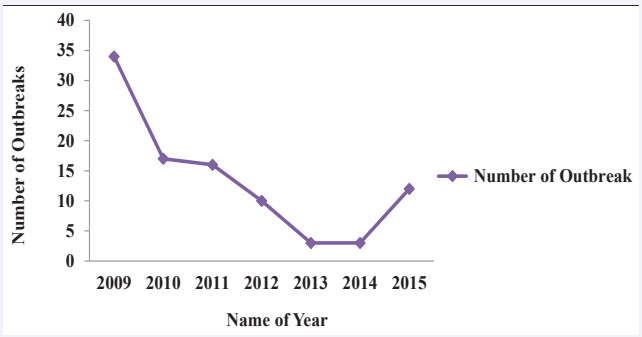

Figure 2 yearly OIE report at 2009 to 2014 in North Showa Zone livestock office.

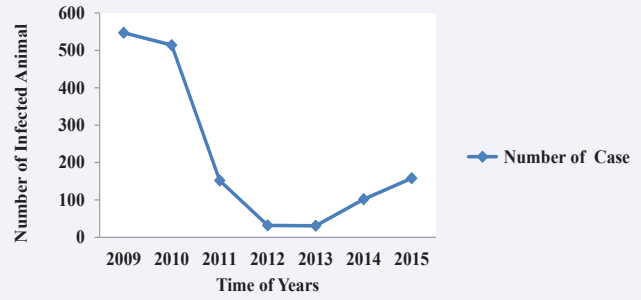

Figure 3 From 2009-2015 yearly OIE report the number of animal infected by SGP disease.

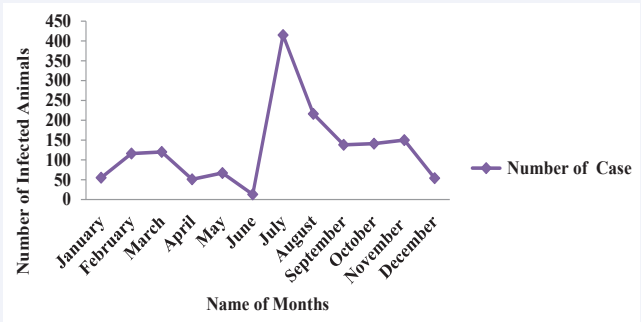

Figure 4 From 2009-2015 monthly OIE report the number of animal infected by SGP disease.

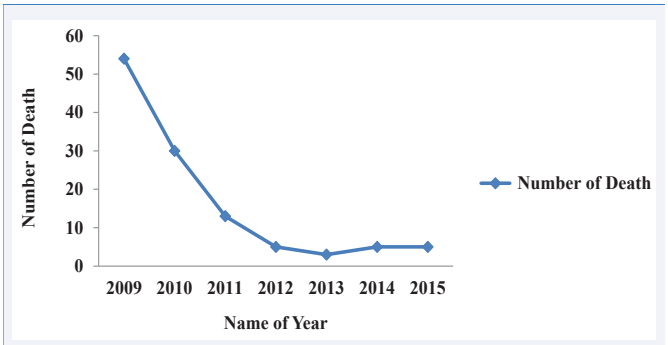

Figure 5 From 2009-2015 yearly OIE report the number of animal death by SGP disease.

The result of the study, large numbers of sheep and goat death SGP disease was recorded in 2009 (n=54), followed by 2010 (n=30). Whereas, the small number of animal death with SGP disease in 2013(n=3), 2014(n=5) and 2012(n=5) this result was indicted the Figure 8 below:-

This study indicated that, at the month July (n=27) a large number of sheep and goat death SGP disease and the small number of animal death by the disease SGP the month December (n=2), followed by April (n=3), this showed the Figure 6 below:-

Current finding, highest incidence rate of SGP disease outbreaks were recorded in 2014 (>100%), whereas the lowest incidence rate recorded in 2015 (15%), followed by 2013 (16%) and 2013(18%) showed the Figure 7 below:-

The highest incidence rate was reported in February, April, October as well as May (>100%) followed by September (94%), whereas the lowest incidence rate in June (10%) followed by January (36%). showed Figure 8 below:-

This study showed, highest mortality rate was observed in 2014 (26%), whereas the lowest in 2015 (0%), followed 2011 (2%) and in 2013 (2%), these result was indicted Figure 9 below:-

The current finding, the highest mortality rate SGP disease outbreaks were reported month February (23%), followed by the month May (22%). Whereas, the smallest mortality rate reported month December (2%), March (2%), and followed by July (4%), August (4%) and November (4%), this show the Figure 10 below:-

This study finding showed that, highest case fatality rate recorded in 2012 (16%), followed by 2009 (10%) and 2013 (10%), whereas the lowest percentage reported in 2015(3%) followed by 2014 (5%). This indicated that the Figure 11 below:-

This study observed that, the highest percentage case fatality of disease was reported month June, whereas smallest percentage reported month March followed by December, this result show Figure 12 below;-

At time of study, highest number of outbreak was reported in Berehet, followed by E/gidem Woreda. Whereas, lowest number of outbreak was reported in Ankober and M/lalo, however during study period Taremaber, Shewarobit, Gishia, M/qeya, M/mama, Angolela as well as Merhabet Woredas were not reported SGP disease outbreak, showed Figure 13 below:-

Large numbers of case was reported E/gidem, followed by Asagiret and M/wodera, whereas small number was reported Antsokeya and Kewot Woredas, indicted the Figure 14 below:-

The highest numbers of death animal was recorded in Berehet, followed by E/gidem Woreda. Whereas, the lowest number of animal death in Ankober, Kewot and M/lalo Woredas, lowest in so these result was indicted the Figure 15 below:-

The highest number of sheep pox and goat pox vaccine was

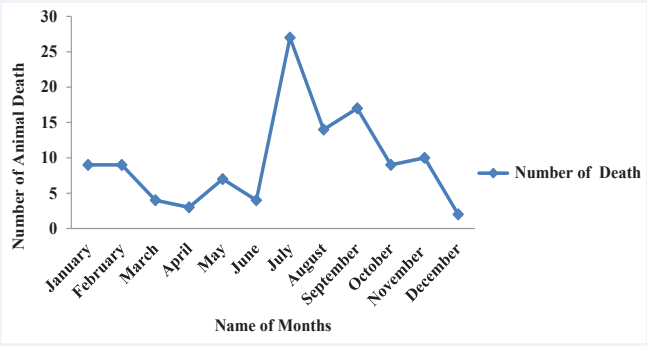

Figure 6 From 2009-2015 monthly OIE report the number of animal death by SGP disease.

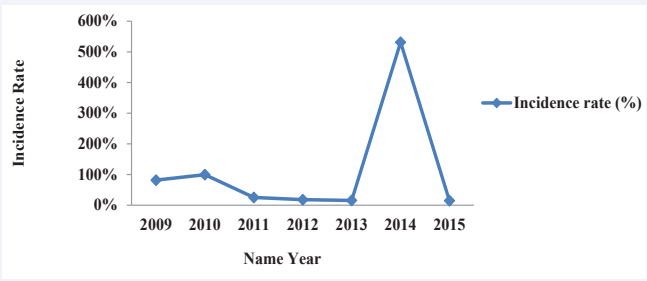

Figure 7 yearly incidence rate of SGP disease at the time of study 2009 to 2015.

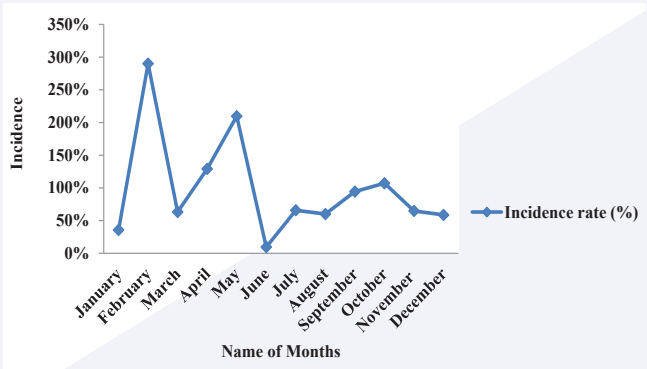

Figure 8 Monthly incidence rate of SGP disease at the time of study 2009 to 2015.

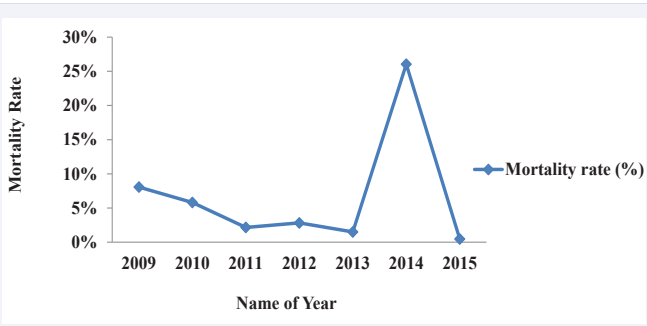

Figure 9 yearly mortality rate of SGP disease at the time of study 2009 to 2015.

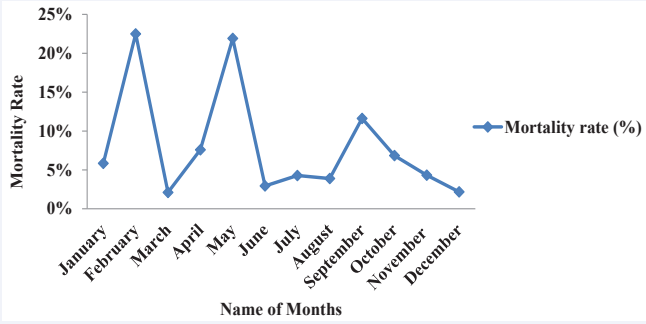

Figure 10 Monthly mortality rate of SGP disease at the time of study 2009 to 2015.

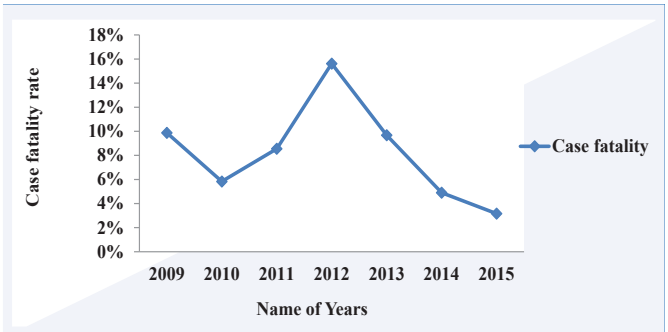

Figure 11 yearly fatality rate of SGP disease at the time of study 2009 to 2015.

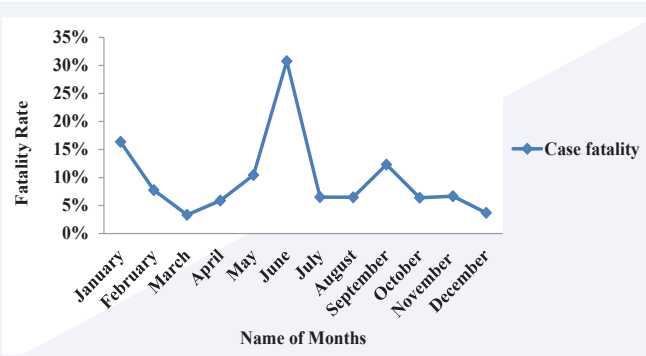

Figure 12 Monthly fatality rate of SGP disease at the time of study 2009 to 2015.

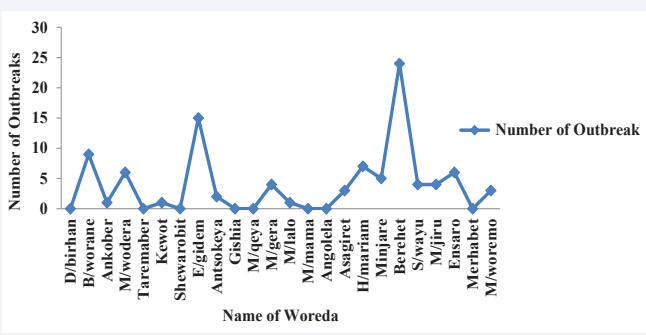

Figure 13 The frequency of OIE reports in North Showa Zone Woredas.

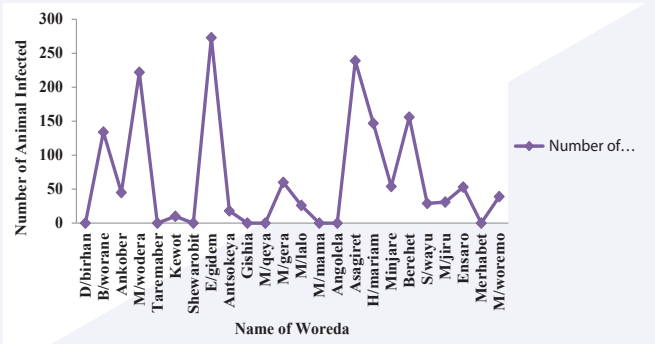

Figure 14 At the time of study the number of animal infected by SGP in different woredas.

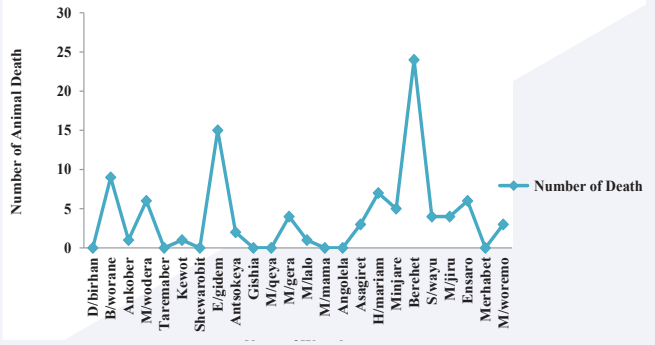

Figure 15 The number of animal death by SGP at the time of study in different woredas.

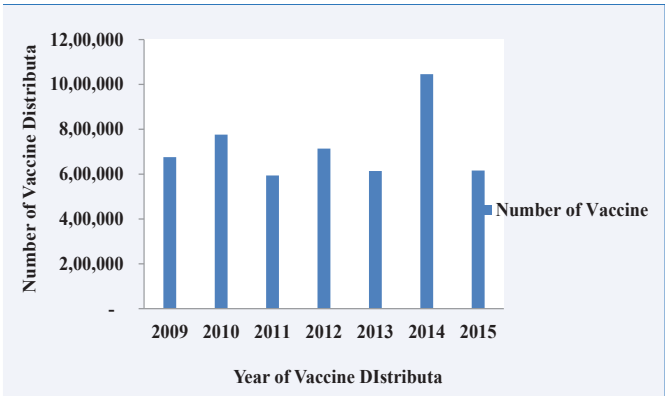

Figure 16 Annual distribution of SGP vaccine from 2009 to 2015 in North Showa Zone.

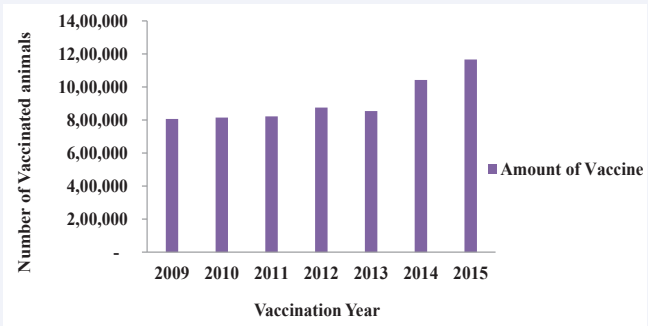

Figure 17 Annual sheep and goat pox vaccination rate at 2009 to 2015 in North Showa Zone.

distributed in 2014 and 2010 followed 2009 and 2012, whereas lowest number of SGP vaccine distribute in 2011 Woredas, so the result indicted Figure 16 and Table 3 below:-

The lowest vaccination rate was recorded in 2009, whereas highest vaccination rate recorded in 2015, followed by 2014, so the finding showed the Figure 17 below

DISCUSSION

The sheep pox and goat pox was significant infections viral disease, worldwide distribute and a serious problem in the study area. The disease was affected all ages, both sexes and breed of shoat; also mostly the outbreak occurred in extensive and mixed farming system. At time of study 2009 to 2015, the outbreaks of SGP disease reported from all administrative Woredas (n=24) in North Showa Zone livestock office were 95, from these highest number of outbreak was reported in Berehet, followed by E/gidem Woreda. Whereas, lowest number of outbreak was reported Ankober and M/lalo woreda, however Taremaber, Shewarobit, Gishia, M/qeya, M/mama, Angolela and Merhabet Woredas were not reported SGP disease outbreak. In this study highest outbreak was recorded the year 2009 and whereas lowest the year in 2013 and 2014. The difference between years to year was the duration of the study period, lack of reporting system, limitation disease surveillance and the vaccination coverage.

The overall result of this study, total of 95 SGP disease outbreaks 1,536 number of case and 115 number of death, the difference was limitation of the study, spreading SGP disease and management of infected animal in North Showa Zone administrative livestock office. In this study, there were significant difference outbreaks of SGP among Woredas, years and months, the reason behind seasonal variation environmental condition, immune states of the herds, limitation rearing and farming system. Also based on this finding a number of SGP outbreaks were occurred the time 2009 to 2015, so that indicted there was no strategic control method applied. Therefore, the government organization should be attention disease prevention and control strategies, established regular disease surveillance methods.

CONCLUSION AND RECOMMENDATIONS

The disease was widely spread and occurred in all Woredas, which found North Showa Zone Amhara regional states during study years 2009 to 2015. Also, the incidence of the disease was high and outbreaks occur at dry cold and rainy season, which cause stress in shoat. Based on the result spatiotemporal analysis the following recommendation foreword:-

- ✓ Routing surveillance as well as control strategic method of SGP disease should be implementing all Woredas.

- ✓ At dry cold and rainy season immune status of animal low, so it should be applied appropriate feeding and housing system.
- ✓ To avoided limitation of OIE reports, so it should be functional regular monitoring and evaluation reporting system.
- ✓ Should be improving the distribution and vaccination rate of vaccine based on the schedule of the disease occurrences.
- ✓ Farther study should be needed the epidemiological occurrence of SGP disease outbreaks also determining the associated risk the study areas, which give more attentions to implementing control strategies.

ACKNOWLEDGEMENTS

I would like to express my deepest thanks to God for allowing me permission to do all daily activities, and also I did liked to thanks for North Shewa Zone Livestock Office Animal Health Department experts for them variable information support.

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