

Current Status of Calf Coccidiosis Managed under Extensive and Semi-intensive in Bekoji district, Arsi zone, Ethiopia

Gossa Regasa, Fikru Gizaw, Gelane Fekadu and Hailegebrael Bedada*

College of Veterinary Medicine, Samara University, P.O.Box 132, Semera, Afar, Ethiopia

*Corresponding Author: Hailegebrael Bedada, College of Veterinary Medicine, Samara University, P.O.Box 132, Semera, Afar, Ethiopia.

Received: October 20, 2017; Published: October 30, 2017

Abstract

A cross sectional study was conducted from November 2016 up to April 2017 in Bekoji district to determine the current status of calf coccidiosis. A total of 384 calves with the age of up to one year were subjected to coprological investigation. Based on the coprological investigation the overall prevalence of coccidiosis was 186 (48.4%). Coccidiosis was higher in calves above 6 months of age than calves with age less than 6 month ($P < 0.05$). The present study showed that there was significant difference ($P < 0.05$) in the prevalence of coccidiosis among the husbandry systems of calves with the highest prevalence in semi-intensive system (55.6%).

There was also significant variation observed ($P < 0.05$) between local breeds and cross breeds. The highest prevalence of coccidial infection was recorded in calves with poor hygienic condition (53.2%) than in good and medium hygienic status (36.9% and 47.3%) ($P < 0.05$). Likewise significant variation in prevalence was observed between poor body condition and good body condition calves ($P < 0.05$). However, significant difference in prevalence was not observed between different sex, and PAs. The present study showed that calves coccidiosis was one of the important diseases in the study area. Hence, appropriate disease prevention and control measures and further molecular investigations to determine the circulating Eimeria species should be implanted.

Keywords: Bekoji; Calves; Coccidiosis; Prevalence; Risk factors

Volume 1 Issue 4 October 2017

© All Copy Rights Reserved by Hailegebrael Bedada., *et al.*

Introduction

Bovine coccidiosis is one of the most common parasitic diseases of cattle that prevail widely in different parts of the world. More than twelve different species of Eimeria in cattle and buffalo have been documented until now. Most commonly prevalent species are *E. bovis*, *E. zuernii*, and *E. auburnensis*. *E. bovis* and *E. zuernii* are highly pathogenic causing mortality and morbidity by disturbing absorption mechanisms. (Lassen., *et al.* 2009). Coccidiosis is responsible for major economic losses in animal husbandry worldwide (Nisar-Khan., *et al.* 2013).

Citation: Hailegebrael Bedada., *et al.* "Current Status of Calf Coccidiosis Managed under Extensive and Semi-intensive in Bekoji district, Arsi zone, Ethiopia". *Multidisciplinary Advances in Veterinary Science* 1.4 (2017): 175-182.

Adult animals are usually asymptomatic carriers that often serve as a source of infection for juvenile animals, which are more susceptible to infection (Faber, *et al.* 2002; Abede, *et al.* 2008). *Eimeria* is very host specific which limits the infection transmission to come from other cattle and occasional passive transfer of oocysts. The oocysts require sporulation time outside of the animal ranging from a few days to weeks depending on the species, humidity, temperature, and other environmental factors (Dauguschies and Najdrowski, 2005). The oocysts are very resistant and can under favorable conditions survive minus degrees of temperature for long periods that can span the winter (Svensson, 1995).

In severe cases, these organisms damage the intestine by destroying epithelial cells and tissues, which interferes with the animal's ability to absorb nutrients. The result is a marked reduction in feed efficiency and weight gain. As the disease progresses, feed and water intake steadily declines, resulting in dehydration. If weight loss and dehydrations are severe enough, cattle may die from coccidiosis. Moreover, it results in failure of young stock to gain weight and to grow to their full potential (Nisar-Khan, *et al.* 2013).

Usually clinical coccidiosis is a result of the interaction of several factors, including age of the animals, the number of ingested oocysts, production systems and management practices, hygienic conditions, stable temperature, season and the level of stress for the animals, which may favor a clinical outbreak of coccidiosis (Lassen, *et al.* 2009; Rehman, *et al.* 2011).

Calves are usually the most affected of all age groups and show the clinical form. They appear unthrifty, perineum stained with feces, watery feces sometimes with blood (Maas, 2007). Severely infected animals present with thin bloody diarrhea, which may persist for about one week, or merely thin feces with shreds of intestinal epithelium and mucus and eventually anemia may develop (Coetzer and Justin, 2004). Dehydration, weight loss, depression, anorexia, straining after defecation and occasionally death may occur (Kennedy, 2000 and Maas, 2007). Mortality is however acute as a result of the infection or later due to secondary complications. (The Merck Manual, 2005). Less severe infections in which the animal survives and develops resistance, may nevertheless affect the growth and health of an animal thus the animal remains stunted (Kennedy, 2000 and Maas, 2007).

Although coccidiosis is an important cause of calf morbidity and mortality in Ethiopia, very little attention has been given to this disease. While few studies have been undertaken in various parts of the Ethiopia (Rahmeto, *et al.* 2008), no previous studies has been undertaken to assess the magnitude of this disease in Bekoji district. Therefore, the objective of this study was to determine the current status of calf coccidiosis in selected dairy farm and free range managed calves of Bekoji district.

Materials and Methods

Description of study area

The study was conducted in and around Bekoji town which is found in Lemuna Bilbilo Woreda, Arsi Zone of Oromia Regional State of Ethiopia. It is located 231 Km in the South Eastern side of Addis Ababa and 56 kms in the South of the Zonal town called Assela. Astro-nomically Bekoji town has latitude of 7°35' N -39° 10' E and longitude of 7.6°N -39.2°E with an elevation of 2810 meters (Bekoji Town Municipality, 2013).

The area has highland escarpment above 2400 meter. The mean maximum and minimum temperature are 28°C and 10°C, respectively. The annual rainfall is 700-1658 mm with a bimodal rainfall occurring from March to April (short rainy season) and from July to October (long rainy season). Keeping livestock like cattle, small ruminants, chickens, equine and honeybee for income, draft power, milk, meat, honey, hide and skin and economic asset is the main activity next to crop production in Bekoji District.

Study population

The study was conducted on local and cross-breed calves selected from 6 Peasants association found in Bekoji district. The study incorporated calves less than one year of age and managed extensively and semi-intensively. The age of calves was determined according to Pace and Wakeman (2003) as well as by the information gathered from the owners.

Study Design and Sample Size Determination

Cross-sectional study was conducted from November 2016 to April 2017 to determine the prevalence and associated risk factors of calf coccidiosis in Bekoji District. The sample size required for the study was determined using the formula given by Thrustfield (2005). To calculate the sample size, 50% expected prevalence with 95% confidence level and 5% of desired absolute precision was used.

$$n = \frac{(1.96)^2 \cdot p_{exp} (1 - p_{exp})}{d^2}$$

Where, n = required sample size, p_{exp} = expected prevalence, d² = desired absolute precision at 95% confidence level. Therefore based on the above formula 384 calves were sampled.

Sampling method

The study of calve coccidiosis involves district, peasant associations (PAs) and calves as a sampling unit. The district was selected purposively based on the previous history of calve coccidiosis investigation and animals population; however, six PAs were selected randomly from the district. Calves found in the PAs were selected randomly from the herd or farm containing calves. The hygienic status of calf pens and the calves themselves were assessed based on housing system (ventilation, draughts, group pens, heavy stocking), sanitation of bedding (soiled bedding) and body parts of the calves (Curt 2005) and was conveniently categorized as poor, moderate and good.

Sample collection and laboratory investigation

A fresh fecal sample of about 30 gm was collected from the rectum of each calf using sterile disposable plastic gloves. The sample was placed in a labeled clean glass bottle container and transported to the parasitology laboratory on the same day and was kept at 4°C in a refrigerator until processing within 48 hours of arrival. At the time of sampling, the name of the PAs, date of sampling, the age, sex, breed, body condition, hygiene, and management were recorded for each calf on a recording format.

Statistical analysis

Data was recorded and entered to Microsoft Excel sheet and analyzed by using SPSS version 20. Chi square test were implemented to test the association between coccidiosis and various risk factors (breed, age, sex, body condition, hygiene and management). In the analyses, the confidence level was held at 95% and P-value less than 0.05 was considered as significant.

Results

Overall prevalence

Coprological examinations revealed out of 384 calves examined for the presence of oocyst 186 (48.4%) were found to be positive for coccidiosis.

Sex wise prevalence

Coccidiosis prevalence in female and male calves of the study area was 44.9% and 51.4% respectively. Statistically significant variation in the prevalence of coccidiosis was never recorded between male and female calves of the study area (p > 0.05) (Table 1).

Sex	No examined	No positive	Prevalence %	SE	p-value
Male	208	107	51.4%	0.225	0.418
Female	176	79	44.9%		
Total	384	186	48.4%		

Table 1: Prevalence of coccidiosis in relation to sex.

Age wise prevalence

The prevalence of coccidiosis in calves less than six months of age and calves greater than six months of age was 31.5% and 61.2% respectively. Significantly higher prevalence of coccidiosis was recorded in calves of greater than six months of age ($p = 0.000$) (Table 2).

Age	No examined	No of positive	Prevalence %	SE	P-value
1-6 month	165	52	31.5%	0.227	0.000
> 6 month	219	134	61.2%		
Total	384	186	48.4%		

Table 2: Prevalence of coccidiosis in association with age.

Breed wise prevalence

The prevalence of coccidiosis in local and cross breed calves of the study area was 40% and 52% respectively. Statistically significant variation in the prevalence of coccidiosis was recorded between cross breed calves and local calves of the study area ($p = 0.000$) higher in cross breeds than local breeds of the study area (Table 3).

Breed	No examined	No positive	Prevalence %	SE	P-value
Local	113	45	40%	0.243	0.000
Cross	271	141	52%		
Total	384	186	48.4%		

Table 3: Breed wise prevalence of coccidiosis.

Management wise prevalence

The prevalence of coccidiosis was 55.6% and 46.5% in calves managed under semi-intensive and extensive production system respectively. Significance difference in prevalence of coccidiosis infection ($P = 0.031$) was observed between calves managed under semi-intensive and extensive production system of the study (Table 4). The prevalence is significantly higher in the calves kept under semi-intensive production system.

Management	No examined	No positive	Prevalence %	SE	P-value
Extensive	303	141	46.5%	0.298	0.031
Semi-intensive	81	45	55.6%		
Total	384	186	48.4%		

Table 4: Management wise prevalence of coccidiosis.

Hygiene based Prevalence

The prevalence of coccidiosis in calves reared in poorly, moderately and highly hygienic house was 53.2%, 47.3% and 36.9% respectively. Statistically significant variation in the prevalence of coccidiosis was recorded among calves reared in poorly, moderately and highly hygienic state ($p = 0.025$) highest prevalence of coccidiosis was observed in herd managed under poor hygienic state than moderate and good (Table 5).

Hygiene status	No examined	No positive	Prevalence %	SE	P-value
Poor	190	101	53.2%	0.139	0.025
Medium	129	61	47.3%		
Good	65	24	36.9%		
Total	384	186	48.4%		

Table 5: Hygiene wise prevalence of coccidiosis.

Body condition based prevalence

The prevalence of coccidiosis in poor, medium and good body condition calves was 43.5%, 47.9% and 16.7 respectively. Statistically significant difference in the prevalence of calves coccidiosis was recorded ($p = 0.000$), higher in medium body condition calves than poor and good body condition animals (Table 6).

Body condition	No examined	No positive	Prevalence %	SE	P-value
Poor	177	100	43.5%	0.174	0.000
Medium	165	79	47.9%		
Good	42	7	16.7%		
Total	384	186	48.4%		

Table 6: Prevalence of coccidiosis based on the body condition.

Prevalence among peasant association/kebeles

Peasant association (kebele) wise prevalence of calves coccidiosis in Bekoji negeso, Bekoji 02, Dawa Barsa, Koma Katar, Limu mikael and Hulule Hasa was 40.5%, 56.9%, 40.8%, 56.6%, 46.6% and 50.9% respectively. Statistically significant variation in the prevalence of coccidiosis was not recorded among the PAs of the study area ($p = 0.243$) (Table 7).

Site	No examined	No positive	Prevalence %	SE	P-value
Bekoji Negeso	74	30	40.5%	0.069	0.243
Bekoji 02	65	37	56.9%		
Dawa Barsa	49	20	40.8%		
Koma Katar	53	30	56.6%		
Limu Mikael	88	41	46.6%		
Hulule Hasa	55	28	50.9%		
Total	384	186	48.4%		

Table 7: Prevalence of coccidiosis based on the site.

Discussion

Results presented in this study revealed overall prevalence of coccidiosis is 48.4%. This finding is inline with the study conducted by (Yadessa, *et al.* 2014). The prevalence of calf coccidiosis of the current study is higher than reports from different parts of Ethiopia (Ferid, *et al.* 2012; Alula, *et al.* 2013; Getahun 2016; Mohammed, *et al.* 2016; Tigist, *et al.* 2017). However, the current study result was much lower than the finding of (Rodriguez, *et al.* 1996; Abebe, *et al.* 2008; Dejena, *et al.* 2016). This variation is most likely attributed to the differences in agroecology and husbandry practices of the study animals in different agro ecologies (Radostits, *et al.* 2006).

There was no statistically significant association ($P > 0.05$) between sex and coccidia infection. This finding agrees with reports of (Abebe, *et al.* 2008; Alemayehu, *et al.* 2013; Alula, *et al.* 2013; Dejene, *et al.* 2016; Mohammed, *et al.* 2016) Absence of statistically significant difference between the sexes of the study animals indicates that sex does not have influence on the occurrence of coccidian infection. This is due to either equal chance of accessing the oocytes or no difference on protective immunity for the disease. Yet, a bit higher prevalence in male calves could be due to the less care given to the male calves as compared to the female calves that are deemed to be future cows.

There was a strongly significant association ($P < 0.05$) between the ages of the calves with the risk of infection in which the prevalence of coccidia appeared to follow an age pattern. Higher infection rate was observed in calves greater than 6 months of age than calves of less than 6 months of age due to the fact that there was good nursing of the colostrum feeding for younger calves. During investigation, most calves older than 6 months were housed in overcrowded condition, less care were given and have easy contact with adult animals.

This has given more chance for the animals to lick each other and ingest large number of oocysts, which is in agreement with previous reports (Rodriguez-Vivas, *et al.* 1996; Radostits, *et al.* 2006; Abebe, *et al.* 2008; Alula, *et al.* 2013; Mohammed, *et al.* 2016; Tigist, *et al.* 2017). Coccidiosis occurs most commonly in young animals with a seasonal incidence when young calves are brought together for weaning or moved into feedlots or fed in small areas for the winter months. The prevalence of infection and the incidence of clinical disease are also age related (Radostits, *et al.* 2006). However this finding is in disagreement with the report of (Getahun 2016).

During investigation, breed (Local 40.06%, Cross 52%) of calves was showed statistically significant difference ($P < 0.05$) to coccidiosis. This finding is in line with the findings of other work (Dejene, *et al.* 2016; Getahun 2016). However, the present finding disagrees with previous studies indicating that there was no statistical significant association between breed and coccidian infection (Abebe, *et al.* 2008; Alemayehu, *et al.* 2013; Alula, *et al.* 2013; Mohammed, *et al.* 2016). This is due to either unequal likelihood of being infected with coccidiosis or no difference on protective immunity for the disease.

The stronger association ($P < 0.05$) of coccidia infection in relation to the hygienic status (Good 36.9%, Medium 47.3% and Poor 53.2%) of calves has been demonstrated in this study. Consequently, calves belonging to poor hygiene showed significantly higher prevalence than calves belonging to medium and good hygiene. This result agrees with the report of (Mehreteab, *et al.* 2012; Dejene, *et al.* 2016; Getahun, *et al.* 2016). 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, poor ventilation, droughts, poor calf nutrition, group pens, heavy stocking, cows present with calves, soiled bedding were regarded as risk factors for coccidiosis (Radostits, *et al.* 2006). However the current study is not in agreement with the findings reported that hygiene and coccidian infection have no association (Mohammed, *et al.* 2016).

The influence of management system on prevalence of coccidian has revealed that there was statistically significant association between them ($P < 0.05$). This finding is in line with the reports of other studies (Dejene, *et al.* 2016; Tigist, *et al.* 2017). However, this result also disagrees with the previous reports by (Alemayehu, *et al.* 2013; Getahun 2016) indicating that there was no statistical significant association between the occurrence of coccidian infection and management system. This might be attributed to the fact that hygienic system of the barn, nutritional status and contamination of the feed or overcrowding of the animal was different in all management systems. Moreover, management factors may also be related to greater susceptibility of cattle to coccidian infection.

Citation: Hailegebrael Bedada, *et al.* "Current Status of Calf Coccidiosis Managed under Extensive and Semi-intensive in Bekoji district, Arsi zone, Ethiopia". *Multidisciplinary Advances in Veterinary Science* 1.4 (2017): 175-182.

Calves that are reared under artificial conditions are exposed to greater numbers of risk factors for the coccidiosis, such as: early weaning, failure to ingest colostrum and difficulty in adapting to artificial high-density diets. Pasture with high concentrations of animals also present greater quantities of feces deposited, and consequently, greater contamination of the ground with parasite eggs and oocytes, which constitutes a risk for susceptible calves (Jolley and Bardsley, 2006). It is important to emphasize that, even in the subclinical form the lesions caused by different species of this parasite may be related to lower nutrient absorption, with an effect on the performance, health and production of the animals (Lassen., *et al.* 2009).

The stronger association ($P < 0.05$) of coccidial infection in relation to the body condition of calves has been demonstrated in this study. Consequently, calves with poor and medium body condition showed significantly higher prevalence than calves of good body condition. This result agrees with the report of (Mehreteab., *et al.* 2012; Getahun 2016; Mohammed., *et al.* 2016; Tigist., *et al.* 2017).the existence of parasite in the GIT it induce destruction of intestinal villi that interfere with absorption of nutrient hence, the animals may not at good physical state (Radostits., *et al.* 2006). However the current finding is disagree with the findings of (Alemayehu., *et al.* 2013).

Conclusion

This study has revealed that the prevalence of calves coccidial infection in Bekoji district was 48.4%. Hence, this study indicates the coccidial infection is high and could potential pose significant economic problems to livestock producer. The prevalence was significantly influenced by age, breed, production system, hygiene status, and body condition score of the animals. However, prevalence of the disease was not attributable to the sex of calves and PAs of the study area. Therefore, further epidemiological investigation in different season of the year should be carried out to look at the effect of season on prevalence of the disease and other stressor factors.

Acknowledgement

We would like to forward our appreciation for staff members of Asella Regional Veterinary Laboratory and Samar University for their cooperation to accomplish this work.

References

1. Abede R., *et al.* "Epidemiology of Eimeria infections in calves in Addis Ababa and DebreZeit dairy farms Ethiopia". *The International Journal of Applied Research in Veterinary Medicine* 6.1 (2008): 24-30.
2. Alula A., *et al.* "Prevalence of bovine coccidia in Kombolcha district of South Wollo, Ethiopia". *Journal of Veterinary Medicine and Animal Health* 5.2 (2013): 41-45.
3. Coetzer J and Justin R. "Infectious Diseases of Livestock". 2nd edition Vol 3; Oxford University press. (2004): 319 -331.
4. Dauschies A and Najdrowski M. "Eimeriosis in cattle: current understanding". *Journal of veterinary medicine. B, Infectious diseases and veterinary public health* 52.10 (2005): 417-427.
5. Dejene A., *et al.* "Prevalence and Associated Risk Factors of Calf Coccidiosis in and around Asela Town, Southeast Ethiopia". *Journal of Natural Sciences Research* 6.3 (2016) 27-33.
6. Faber J., *et al.* "Eimeria infection in cows and their calves: oocyst extraction and levels of specific serum and colostrum antibodies". *Veterinary Parasitology* 104 (2002): 1-17.
7. Ferid D., *et al.* "Calf Coccidiosis in Selected Dairy Farms of Dire Dawa, Eastern Ethiopia". *Global Veterinaria* 9.4 (2012): 460-464.
8. Getahun K. "Epidemiological Studies on Calve Coccidiosis in Dairy Farms in South Wollo Zone Amhara Region, Ethiopia". *Journal of Veterinary Science & Technology* 7 (2016): 6.
9. Jolley W R and Bardsley K D. "Ruminant Coccidiosis." *Veterinary Clinics of North America* 22.3 (2006): 613-621.
10. Kennedy M. (2000): "Coccidiosis in Cattle. Health Management section of the Alberta Feedlot". Manual UK. (2000).
11. Lassen B., *et al.* "Eimeria and Cryptosporidium in Estonian dairy farms in regard to age, species and diarrhea". *Veterinary parasitology* 9 (2009): 212-219.

Citation: Hailegebrael Bedada., *et al.* "Current Status of Calf Coccidiosis Managed under Extensive and Semi-intensive in Bekoji district, Arsi zone, Ethiopia". *Multidisciplinary Advances in Veterinary Science* 1.4 (2017): 175-182.

12. Maas J. "Coccidiosis in Cattle". UCD Vet Views. Carlifornia Cattlemen's Magazine. Management Guide. 145-49 (2007).
13. Mehreteab B., *et al.* "Calf coccidiosis in selected dairy farms of dire dawa, eastern Ethiopia". *Global Veterinaria* 9.4 (2012): 460-464.
14. Mohammed N., *et al.* "Study on prevalence and risk factors of calf coccidiosis in and around Jimma town, Southwest Ethiopia". *Ethiopian Journal of Science and Technology* 7.2 (2016): 21-28.
15. Nisar-Khan M., *et al.* "Determinants influence prevalence of coccidiosis in Pakistani buffaloes". *Pakistan Veterinary Journal* 33.3 (2013): 287-290.
16. Pace J E and Wakeman D L. "Department of Animal Science, Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, 32611. (2003).
17. Radostits O M., *et al.* "A Text Book of the Disease of Cattle, Horse, Sheep Pigs and Goats". Veterinary Medicine 10th ed, Sanders, Edinburgh. (2006): 969-984.
18. Rahmeto A., *et al.* "Epidemiology of Eimeria Infections in Calves in Addis Ababa and DebreZeit Dairy farms, Ethiopia". *The International Journal of Applied Research in Veterinary Medicine* 6.1 (2008): 24-30.
19. TU Rehman., *et al.* "Epidemiology of Eimeria and associated risk factors in cattle of district Toba TekSingh, Pakistan". *Parasitology Research* 108.5 (2011): 1171-1177.
20. Rodriguez-Vivas R., *et al.* "Epidemiological factors associated to bovine coccidiosis in calves (*Bos indicus*) in a sub humid tropical climate". *Revista Biomédica* 7 (1996): 211-218.
21. Svensson C. "Survival of oocysts of *Eimeria alabamensis* on pastures under different climatic conditions in Sweden". *Acta Veterinaria Scandinavica* 36.1 (1995): 9-20.
22. Thrusfield BM (2005): "Veterinary epidemiology, 3rd Edition". UK: Blackwell Science. (2005): 182-198.
23. Tigist T., *et al.* "Study on Prevalence of Calves Coccidiosis in and Around Jimma Town, Ethiopia". *Journal of Veterinary Medicine and Research* 4.3 (2017): 1077.
24. Yadeessa T K., *et al.* "Prevalence of calves coccidiosis in Jimma town dairy farms, South-Western Ethiopia". *Scientific Journal of Zoology* 3.4 (2014): 36-44.
25. Curt AG. "Senior Extension Associate, Department of Agricultural and Biological Engineering, PRO-DAIRY Program, Cornell University. Dairy Calves and Heifers: Integrating Biology and Management Conference". January 25-27, 2005. Syracuse, NY. NRAES-175. (2005).

Submit your next manuscript to Scientia Ricerca Open Access and benefit from:

- Prompt and fair double blinded peer review from experts
- Fast and efficient online submission
- Timely updates about your manuscript status
- Sharing Option: Social Networking Enabled
- Open access: articles available free online
- Global attainment for your research

Submit your manuscript at:

<https://scientiaricerca.com/submit-manuscript.php>