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Prevalence of Major Gastrointestinal Tract Parasite of Cattle at Municipal Abattoir of Jimma Town, Oromia, South Western Ethiopia

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ABSTRACT

Aim
The objectives of this study were to assess the prevalence of major gastrointestinal tract (GIT) parasite of cattle's and associated major risk factor at Jimma municipal abattoir.

Method
A cross-sectional study with a simple random sampling method was conducted from November, 2018 to April, 2019.

Result
Based on the carpological examination, from 400 animals that were presented for slaughter at Jimma municipal abattoir, 46.8% (187) of animals have at least one GIT parasite. The study detected five genera of GIT parasite which were Strongyle-type, *Trichuris* spp., *Monezia* spp., *Paramphistomum* spp. and *Eimeria* spp. with prevalence of 28.9% (54), 4.8% (9), 3.2% (6), 38.5% (72) and 13.4% (25), respectively while mixed parasites has 11.2% (21) of prevalence. The diversity of those mixed parasite were Strongyle type with *Paramphistomum* spp., *Paramphistomum* spp. with *Eimeria* spp., *Eimeria* spp. with *Trichuris* spp., Strongyle spp. with *Monezia* spp., *Paramphistomum* spp with *Monezia* spp,, Strongyle type with *Emeria* spp. and *Paramphistomum* spp. with *Trichuris* spp. with the prevalence of 42.9%, 14.3%, 14.3%, 9.5%, 14.3%, 23.8% and 10.0% respectively. The prevalence of gastrointestinal parasite based on origin of the study animals was recorded and showed statistically significant difference with p-value of 0.001 ($p \leq 0.05$) and the prevalence was highest in Seka Chekorsa and followed by Kersa, Mena, Oma Nada and Dedo in decreasing order. The risk factor related to the age showed statistically significant difference ($p<0.05$) in which GIT parasite has highest prevalence in young and least in old and moderate in adult cattle. This study showed that infection prevalence was highest in animal with poor body condition followed by medium and good body condition scores and difference was statistically significant ($p<0.05$). In addition, the difference between the season also recorded and found statistically significant ($p<0.05$).

Conclusion
The finding showed that good management and strategic anthelmintic treatment need to be applied in the area to reduce the prevalence of the GIT parasites of cattle and their risk factor to lessen economic loss caused by the parasite.

Keywords
Abattoir; Carpological examination; GIT parasite; Jimma.

Abbreviations
ELISA: Enzyme-linked immunosorbent assay; GDP: Gross domestic product; GIT: Gastrointestinal tract; Spp: Species; BW: Body weight.

INTRODUCTION

Livestock systems occupy about 30 per cent of the planet's ice-free terrestrial surface area and are a significant global asset with a value of at least $1.4 trillion.[1] They are important source of animal protein in many countries of the world, supplying a good percentage of the daily meat and dairy products in cities and villages, flexible income for family units, employment, farm energy and manure.[2,3] It is increasingly organized in long market chains that employ at least 1.3 billion people globally and directly support the livelihoods of 600 million poor smallholder farmers in the developing world.[1] According to Herrero et al,[4] the total demand for livestock products might almost double by 2050, mostly in the developing world owing to increases in population density, urbanization and increased incomes.

Ethiopia is one of the African country that possess about 59.5 million cattle, 30.7 million sheep, 30.2 million goats and 59.5 million chickens.[5] They contribute about 16.5% of the national gross domestic product (GDP) and 35.6% of the agricultural GDP.[6] In spite of the large population of cattle, productivity in Ethiopia is low due to poor nutrition, reproduction insufficiency, management constraints and prevailing animal disease. Gastrointestinal parasites are considered as the major diseases of cattle in the country.[7] It is one of the major causes of wastage and decreased productivity exerting their effect through mortality, morbidity, decreased growth rate, weight loss in young growing calves and late maturity of slaughter stock, reduced milk and meat production and working capacity of the animal mainly in developing countries.[8]

The numbers of gastrointestinal tract (GIT) parasite species are known to infect cattle worldwide. The most important ones include nematodes like *Strongyle* species (Haemonchus, Ostartagia, Trichostrongylus, Cooperia) and trematodes of economic importance *Fasciola* species (*Fasciola hepatica* and *Fasciola gigantica*) and *Paramphistomum* species (*Paramphistomum* cervei), while cestodes like *Monezia* species (*Monezia benideni* and *Monezia expanza*) could also be important constraints in animal production.[8] There are many associated risk factors influencing the prevalence and severity of GI helminths. These include age, sex, and weather condition and husbandry or management practices.[9]

Many *cross sectional* study on GIT parasite of cattle were carried out in many part of Ethiopia. According to Etsehiwot,[10] the study conducted in and around Holleta indicated that the overall prevalence parasitic infection of cattle was 82.8%. The predominant helminths egg identified were trematodes (*Fasciola* and *Paramphistomum* spp.) 80.6%, *Strongyles* 66.25%, mixed infection (*Trematodes* and *Strongyles*) 63.12%, while others such as *Trichuris* and *Monezia* 1.5%.[10] 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.[11] In addition according to Tulu et al[7] the study on major gastro-intestinal helminths parasites of cattle in Tulo District, West Hararghe Zone shows that 50.08% was recorded with one or more species of GI helminthic parasites.

Furthermore, the abattoirs are instruments for the insurance of wholesome meat and meat products as well as providing abattoir by-products for livestock base industries.[12] More importantly, abattoirs are used for the purpose of surveillance against animal and zoonotic diseases.[12] The importance of abattoir records in analysis of prevalence rate and planning strategy for the control of livestock diseases cannot be undermined. However, there was no enough study that was carried out on GIT parasite of cattle that slaughtered at different municipals' of abattoirs of Ethiopia including Jimma municipal abattoir yet. Therefore, the objectives of this study were to assess the prevalence of GIT parasites of cattle come for slaughter and associated major risk factor at Jimma municipal abattoir. This is with a view of providing a baseline epidemiological data on this group of parasites and other livestock diseases of economic and zoonotic importance in an ongoing study in Ethiopia.

MATERIALS AND METHODS

Study Area Description

The study was carried out on the cattle that were come for slaughter at Jimma municipal abattoir from November 2018 to April 2019. Jimma is the largest city in south-western Ethiopia. It is a special zone of the Oromia Region about 352 km southwest of Addis Ababa. It has latitude of 7013' to 8056' N and longitude of 35052' to 37037' E, and an elevation ranging from 880 to 3360 m above sea level.[13] The area receives a mean annual rainfall of about 1,530 mm, which comes from long and short rainy seasons. The average minimum and maximum annual temperature ranges between 14.4 and 26.7 °C, respectively.[14] The predominant economic activities involve mixed farming, which broadly includes cultivation of cereal crops, cash crops including primarily coffee and production of livestock. The total livestock population of Jimma zone is estimated to constitute, 2.02 million cattle, 288,411 goats, 942,908 sheep, 152,434 equines, 1,139,735 poultry and 418,831 bee hives.[15]

Study Population

All cattle that were presented for slaughter at Jimma municipal abattoir during the study periods were considered as study animals for the presence of gastrointestinal parasite. Those animals were transported to the abattoir from different district of Jimma zone and all of them were zebu cattle. Sex of examined animals was male. Female animals were not slaughtered in abattoir during this study.

Study Design

A cross-sectional study was conducted to determine the prevalence of GIT parasite of cattle which were presented for slaughter at Jimma abattoir and to investigate the major risk factors influencing the prevalence of parasite infection in cattle.

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Sampling Methods and Sample Size

The sampling method that used in this study was random sampling method. Animals were selected in the lottery method of simple random sampling in which all the ID of the cattle that were transported to Jimma municipal abattoirs written on separate slips of paper of the same size, shape and colour and they were folded and mixed up in a container. The required numbers of slips were selected at random for the desire sample.

The sample size was determined by the formula stated in Thrustfiled[16] with 95% confidence interval and 5% of absolute precision and considering that expected prevalence is 50% used since there is no reported studies at Jimma municipal abattoir. Hence, the sample size was calculated to be 384.

$$N= (1.96)^2 P_{exp}(1-P_{exp})/d^2$$

Where, N=required sample size P_{exp}=Expected prevalence (50%), d=desired absolute precision (0.05). Accordingly, 384 samples were needed, however, 400 cattle was sampled and examined to increase precise of the mean. It was increased by 4%.

Data and Sample Collection

Fecal samples was collected directly from rectum of animals in clean universal bottle then labeled and kept in icebox and immediately transported to parasitology laboratory of Jimma University, College of Agriculture and Veterinary Medicine and was examined. Those that were not examined on that time were stored in refrigerator at 4 °C and examined in the following day. During sample collection various potential risk factors including sex, age, breed, and body condition score were recorded. The age of cattle was determined by dentition using the given standard. Cattle were grouped into three age categories; under 5-years of age, they were categorized as young, those in range of 5 to 10-years were grouped as adult and those above 10-years were classified as old. In addition to that body conditions of animals were recorded based on the scoring system described by Nicholson et al[17] in Zebu cattle. Accordingly the cattle were categorized in to poor, medium and good.

Carpological Examination

The collected fecal samples were examined by using floatation and sedimentation techniques simultaneously. The presence of at least one parasite egg in either of the tests revealed that the result was positive. The egg morphology, appearance, color and presence of blastomeres were used to identify the parasites.

Data Analysis

The information and data that were collected on GI parasite of cattle and its risk factors during the period were recorded in excel Sheet and analyzed using SPSS version 20. Descriptive Statistics was used determine the prevalence through percentage and frequency. The significance of association between and among the considered variables was determined using *p*-value, chi-square (χ^2) test statistics. Association between variables was said to exist if the calculated level of significance is less than 5% ($p<0.05$) at 95% confidence level.

RESULTS

Overall Prevalence of GIT Parasite

Based on the carpological examination, from 400 fecal samples of animals that were come to Jimma municipal abattoir for slaughter, 46.8% (187) of animals had GIT parasite. Variation had been observed on the prevalence of different types of gastrointestinal nematode parasites. 166 (88%) of the animals were positive with single parasite whereas 21 (11.2%) of the animals were positive for mixed types of GIT parasite. The study was detecting five genera of GIT parasite. Those were *Strongyle* type egg, *Trichuris* spp., *Monezia* spp, *Paramphistomum* spp and *Eimeria* spp. with the prevalence of 28.9% (54), 4.8% (9), 3.2% (6), 38.5% (72) and 13.4% (25), respectively. The diversity of those mixed parasite were Strongyle type with *Paramphistomum* spp., *Paramphistomum* spp. with *Eimeria* spp., *Eimeria* spp. with *Trichuris* spp., *Strongyle* spp. with *Monezia* spp., *Paramphistomum* spp. with *Monezia* spp., *Srongyle* type with *Eimeria* spp. and *Paramphistomum* spp. with *Trichuris* spp. and their prevalence were 42.9%, 14.3% , 14.3%, 9.5%, 14.3%, 23.8% and 10.0% , respectively (Tables 1 and 2).

Table 1. *Prevalence of Major Git Parasite of Cattle that Slaughtered at Jimma Municipal Abattoir*

Species of Parasite	No. of sample	Number of positive	Prevalence in %
Strongyle type	400	54	28.9
Trichuris spp.		9	4.8
Paramphistomum spp.		72	38.5
Monezia spp.		6	3.2
Eimeria spp.		25	13.4
Mixed parasite		21	11.2
Total	400	187	100

Table 2. *Prevalence of Mixed Git Parasite of Cattle Slaughtered at Jimma Municipal Abattoir*

Types of Parasite Genera	No of Animal Examined	No of Positive Animals	Prevalence in %
Strongyle type Paramphistomum spp.	400	9	42.9
Paramphistomum spp. with *Eimeria* spp.		3	14.3
Eimeria spp. with *Trichuris* spp.		3	14.3
Strongyle type with *Moneizia* spp.		2	9.5
Paramphistomum spp. with *Monezia* spp.		3	14.3
Srongyle type with *Eimeria* spp.		5	23.8
Paramphistomum spp. with *Trichuris* spp.		2	10.0

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Table 3. *Prevalence of Git Parasite Cattle Slaughtered at Jimma Municipal Abattoir in Related to Risk Factor*

Risk Factor	Number of Animal Examined	Number of Positive Sample	Prevalence in %	χ2	*p*-value
Origin of Animals					
Kersa	75	38	50.7		
Dedo	87	30	34.5		
Seka Chekorsa	95	62	65.3	22.971[a]	0.001
Oma Nada	89	32	36.0		
Mana	54	25	46.3		
Age Categories					
Young	142	107	75.4		
Adult	190	67	35.3	77.591[a]	0. 001
Old	68	13	19.1		
BCS					
Poor	114	72	63.2		
Medium	182	90	49.5	34.411[a]	0.001
Good	104	25	24.0		
Months					
November	80	52	65.0		
December	80	39	48.8		
January	80	30	37.5	15.927[a]	0.003
February	80	35	43.8		
March	80	31	38.8		

Prevalence of Gastrointestinal Parasite Based on the Risk Factor

The prevalence of gastrointestinal parasite based on origin of the study animals was identified and out of the total 75 animals from Kersa, 87 from Dedo, 95 from Seka Chekorsa, 89 from Oma Nada, and 54 from Mena, 50.7% (38), 34.5% (30), 65.3% (62), 36.0% (32), and 46.3% (25), respectively of them were positive at least for one GIT parasite. The difference was statistically significant with *p*-value of 0.001 ($p \leq 0.05$) and Chi-square value of 22.971. Young, adult and old animals were found to be infested with a prevalence of 75.4%, 75.4% and 19.1, respectively with statistically significant difference with *p*-value of 0.001 ($p<0.05$) and χ^2 of 77.591[a]. Infection prevalence was significantly highest in animal with poor body condition followed by medium and good body condition scores and difference was statistically significant with *p*-value was 0.001 ($p<0.05$) and χ2 of 34.411[a]. The overall infection prevalence according to body condition grades, 63.2%, 49.5% and 24.0% with poor, medium and good, respectively (Table 3).

In addition, the prevalence of GIT parasite of cattle in the different month was recorded and the associations found statistically significant ($p<0.05$) and its *p*-value was 0.001. The prevalence was 65.0%, 48.8%, 37.5%, 43.8% and 38.8% in November, December, January, February and March, respectively.

DISCUSSION

Gastrointestinal tract parasites cause severe infection to domestic animals worldwide. Those GIT parasite mostly caused by nematode, cestode, trematode and protozoa in domestic animals and affects fertility, work capacity, involuntary culling, reduction in food intake, weight & milk production and higher mortality rate.[18,19]

The findings of present study show that from 400 of the cattle screened, 46.8% (187) of animals had at least one GIT parasite infection which was similar with the result study of Adedipe et al[20] on the prevalence gastrointestinal helminths in slaughtered cattle in Ibadan, South-Western Nigeria which was 41.6% and of Lemy and Egwunyenga[21] on the prevalence of parasitic helminthes at various abattoirs in Abraka, Delta State, Nigeria which was 50.4%. However, it was less than that of other study result of Waruiru et al[22] in the central Highlands of Kenya, of Elele et al[23] at selected abattoirs in Port Harcourt, South-south, Nigeria, of Usman et al[24] in Katagum Abattoir Of Bauchi State, Nigeria, of Okike et al[25] at Aba, Nigeria, of Luka et al[26] at Gombe Abattoir, Gombe State, North-Eastern Nigeria and of Bisimwa et al[12] which were 86.8%, 62.1%, 61.8%, 87.41%, 80.72% and 74%, respectively. In addition to that the result of the study was greater than other study results which were conducted in Wukari Local Government abattoir, in Taraba State, North-Eastern Nigeria[20] and in Wudil Local Government Area abattoir in Kano State, Nigeria[27] with the same overall prevalence of 34.9%. These differences could be due to the periods or seasons in which the studies were conducted, the management system, topography climatic condition that favors the survival of infective stage of the parasite and intermediate hosts as well as the sources of cattle sampled in the various regions

In this study different genus of parasite was found. Five genus of parasite was observed. Those are *Strongyle* type, *Trichuris* spp., *Paramphistomum* spp., *Eimeria* spp. and *Monezia* spp. Those GIT were encountered in the study had been reported by other

researcher in different parts of the other country.[12,20-26]

Furthermore, the study showed that paramphistomum eggs were the most prevalent among the parasite which has prevalence of 38.5%. This prevalence was greater than the reported study that was conducted at Wukari Local Government abattoir, in Taraba State, North-Eastern Nigeria which was 23.70%[28]; furthermore, it was disagree with reported result of Ayalew et al[29] who reported paramphistomum prevalence which was greater than the study which was 51.82% in Gondar Elfora Abattoir.[30] This difference might be associated with the differences in geographical and/or climatic conditions and ecology of the region, health management of the animals and availability of the intermediate hosts.

In addition, the mixed infection such as *Strongyle* type with *Paramphistomum* spp., *Paramphistomum* spp. with *Eimeria* spp., *Eimeria* spp. with *Trichuris* spp., *Strongyle* type with *Monezia* spp., *Paramphistomum* spp. with *Monezia* spp. and *Srongyle* type with *Eimeria* spp. which also reported in different study at Various Abattoirs in Abraka, Delta State, Nigeria.[21] Mixed infection was characterized by the presence of two or more helminths. The phenomenon of mixed infection has been suggested to be an important cause of morbidity and reduced production in livestock.[28] Furthermore, the immune suppression of the host immune system by mixed infections increases host susceptibility to other diseases or parasites.

In the study the single infections were found more prevalent in comparison to mixed infections. Out of 400 samples examined 166 (88%) had GIT one type of GIT parasite and 21 (11.2%) had mixed parasite which was disagree with reported result of Yuguda et al[31] which was (55.67%) had single and 56 (18.67%) had mixed infection with different helminths species. The possible reason was the difference in management of animals and ecology of the area.

From the present result of study, cattle with poor body condition score had highest prevalence of gastrointestinal parasite when compared to those that were moderate and good body condition. The cause might be related to nutritional deficiencies which may have interfered with the development of acquired immunity in cattle.[31] Possible reason for this could be that those with moderate and good body condition for a number of reasons, including good nutrition, tolerated helminth infections better or that both host and parasites had reached a state of equilibrium and were asymptomatic at the point of faecal collection.[32]

The present study also shows that the presence of significant difference ($p \leq 0.05$) among the origin of cattle in related to GIT parasite. The prevalence of GIT parasite highest in Seka Chekorsa (65.3%) and followed by Kersa (50.7%), Mena (46.3%), Oma Nada (36%) and Dedo (34.5%) in decreasing order. The difference in the prevalence obtained could be attributed to the existence of favorable environmental factors necessary for the prolonged survival and development of infective larval stage of most helminthes.[33] District of Seka Chekorsa, Kersa, Dedo, Seka Chekorsa, Oma Nada, and Mena have different swampy area which were accounted as part of swampy, degraded unusable part of their land of 22.8%, 18.9%, 14%, 11.7% and 5.4%, respectively which is favorable environmental factors necessary for the prolonged survival and development of infective larval stage and other factor.

Statistically significant difference among the age of animals as risk factor for GIT parasite also found in this study. The young animals were most infected when compared with adult and old animals with prevalence of 75.4%, 35.3% and 19.1%, respectively. There was a decrease in infection rate (prevalence) as age increased. This may be due to the result of acquired immunity (natural) with age which is manifested by humoral immune response through frequent challenges and expel the ingested parasite before they establish infection. The natural immunity of the animals influenced by nutrition and general condition of the animal.[34] The result was similar with the study result of Shitta et al[35] in which young has prevalence of 45.30% than the adult examined which had 30.10%.

In addition the study shows that there was statistically significant difference of GIT parasite prevalence in different month in which sample was collected. The highest prevalence of helminths parasitic infections (65.0%) was recorded in November which was included in the rainy season and lowest prevalence (37.5%) was recorded in January which was categorized in dry season. This finding was in agreement with Wadhwa et al[36] and Kumar et al[37] who recorded higher incidence of parasitic infection during rainy season and lower prevalence during dry season. This may be due to high-moisture content and temperature which favours the growth and development of larvae on pasture resulting in increased contact between the host and parasites. In addition to that the reason of the lowest prevalence (37.5%) was recorded in January might be the January was come followed driest month of the December (en.climate-data.org). Thus, there were no available larvae of parasite whose cycle depends on optimum temperature and moisture that were infecting the cattle.

CONCLUSION AND RECCOMMENDATIONS

Generally, gastrointestinal parasites are considered as the major diseases of cattle which are one of the major causes of wastage and decreased productivity exerting their effect through mortality, morbidity, decreased growth rate, weight loss in young growing calves and late maturity of slaughter stock, reduced milk and meat production and working capacity of the animal mainly in developing countries. The study was performed to identify and find the prevalence of GIT parasite at abattoir. Five types of GIT parasites were identified including *Strongyle* type, *Trichuris* spp., *Paramphistomum* spp., *Eimeria* spp. and *Monezia* spp. In addition this study identified the potential risk factors such as age, body condition and the origin of the animals and season of the year which showed statistically significant difference associated with high-prevalence rate. Therefore based on the above conclusion the following recommendations are forwarded:

- Animals should be management in good manner to lessen their susceptibility

- periodical deworming need to be applied in the area to reduce the prevalence of the GIT parasites of cattle
- The habitat of the intermediate host should be the destructed if it is possible

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ANNEXES

Collection of Fecal Samples and Laboratory Procedures

Collection of fecal samples: Collection of faecal samples is performed according to the following procedure;

- Faecal samples for parasitological examination were collected from the rectum of the animal
- Then it was put in to universal bottles
- Each universal bottle was clearly labeled with animal identification, date and place of collection.
- Then Samples were packed and dispatched in a cool box to avoid the eggs developing and hatching.
- As soon after passage from the animal as possible examination was carried out.
- But when the processing of a fecal specimen delayed for some reason, it was preserved for the followed day be used; it was fixed with 10% formalin. Fixative added to feces at a ratio 3:1 (v:v) and mixed well.

Processing fecal samples

Floatation method

Principle: The simple test tube flotation method is a qualitative test for the detection of nematode and cestode eggs and coccidiaoocysts in the faeces. It is based on the separating of eggs from faecal material and concentrating them by means of a flotation fluid with an appropriate specific gravity.

Application: This is a good technique to use in initial surveys to establish which groups of parasites are present.

Equipment

- Beakers or plastic containers
- A tea strainer (preferably nylon) or double layer cheesecloth
- Measuring cylinder or other container graded by volume
- Fork, tongue blades or other type of stirring rod
- Test tube
- Test tube rack or a stand
- Microscope
- Microslides, coverslips
- Balance or teaspoon
- Flotation fluid

Procedure

a. Put approximately 3 g of faeces (weigh or measure with a precalibrated teaspoon) into Container 1.
b. Pour 40 ml flotation fluid into Container 1.
c. Mix (stir) faeces and flotation fluid thoroughly with a stirring device (tongue blade, fork).
d. Pour the resulting faecal suspension through a tea strainer or a double-layer of cheesecloth into Container 2.
e. Pour the faecal suspension into a test tube from Container 2.
f. Place the test tube in a test tube rack or stand.
g. Gently top up the test tube with the suspension, leaving a convex meniscus at the top of the tube and carefully place a coverslip on top of the test tube.
h. Let the test tube stand for 16 minutes.
i. Carefully lift off the coverslip from the tube, together with the drop of fluid adhering to it, and immediately place the coverslip on a microscope slide (Table 1.1).

Table 1.1. *Specific Gravity of Some Helminth Eggs*

Species	Mean Specific Gravity	Range
Ancylostomacaninum	1.0559	1.0549-1.0573
Toxocaracanis	1.0900	1.0791-1.0910
Toxocaracati	1.1005	1.1004-1.1006
Taenia sp.	1.2251	1.2244-1.2257
Physalopterasp.	1.2376	1.2372-1.2380
$ZnSO_4$ Solution	1.18	
Saturated Salt or Sugar	1.20	

Source: David and Lindquist, 1982. J. Parasitology 68:916-919.

Sedimentation technique (for trematode eggs)

Principle: The sedimentation technique is a qualitative method for detecting trematode eggs (Paramphistomum) in the faeces. Most trematode eggs are relatively large and heavy compared to nematode eggs. This technique concentrates them in sediment.

Application: This is a procedure to assess the presence of trematode infections. It is generally run only when such infections are suspected (from previous postmortem findings on other animals in the herd/flock area), and is not run routinely. The procedure can be used to detect liver fluke (Fasciola) and Paramphistomum eggs.

Equipment

- Beakers or plastic containers
- A tea strainer or cheesecloth
- Measuring cylinder
- Stirring device (fork, tongue blade)
- Test tubes
- Test tube rack
- Methylene blue
- Microslide, coverslips
- Balance or teaspoon
- Microscope

Procedure

a. Weigh or measure approximately 3 g of faeces into Container 1.
b. Pour 40 ml of tap water into Container 1.
c. Mix (stir) thoroughly with a stirring device (fork, tongue blade).
d. Filter the faecal suspension through a tea strainer or double-

layer of cheesecloth into Container 2.
e. Pour the filtered material into a test tube.
f. Allow to sediment for 5 minutes.
g. Remove (pipette, decant) the supernatant very carefully.
h. Resuspend the sediment in 5 ml of water.
i. Allow to sediment for 5 minutes.
j. Discard (pipette, decant) the supernatant very carefully.
k. Stain the sediment by adding one drop of methylene blue.
l. Transfer the sediment to a microslide. Cover with a coverslip.

Microscopically examination of prepared samples: the prepared samples on microslides from the simple test tube flotation method, the simple flotation method and the sedimentation method are examined under a microscope at the magnifications listed in Table 1.2

Table 1.2. *Magnification Levels for Examining Prepared Samples*

Magnification	Parasites
10×10	Nematode and cestode eggs
10×40	Coccidia oocysts
10×4	Trematode eggs

Age Determination Based on Dentations

Table 2. *Age Determination Based on Dentations Principle*

Age (year)	Characteristics change
1.5-2	I_1 erupt
2-2.5	I_2 erupt
3	I_3 erupt
3.5-4	I_4 erupt
5	All incisors and canine are in wear
6	I_2 is level and the neck has emerged from gum
7	I_2 is level and neck is visible
8	I_3 is level and the neck is visible, I_4 may be level
9	I_4 is level and the neck is visible
10	The dental stars are squire in I_1 and in all teeth by 12-years
15	The teeth that are not fallen out are reduced (small round pags)

Accordingly cattle was categorized in to 3: 1. if≤5, young; 2. if 5-10, adult; 3. if≥10, old. Source: Delauta and Habel (1986). (De-Lahunta, A and Habel, R.E (1986): Teeth applied Veterinary Anatomy. Webester Saunder Company. 4-6).

Body Condition Score

Table 3. *Body Condition Score Principle*

Score	General Feature
1	Marked emaciation (animal would be condemned at ante mortem examination).
2	Transverse process project prominently.
3	Individual dorsal spines are pointed to touch, hip and pin. Tail, head and ribs are prominent transverse process visible, usually individual.
4	Ribs, hip and spines clearly visible muscle mass between hook and pines slightly concave, slightly more flesh above the transverse process.
5	Ribs usually visible, little fat cover, dorsal pins are barely visible.
6	Animal smooth and well cover, dorsal pins cannot be seen but are easily felt.
7	Animal smooth well covered, but fat deposits are no marked. Dorsal spines can be felt with firm pressure, but rounded rather than sharp.
8	Fat cover in critical areas can be easily seen and felt, transverse process cannot be seen.
9	Heavy deposit of fat clearly visible on head brisket, dorsal, spines, ribs, hooks and pins fully, covered and cannot be felt even with firm pressure.

According to above table cattle was categorized in to 1. Poor: 1, 2, 3; 2. Medium: 4, 5, 6 and; 3. Good: 7, 8 and 9. Source: Nicholson and Butterworth, 1986

Data Collection Form

Table 4. *Monthly Prevalence of Gastrointestinal Helminthosis and Parasite Types of Cattle at Jimma Municipal Abattoir in 2018-2019*

Season/ Month	Cattle	Sex	Origin	Age	BCS	Parasite that Identified During Fecal Examination (FE)				
						Strongyle type	*Trichuris* spp.	*Paramphisomum* spp.	*Eimeria* spp.	*Monieziaspp.*