Full Length Research

Prevalence of GIT Parasites and associated risk factors in Cattle of Lume, Bora, Dugda and Adamitulu Jido Kombalcha districts of East Shewa Zone

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A cross-sectional study was carried out from November 2015 to November 2016 to investigate the prevalence and associated risk factors of gastrointestinal parasites of cattle in four districts of east Shewa zone. Fecal samples were examined by using simple flotation techniques. Out of 384 cattle examined 157 (40.9%) were found positive for at least an egg or more of some of parasites belonging to Strongyle, Trichuris, Toxocaravitudulorum and/or oocytes of some protozoa. Moreover there was no significant variation ($\chi^2=6.61; \ P>0.05$) between districts in finding positive cattle considering the distribution of parasite groups. Based on fecal egg findings, the relative importance of parasites was recorded as Eimeria species, Toxocaravitudulorum, Strongyle, Strongyloides species, Trichurisglobsulosa and cryptosporidium species in the order of 47.8%, 0.6% 14.0%, 1.3%, 5.1% and 31.2% respectively. Other factors like age category and sex did not show significant variation while body condition was associated with gastrointestinal parasites infections ($p< 0.05$) were also detected at a considerable rate in cattle despite their history of deworming. No significant variation ($P>0.05$) was observed to have effect on the infection between cattle based on history of deworming. Considering the current study, gastrointestinal parasites comprising of nematodes and protozoa are common in Lume, Bora, Dugda and Adamitulu Jido Kombalcha districts and pose serious constraints to cattle rearing in the area that necessitate education of farmers. Hence, it is recommended that farmers and extension officers should be educated on the importance of using the right anthelminthic products at the right time in order to improve the economy of farmers keeping cattle in the area.

Keywords: - Gastrointestinal parasites, prevalence, risk factor, cattle, East Shewa


INTRODUCTION

Ethiopia livestock population has reached to 52 million cattle, 33 million sheep, 30 million goats and 2.5 million camels and it is the largest in Africa (CSA, 2016). However, the contribution from this huge livestock resource to the national income is disproportionately small, owing to several factors. Diseases are among the factors responsible for poor production and productivity (MOA, 2010). Parasitic diseases are considered as a
major obstacle in the health and product performance of livestock. Gastrointestinal tract (GIT) infections are worldwide problem for both small and large scale farmers but, their impact is greater in sub-Saharan Africa in general and Ethiopia in particular due to availability of a wide range of agro-ecological factors suitable for diversified host and parasite species. The infections of these parasites are the cause of losses of productivity (Holmes, 1985; Labbie et al., 1994; Vercruysse and Claerebout, 2001).

A number of helminths species are known to infect cattle worldwide. The most important ones include nematodes like Strongyle species (Haemonchus, Ostertagia, Trichostrongylus, Cooperia) and trematodes of economic importance Fasciola species (Fasciola hepatica and Fasciolagigantica) and Paraphistomum species (Paraphistomum cervei), while cestodes like Monezia species (Moneziabenenidi and Moneziaexpanza) could also be important constraints in animal production (Onah and Nawa, 2000; Telila et al., 2014).

The prevalence of GIT parasites, the general of helminthes parasites involved, species and severity of infection also vary considerably depending on local environmental condition such as humidity, temperature, rainfall, vegetation and management practice (Tekle, 1991). Among the predisposing factors of intestinal parasite infections are climate, nutritional deficiency, grazing habit, immunological status, pasture management presence of immediate host and vector and the number of effective larvae and eggs in the environment (Radostitis et al., 2007). Damages inflicted to the health and productivity includes loss in body weight, poor reproductive performance, digestive disturbance and emaciation for longer period (Radostitis et al., 2007). So it is important to control internal parasites through better management as in developed countries and knowledge on prevalence of these parasites is mandatory.

There are many associated risk factors influencing the prevalence and severity of GIT helminths. These include age, sex, weather condition and husbandry or management practices (Khan et al., 2009). Gastrointestinal infection is one of the most prevalent diseases of ruminants in Ethiopia. A study conducted in and around Holleta indicated that the overall prevalence parasitic infections of cattle were 82.8%. The predominant helminths egg identified were trematodes (Fasciola and Paraphistomum spp.) 80.6%, Strongyles 66.25%, mixed infection (trematodes and Strongyles) 63.12%, while others such as Trichuris and Monezia1.5% (Etsehiwot, 2004). Other study conducted on gastrointestinal (GI) parasite of ruminants in Western Oromia also showed that the overall prevalence of GIT parasites was 69.6% in cattle with predominant prevalence of Strangles and Eimeria parasite (Regassa et al., 2006).

These reports of from different parts of the country indicated that livestock production is constrained by GIT parasites. However, such information lacks in the present study area. Therefore, the objectives of this study were to estimate the prevalence of GIT parasites and associated risk factors in cattle of four districts of East Shewa Zone.

MATERIALS AND METHODS

Study area

The study was conducted in east Shewa zone of Adamitulujidokombalcha, Lume, Dugda and Bora districts. Adamitulujidokombalcha district is part of rift valley that lies between 130-180km south of Addis Ababa and the altitude ranges between 500-1800 meters above sea level. The area has an annual rainfall ranging between 500-900mm. The rainfall is with short rainy season from March to May and long rainy season from June to September, followed by the dry season from October to February. The area has an average maximum and minimum temperature of 27 ºC and 12ºC respectively and relative humidity of 60%. Dugda and bora are located at about 134km south of Addis Ababa. The long rainy season in the area is between June and October, while the long dry season lasts from October to February. The minimum and maximum temperatures in the area range from 14 to 27ºC. The average altitude is 1650 above sea level, with an average rainfall of 716mm (Ebro et al., 1998). Lume district is located in eastern Shewa Zone of Oromiya. It is also located 70km southeast of Addis Ababa. The long rainy season in the area is between June and October, while the long dry season lasts from October to February. The minimum and maximum temperatures in the area range from 14 to 27ºC. The average altitude is 1650 above sea level, with an average rainfall of 716mm (Ebro et al., 1998). Lume district is located in eastern Shewa Zone of Oromiya. It is also located 70km southeast of Addis Ababa. The long rainy season in the area is between June and October, while the long dry season lasts from October to February. The minimum and maximum temperatures in the area range from 14 to 27ºC. The average altitude is 1650 above sea level, with an average rainfall of 716mm (Ebro et al., 1998).

Study Animals and Study Design

The cross-sectional study was conducted from November 2015 to November 2016 to estimate the prevalence associated risk factors of GIT Parasites in four districts of east Shewa zone. The study was included calves, young and adult cattle found. The study animals were local breeds of cattle kept by farmers in the area where mixed crop-livestock production system is practiced. Moreover, cross cattle were also assessed.

Sample size and sampling method

East Shewa zone was selected purposively while kebeles and villages were selected randomly from each district.
Simple random sampling method was followed to select the study animals. The numbers of animals to be sampled from each Kebele were determined by the proportion of the cattle population existing in each Kebele. Animals within the villages were selected using simple random sampling. It was computed was followed to collect feces from the individual animals. Since there was no previous in study area, the sample size was determined by taking the 95% level of confidence (CL), 5% desired level of precision and expected prevalence of 50%, the sample sizes was calculated using the formula given by Thrusfield (2005).

\[ n = \frac{1.96^2 (P_{exp} (1-P_{exp}))}{d^2} \]

\( n = \) required sample size, \( P_{exp} = \) expected prevalence, \( d = \) desired absolute precision

Therefore, based on the above formula the total sample sizes of cattle were calculated to be 384.

**Study Methodology**

Fecal samples were collected directly from the rectum of calves, young and adult at particular time. In cases where retrieval from rectum was not possible, top layer of freshly voided feces was taken and placed into labeled plastic container. After collection and preservation in ice box, samples were transported to Adamitulu Agricultural Research Center laboratory for investigation. Those samples which were not examined within 24 hours of arrival were stored at 4°C and examined the next day early in the morning. The breed, the body condition scores, date and age of animals were recorded on the format prepared. Floatation technique was employed to detect parasite eggs and the results were registered as Strongyle, Trichuris or Toxocaravulorum and/or oocytes of some protozoa. Based on the result of fecal finding, egg of parasites detected belong to nematodes like Trichuris (5.1%), Strongyle (14.0%), Toxocaravulorum (0.6%) and Strongyloidespapillosus (1.3%) as well as protozoa of Eimeria species (47.8%) and cryptosporidium species (31.2%). Moreover, there was no significant variation \( (\chi^2=6.61; p>0.05) \) between districts in finding positive cattle considering the distribution of parasite groups. The highest (47.6%) and lowest (31.0%) prevalence of GIT parasites was recorded in Lume and Dugda districts (Tables 1).

Out of 157 cattle detected positive, 54(42.5%) were calves, 49(38.3%) young and 54(41.9%) belong to adult age groups. No significant variation \( (p>0.05) \) was observed between age category and fecal egg findings (Table 2).

Out of 157 positive cattle 65(39.9%) were males and 92(41.6%) females with no significant variation \( (\chi^2=0.12; P > 0.05) \) between sexes on fecal egg findings (Table 3).

Out of 157 cattle found positive for fecal egg detections, 38(31.7%) had good body condition score, 50(38.2%) medium and 69(51.9%) poor body conditions. Moreover, there was significant variation \( (\chi^2=12.03; p<0.05) \) when cattle in poor and good body conditions were considered in finding fecal eggs (Table 4).

From the findings of questionnaire, some farmers indicated that they deworm their cattle when drugs are available and others do not at all. However, infections were detected at a considerable rate in both cattle despite their history of deworming. No significant variation \( (p>0.05) \) was observed to have effect on the infection between based on history of deworming (Table 5).

**RESULTS**

**Prevalence and risk factors**

Out of 384 cattle examined, 157(40.9%) were found positive for at least an egg or more of parasites belonging to Strongyle, Trichuris, Toxocaravulorum and/or oocytes of some protozoa. Based on the result of fecal finding, egg of parasites detected belong to nematodes like Trichuris (5.1%), Strongyle (14.0%), Toxocaravulorum (0.6%) and Strongyloidespapillosus (1.3%) as well as protozoa of Eimeria species (47.8%) and cryptosporidium species (31.2%). Moreover, there was no significant variation \( (\chi^2=6.61; p>0.05) \) between districts in finding positive cattle considering the distribution of parasite groups. The highest (47.6%) and lowest (31.0%) prevalence of GIT parasites was recorded in Lume and Dugda districts (Tables 1).

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**DISCUSSION**

The current study revealed that the prevalence of gastrointestinal parasite infections in cattle in four districts of East Shewa zone is 40.9%. This result agrees with the result of previous works by Bacha and Haftu (2014), Epherem (2007) and Keyyu et al. (2006) where they reported prevalence of gastro-intestinal parasite of 41.2% in western Amhara region, 49.0% in west Arsi, Ethiopia and 44.4% in large dairy cattle in Tanzania, respectively. On the other hand, the prevalence of gastro-intestinal parasite reported in the current study is less than the
### Table 1: Fecal parasite egg findings in cattle from four districts of east Shewa zone

<table>
<thead>
<tr>
<th>Districts</th>
<th>Number of cattle Examined</th>
<th>Number of cattle positive</th>
<th>Prevalence%</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dugda</td>
<td>87</td>
<td>27</td>
<td>31.0</td>
<td>21.1-40.9</td>
</tr>
<tr>
<td>Bora</td>
<td>93</td>
<td>43</td>
<td>46.2</td>
<td>35.9-56.6</td>
</tr>
<tr>
<td>Lume</td>
<td>90</td>
<td>43</td>
<td>47.6</td>
<td>37.3-58.3</td>
</tr>
<tr>
<td>ATJK</td>
<td>114</td>
<td>44</td>
<td>38.6</td>
<td>35.9-45.8</td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td>157</td>
<td>40.9</td>
<td>35.9-45.8</td>
</tr>
</tbody>
</table>

$X^2=6.61; p=0.085$

### Table 2: Fecal parasite egg findings in different age groups of cattle in four districts of east Shewa zone

<table>
<thead>
<tr>
<th>Age category</th>
<th>Number of cattle Examined</th>
<th>Number of cattle positive</th>
<th>Prevalence%</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calves</td>
<td>127</td>
<td>54</td>
<td>42.5</td>
<td>33.8-51.2</td>
</tr>
<tr>
<td>Young</td>
<td>128</td>
<td>49</td>
<td>38.3</td>
<td>29.7-46.8</td>
</tr>
<tr>
<td>Adult</td>
<td>129</td>
<td>54</td>
<td>41.9</td>
<td>33.2-50.5</td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td>157</td>
<td>40.9</td>
<td>35.9-45.8</td>
</tr>
</tbody>
</table>

$X^2=0.55; p=0.76$

### Table 3: Fecal parasite egg findings in different sex groups of cattle in four districts of east Shewa zone

<table>
<thead>
<tr>
<th>Sex group</th>
<th>Number of cattle Examined</th>
<th>Number of cattle positive</th>
<th>Prevalence%</th>
<th>95% CI</th>
<th>P –value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>163</td>
<td>65</td>
<td>39.9</td>
<td>32.3-47.5</td>
<td>$X^2; 0.12$</td>
</tr>
<tr>
<td>Female</td>
<td>221</td>
<td>92</td>
<td>41.6</td>
<td>35.1-48.2</td>
<td>$p=0.73$</td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td>157</td>
<td>41.9</td>
<td>35.9-45.9</td>
<td>$X^2=0.12$</td>
</tr>
</tbody>
</table>

### Table 4: Fecal parasites egg findings based on body condition of cattle in four districts of east Shewa zone

<table>
<thead>
<tr>
<th>Body condition</th>
<th>Number of cattle Examined</th>
<th>Number of cattle positive</th>
<th>Prevalence%</th>
<th>95% CI</th>
<th>P –value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>120</td>
<td>38</td>
<td>31.7</td>
<td>23.2-40.1</td>
<td>$X^2=12.03; 0.007$</td>
</tr>
<tr>
<td>Medium</td>
<td>131</td>
<td>50</td>
<td>38.2</td>
<td>29.7-46.8</td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>133</td>
<td>69</td>
<td>51.9</td>
<td>43.3-60.5</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td>157</td>
<td>40.9</td>
<td>35.9-45.8</td>
<td></td>
</tr>
</tbody>
</table>

### Table 5: Frequency of cattle deworming and fecal egg findings in four districts of east Shewa zone

<table>
<thead>
<tr>
<th>Frequency of deworming</th>
<th>Number of cattle Examined</th>
<th>Number of cattle positive</th>
<th>Prevalence%</th>
<th>95% CI</th>
<th>P –value</th>
</tr>
</thead>
<tbody>
<tr>
<td>When available</td>
<td>168</td>
<td>64</td>
<td>38.1</td>
<td>32.3-47.5</td>
<td>$X^2=0.962; P= 0.327$</td>
</tr>
<tr>
<td>Not at all</td>
<td>216</td>
<td>93</td>
<td>43.1</td>
<td>35.1-48.2</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td>157</td>
<td>40.9</td>
<td>35.9-45.9</td>
<td></td>
</tr>
</tbody>
</table>

Values reported by Regassa et al. (2006) 50.2% from western Ethiopia, Derib (2005) 50.8% from Bahir-Dar and its surrounding, Tulu and Lelisa (2016) 50.08% in West Hararghe zone and Tellia et al. (2014) 61% in East Showa Zone. The higher prevalence was also reported by Etsehiwot (2004) to be 82.8% in Holleta and its surroundings. The prevalence difference in different study area may be resulted from difference in management system, topography, deworming practices, and climatic condition that favors the survival of infective stage of the parasite and intermediate hosts. Detections of parasite eggs or oocytes with such a level of infection especially during dry period could suggest the existence of suitable climatic conditions throughout the year for the development and survival of free-living stages in the study area. Likewise, it could also be due to lack of regular deworming practice, administration of incorrect dose, inferior quality or high cost of the drugs used in the area for treatment of animals. Hence, parasite eggs were detected at a high frequency in fecal samples collected from all four districts studied.

This work also demonstrated that there was no
variability regarding infection based on fecal egg finding in relation to district, age and sex of animals considered as risk factors. This could be due to more or less similar environmental conditions shared by the districts as well as the practice of grazing animals on the same pasture regardless of age and sex groups. However, the effect of body condition has to manifest variation that animals with poor body condition had a higher frequency of gastrointestinal parasite infections. There was significant difference among body condition and prevalence of gastrointestinal parasite which was higher in thin animals and lower in animals with good body condition. This study finding is in line with reports of Telila et al. (2014), who reported that significant association between prevalence of gastrointestinal parasite and body condition in East Showa Zone. However, this finding contradicts with the findings of Manaye (2002) who reported absence of significant difference on the prevalence of helminths in animals of different body condition.

In this study, it was attempted to evaluate the relative frequencies of occurrence different parasite groups based on fecal egg findings. To this effect, 14.0% infections were due to Strongyle, 5.1% Trichuris globulosa, 47.8% Eimeria species, 31.2% Cryptosporidium species, 0.6% Toxocaravitudorum and 1.3% Strongyloides papillosus. The effects of these infections can be evident by the frequent drought that occurs in some of the study areas. This is described as the most economically important form of infection since it occurs in most of the cases leading to thriftiness and animals are more susceptible to other infections (Ocaido et al., 1996).

The prevalence of infection by Eimeria species (47.8%) is higher than the previous reports in the country 24.9% (Kassa et al., 1985), 20% (Kebadu, 1998); but lower than 68.1% (Rahmeto, 2005). The observed difference could be attributed to the difference in the management situations like feeding, housing and watering and hygiene status of animals. The medium prevalence of cryptosporidiosis observed in this study as well as in many other similar studies is partly attributed to the type of design employed in studying the problem and may under estimate the prevalence because oocysts may be shed for only a few days (Casemore et al., 1997; McCluskey et al., 1995) consequents they there was a possibility of missing cattle that were infected at sampling.

CONCLUSION AND RECOMMENDATIONS

The prevalence of GiT parasites in the cattle in the current study area was generally high. However the findings of parasites like Eimeria species, Cryptosporidium species, Strongyle and Toxocaravitudorum in cattle warrants the need for adoption of control and prevention measures because these parasites can interfere with the growth and reduced life time of productivity. This study also identified that body condition as risk factor for GIT parasites in cattle. Worm control programs should be coupled with a significant improvement in nutrition and management in order to achieve the envisaged economic benefits. A strategy for worm control has to be designed and implemented. This must consider the option for stopping illegal markets, impose quality control schemes, create awareness about when, where and why to treat animals, utilize epidemiological information for planning the control programs, improve nutrition and management system and the possible economic return from the control activity. It is also recommended that further investigation has to be carried out on the status of anthelmintic and anti-protozoan resistance in the area.

REFERENCES


