Prevalence And Associated Risk Factors Of Calves Coccidiosis In Honkolo Wabe Woreda Of East Arsi Zone, Ethiopia

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Abstract: A cross sectional study was conducted from November 2016 up to April 2017 in Honkolo Wabe woreda of East Arsi zone to determine the prevalence and associated risk factors of coccidial infection in calves. Fecal samples were collected from a total of 384 calves between the ages of 2 month to 1 year. Samples were examined for the presence of coccidial oocyst by flotation techniques. Out of 384 calves were examined, 206 (53.6%) were found to be positive for coccidial infection. There were statistically significant differences (P< 0.05) in the prevalence of coccidia between calves with age, location, and hygienic status. In conclusion, the study revealed that calf coccidiosis was prevalent in honkolo wabe woreda and consequently affects the productivity of the area. Hence, appropriate disease prevention and control measures are require to reduce its effect.
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Key words: calf, coccidiosis, honkolo wabe, prevalence, risk factors

1. Introduction

Livestock are directly contributes in commercial production systems in most areas of the world and a recent survey made by Food and Agriculture Organization (FAO) shows that the whole cattle population in the world reaches about 1.43 billion, 1.87 billions of sheep and goats, 0.98 billion of pigs and19.60 billion of chicken (Robinson *et al*, 2014). Ethiopia possesses the largest livestock population in Africa. Livestock is a significant contributor to economic and social development in Ethiopia at the household and national level. They accounts for 15-17% of total Growth domestic product (GDP), 35-49% of agricultural GDP and directly contributes to the livelihoods of more than 70% of Ethiopians (CSA, 2011).

Ethiopia, located in Eastern Africa, is predominantly an agricultural nation. Animal production is practiced in all ecological zones of the country (Tegegne and Crawford, 2000). The total population for the country is estimated to be about 53.99 million cattle in which out of this population 9.77% of the cattle are under 6 month age group and 7.64% of its total population are between 6 month and 1 year. On the other hand, 98.95% of the total cattle in the country are local breeds and the remaining are hybrid and exotic breeds that accounted for about 0.94% and 0.11%, respectively (CSA, 2013).

There are many diseases that affect the livestock productivity in Ethiopia. Coccidiosis is one of the disease condition caused by with one or more of the many species of coccidia. It is a serious disease with adverse effects on general health of various domestic animals. Infection is characterized by acute invasion and destruction of intestinal mucosa, diarrhea, weight loss, fever, anorexia, emaciation and sometimes death (Coetzer and Justin, 2004).

Bovine coccidiosis occurs worldwide and usually affects cattle under 1 year old, but is occasionally seen in yearlings and even adults, especially if massive infections are acquired (Soulsby, 1986). Of the 13 species recorded, two of the principal pathogens are *Eimeria zuernii (E.Zuerni)* and *Eimeria bovis (E.bovis)*. They are usually isolated when clinical cases of bovine coccidiosis (severe diarrhea, dysentery, or tenesmus) occur in heavy infections (Urquhart *et al.,* 1996).

Coccidiosis generally has host species specific and cross infection between hosts has not been documented (Quigley, 2001). Calves are primarily infected via the fecal-oral route and it takes less oocysts to infect a healthy calf (Fayer *et al*., 2000). Infection can rapidly spread from calf to calf when animals are communally housed and overcrowded or from cow to calf via the udders when they are contaminated with infected calf feces in the lying area of the dams (Nasir *et al*., 2009).

Many epidemiological factors like moisture, temperature, and oxygen tension influence the pattern of the bovine coccidiosis (Pilarczyk *et al.,* 2000). In addition, stress factors like, change of diet, harsh environment, poor nutrition and sanitation, and overcrowding can increase level of infection and incidence of the disease due to stress-induced immune suppression (Ernst *et al.,* 1984).

In Ethiopia, despite diarrhea is an important cause of calf morbidity and mortality, studies done to quantify the magnitude of the problem and to determine the underlying causes are scant and scarce. Eimeria was among the most common diarrhea causing protozoan enteropathogen in calves in Ethiopia. However, some works have been conducted to determine the prevalence and economic significance of Eimeria in few areas of the country, there is no information on the status of this protozoan parasite as a cause of diarrhea in calves in honkolo wabe woreda and its surrounding.

Therefore, the objectives of the present study were;

- To assess the prevalence of calf coccidiosis in selected areas of honkolo wabe woreda
- To identify possible risk factors for the occurrences of the disease

2. Materials and Study Methodology

2.1 Study Areas

The study was conducted from November 2016 to April 2017 in 5 selected peasant association Machitu leman, sultana 01, Machitu 01, Taji walkite and changicha of Honkolo Wabe Woreda East Arsi zone, Ethiopia. Honkolo wabe woreda lies East of Wabe River, which separate East Arsi zone from Bale zone. The area is located, 269 km East of Addis Ababa. The area receives an annual range of rain fall from 1200-2150mm and has a biomodal rainfall occurring from March to April (a short rainy season) and from July to October (long rainy season). It is situated at altitude of 2200 – 3850 meter above sea level with the mean annual minimum and maximum temperature 18°C and 20°C respectively. This area is characterized by mixed farming system, which is engaged in agricultural and livestock production (HWWADO, 2015).

2.2 Study Population

The estimated animal population in the study area was about 87216 cattle, 17994 sheep, 9094 goats, 9360 horses, 9520 donkey and 39250 chickens (HWWFLO, 2016). However, the study populations were local and cross breeds that are managed under traditional (free ranging) and semi- intensive Management system. The study was conducted on 384 local and cross-breed calves which are under the age of one year and selected randomly from 5 PA's in Honkolo wabe woreda. The age of calves was determined according to (Pace and Wakeman, 2003) as well as by collecting information from the animal owners.

2.3 Study Design

A cross sectional study design was selected to determine the prevalence of calves coccidiosis in the study area and the samples were collected by using simple random sampling method. Since the prevalence of calf coccidiosis in Honkolo Wabe woreda has not been reported, 50% expected prevalence rate, 95% confidence interval and 5% desired absolute precision was used and the sample size is calculated according Thrustfield 2005. Therefore, the total sample size required was 384.

2.4 Sample Collection and Laboratory Analysis

Fresh fecal samples (20gram) were collected directly from rectum or immediately after defecation using sterile disposable plastic gloves and transported to Asella Regional Veterinary Laboratory was kept at 4°C in a refrigerator until processing within 48 hours of arrival. Each fecal sample was placed in a pre-labeled bottle indicating the age, breed and sex of the calf. The presence of fecal oocysts was determined using the concentration of oocyst by flotation method. The principle allowed the eggs to float to the surface of the solution of higher Specific Gravity (S.G), which concentrates at the top and leaves debris lower down. The higher the specific gravity of the solution, more eggs of various types will float. Three gram of fecal sample was weighed using a top loader balance, put into a mortar and mixed with saturated salt solution of NaCl, it was thoroughly mixed and strained using sieve into test tube of respective fecal sample number and these were placed in test-tube stands. Each test tube was then filled to the brim with salt solution of sodium chloride. Cover slip was placed on test tube surface and was left to stand for 15 minutes after which they are gently lifted (without brushing against the tubes). They were then placed on microscope slides sideways in one quick movement to avoid bubbles on the glass-slide and viewed under the microscope. This method is termed Test Tube Flotation Technique. The hygienic status of calf pens were assessed based on housing system, sanitation of bedding (soiled bedding) and were categorized as poor, medium and good.

2.5 Data Management and Analysis

The raw data was entered and managed using Microsoft Excel worksheet and summarized with descriptive statistics. Statistical Package for social science (SPSS) software version 20 was used and the association between prevalence and risk factor was assessed by using Chi-Square test. A statistically significant association between variables was considered to exist if the computed P-value is less than 0.05.

3. Results

The overall prevalence of calf coccidiosis in the study area was 53.6%. The prevalence of coccidiosis was accounted 44.9%, 40.8%, 45.8%, 66.7%, 63.5%, in changicha, Machitu Goto, Machitu laman, Siltana 01 and Taji walkite, respectively.

As indicated in the table below, the prevalence of coccidiosis in cross and local breeds were 59.8% and 51.7 %, respectively. Among the examined calf, higher infection (64.3%) rate was observed in calf under the age category of 6-12 month than in calf less than 6 month (42.2%). There was also high infection rate in poor (58.7%) body condition as compared to medium (50.7%) and good (45.5%) body condition. As statistical test applied to evaluate the prevalence of the disease, high infection rate was detected in poor hygienic status (62.9%) as compared to medium (54.1%) and good (19.3%) management system. The result of current study also revealed that prevalence rate of 59.2% and 49.6% were recorded in males and females, respectively. Male calf showed high infection rate than females, but not statistically significant.

Table 2: Association of risk factors with coccidiosis infection in calves

Risk Factors	№ examined	№ positive	Prevalence (%)	χ2 value	P–value
Breed:					
local	292	151	51.7	1.832	0.176
cross	92	55	59.8		
Age:					
<6month	185	78	42.2		
6-12month	199	128	64.3	18.932	0.002
Sex:					
Female	220	109	49.6		
Male	164	97	59.2	3.483	0.062
Body condition:					
Poor	179	105	58.7		
Medium	150	76	50.7		
Good	55	25	45.5	3.829	0.147
Hygienic status:					
Poor	205	129	62.9		
Medium	122	66	54.1	35.606	0.002
Good	57	11	19.3		
location:					
Changicha	69	31	44.9		
Machitu Goto	49	20	40.8		
Machitulaman	96	44	45.8		
Siltana 01	96	64	66.7		
Taji walkite	74	47	63.5		
Total	384	206	53.6	17.151	0.002

4. Discussion

The present study revealed that, the overall prevalence of calf coccidiosis was 53.6%, which is in line with previous report of 49.6% in Poland (Pilarczyk *et al*., 2000), 59% in Japan (Hasbullah *et al.*, 1990; Oda and Nishida, 1990), 51.42% in Ethiopia (Tadele *et al.,* 2014) and 52% in South Africa (Matjila and Penzhorn, 2002) and lower than the finding of (Rodriguez-Vivas *et al.*, 1996) in Debre Zeit (87.8%) but the result was higher than the work of Alemayehu *et al*. (2013), (31.9%) in Kombolcha and (Mohammed Nuriye *et al*.,2016), (31%) in Jima. This variation is most likely attributed to the differences in agro ecology and husbandry practices of the study animals in different agro ecologies (Radostits *et al.,* 2006).

The present study also indicated that the prevalence of calve coccidiosis was relatively high in male (59.2%) than female (49.6%) calf; however, there was not statistically significant difference among sex (P=0.062). This result is in consistent with the previous studies of Alemayehu *et al. (* 2013).

During investigation, breed (Local 51.7%, Cross 59.8%) of calves was showed statistically no significant difference (P>0.05) to coccidiosis. Similalirly, the present finding agrees with previous studies indicating that there was no statistical significant association between breed and coccidian infection Alemayehu *et al. (*2013). These indicate that breed does not have influence on the occurrence of coccidia infection. This is due to either equal chance of accessing the oocysts or no difference on protective immunity for the disease.

The strong significant association between the ages of the calves with the risk of infection in Eimera observed in this study was in agreement with the reports of (Abebe *et al*.,2008a); Bekele *et al*. (2012) and Alemayehu *et al. (* 2013) in Ethiopia. In this study, the age dependent frequency was highest in calves between 6 and12 months of age. This was similar to the results of (Gillhuber *et al.,* 2014), a study on diarrheic calves in southern Germany. This was due to the fact that there was good nursing of the colostrum feeding for younger calves. During investigation, almost all the calves older than 6 months were housed in overcrowded condition, less care were given and have easy contact with adult animals.

There was no a statistical significant association between body condition of the animals and coccidian infection (P>0.05). These indicate that body condition does not have influence on the occurrence of coccidia infection. This is may due to the presence of other infection. This result agrees with the report of Alula *et al*. (2013).

The stronger association (P<0.05) of Eimerial infection in relation to the hygienic status (Good 19.3%, Medium 54.1% and Poor 62.9%) of calves has been demonstrated in this study. Consequently, calf belonging to poor hygiene showed significantly higher prevalence than calves belonging to medium and good hygiene. This result agrees with the report of (Bekele *et al.,* 2012). This could imply that poor sanitation in the calving and calf housing areas as well as poor management of housing favors infection with coccidiosis. Obviously, droughts, poor calf nutrition, group pens, heavy stocking, cows present with calves, soiled bedding were regarded as risk factors for coccidiosis (Radostits *et al.,* 2007). There was statically significant between location in this study, which exhibiting higher prevalence in siltana 01 and Taji waalkite as compared with Machitu Goto, Machitu laman and changicha. This variation may be due to different management system.

5. Conclusion and Recommendations

Coccidiosis in calf was one of the constraints in both free ranging and semi -intensive management systems. In present study, the overall prevalence of calf coccidiosis was 53.6%. This disease affects both sex, all breed groups and body condition. Fluctuation of coccidial infections was associated with age, location, hygienic status of animal, which exhibiting highest prevalence in poor management system. Age, location and hygienic status are at most noticeable risk factors related with coccidial infection in this finding. Coccidiosis was still one important parasitic disease of calf in the study area. This can be due to poor management systems and inefficient use of anticoccidial drugs as preventive measure against the disease and also poor housing of calf plays a momentous function in the spread of coccidiosis. Good calf management systems play a significant role to minimize the incidence of infection. Therefore, in line with the above facts the following recommendations were forwarded: Isolation and treatment of sick animals should be given to prevent the further disease and premise contamination. Emphasis should be given by veterinarians on appropriate use of anticoccidial drugs to avoid the development of drug resistant. Immune status of the calves could be improved by providing adequate nutrition and good hygiene calves and monitoring stress levels caused by change in feed and overcrowding and further epidemiological investigations are required to determine the protozoan parasite species composition and different agro ecological risk factor on the occurrence of these parasites.

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Conflict of Interests

The authors declare that they have no competing interests.

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