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Abbatoir and Coproscopic Survey on *Dictiocaulus viviparous* of Cattle in and Around KombolchaTown, South Wollo, Ethiopia

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Abstract: A cross sectional study was conducted to determine the occurrence and prevalence of *Dictyocaulus viviparous* in cattle in and around Kombolcha town. The study was conducted from November 2007 to April 2008. Standard corpological and postmortem examinations were employed to detect the presence of larvae and adult *D. viviparous* in examined cattle. For this purpose 402 lungs were collected from cattle slaughtered at Kombolcha ELFORA industrial abattoir. In addition fecal sample were collected from 200 cattle of all age groups and both sexes from different districts. Barman technique was used to extract larvae of *D. viviparous* from faces. An overall prevalence of 2% and 2.7 % was found by fecal and postmortem examinations respectively. The prevalence of *D.viviparous* was significantly ($p<0.05$) higher in the young than adult age groups of cattle. However, there was no statistically significant ($p>0.05$) variation in cattle of different sex and cattle from different districts. Absence of vaccination, weak veterinary services, poor management and husbandry practices are major factors responsible for the occurrence of *D. viviparous* in cattle of the study area.

Key words: *Dictyocaulus viviparous* · Cattle · Kombolcha · Abattoir

INTRODUCTION

Ethiopia is one of the richest countries in livestock population. Currently the population of cattle estimated at 41 million [1]. This makes the country the first in Africa. Livestock contribute to over 40% of the value of annual agricultural production [2, 3]. In addition 19% of export commodities come from livestock sector [4, 5].

However the productivity of livestock as food source in Ethiopia is poor. One of the major constraints to low productivity and mortality of animals in Ethiopia is the widespread and high prevalence of different diseases. Of these constraints, internal parasitism is one of the most important disease problems that hamper the growth of cattle industry. Some impacts of parasitic disease are loses due to acute illness and death; rejection of entire carcass organs or parts of it; and even more important is loses due to decrease in the productivity of cattle [6]. Endoparasites are a problem for cattle farmers worldwide [7].

Bovine dictyocaulosis is known to exist in East and South Africa [8]. End parasites, including *Dictyocaulus viviparous*, are major causes of death and morbidity in Ethiopian highlands [7]. Lungworm infection (dictyocaulosis) of cattle is a parasitic disease caused by *Dictyocaulus viviparous.* It results in development of verminous pneumonia, acute interstitial pneumonia and secondary bacterial pneumonia [9, 10].

Moisture is essential for survival and development of larvae and a moderate temperature 18-21°C permits their full development to infective stage. Desiccation rapidly kills the larvae whereas moderate temperature and high humidity will enhance their survival. Generally, *dictyocaulosis* is considered to be the disease of calves but it can also occur in yearlings and older cattle in their first grazing season or later [11].

The epidemiological picture may vary depending on climate and husbandry systems. In tropical countries, where the disease occurs intermittently, the epidemiology is quite different and probably depends on pasture

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contamination by carrier animals and may occur during flooding when cattle congregate on damp, high areas, rather than due to prolonged survival of infective larvae [12].

The occurrence of lung worm in Ethiopia was reported by Fikadu [13] with prevalence of 3.1% in Nekemte, Tesfaye [14] in Kombolcha, Gobena [15] in DebreZeit and Desta [16] in Bedelle.These fragment of information both in scope and area coverage shows that the occurrence and importance of the disease in Ethiopia. In Ethiopia, sound helminthes control strategy has not yet been established to any of the agro ecology due to lack of basic information on parasites. Specific studies on *D. viviparous* of cattle were never conducted in Ethiopia. This is in contrary to the reports of several previous works that indicated the worldwide distribution and high economic significance of bovine dictyocaulosis in several countries of the world.

Therefore the objectives of this study were:

- To determine the prevalence of lungworm infection of castles in and around the study area.
- To assess the occurrence and load of lungworm in different management systems, Agro ecology and among different age groups and sex.

MATERIALS AND METHODS

Study Area: The conducted was from November 2007 to April 2008 in districts located around Kombolcha town in South Wollo located 375 km North East of Addis Abeba. The altitude ranges from low land to highlands. The topography of the South and North Wollo was marked by the presence of numerous mountains, plateaus, hilly and sloppy areas, rivers, streams and lakes. Generally the climate of South and North Wollo was divided into sub-humid; arid and semi desert. Kombolcha and its surrounding are categorized as 90% mid- latitude and 10% high altitude.

The two zones experienced bi- modal rainfall, the short and the long rain with 39.63 and 1000 mm respectively. The maximum and minimum daily temperatures during short and long rains varied from 32.9°C to 11.7°C respectively and the relative humidity of the region varied from 23.9 to 7.9 %. Both south and North Wollo Zones are characterized by two main seasons in a year. The dry season "Bega", extends from January to the end of April with mean rainfall of 100 to 300 mm, whereas the long rainy season 'Kermit' extends from July to end of September and its mean annual rainfall is 200-1000 mm.

The vegetation of the area varies from savanna grass lands, bushes and dense spiny shrubs of the lowlands of Kombolcha to huge tree like *Junipers, Acacia, Hagina abyssinicate* (kosso) and *Cordia africana.* The farming system is mixed crop-livestock production type and extensive management of nomadic pastoral with semi-intensive private dairy farms. According to the Kallu district agricultural and rural development office, livestock population comprises of 90, 664 heads of cattle, 12,975 sheep, 31,045 goats, horses, 728 mules, 7,758 donkey, 866 camel and 43,010 poultry [17].

Study Animals: The study animals were cattle which consist of male and female cattle of all age groups that are kept under intensive and extensive management system. A total of 602 head of cattle from different districts in Wollo were studied. The data were summarized into different groups based on agro ecology, management systems, sex and age of the study cattle. Based on altitude and climate condition of their market origin, cattle from Dessie, Kutaber and Dessie Zuriya were considered as highland animals while from Kombolcha and Kallu were midland and those from Afar, Bati, Cheffa and Kemisse were considered as lowland animals. They are categorized into three age groups as Group I < 2 years, Group II 2-7 years and Group III > 7 years from postmortem examinations whereas for coprological examination based on districts, management systems and two age groups as Group I = Young and Group II = Adult.

Study Design and Sample Collection: For coprological examination faecal samples were collected directly from the rectum of randomly selected animals. For postmortem examinations the lungs were collected and stored in icebox immediately after slaughter from Kombolcha industrial abattoir. A total of 602 cattle were examined, out of which 402 were subjected to postmortem examination while the rest 200 were tested by coprological examination. The origins of the study cattle were different districts of South Wollo Zone for postmortem examination whereas the cattle used for faecal sample were originated from Kombolcha and the surroundings districts representing different ranges of altitudes from low to highland.

Parasitological Techniques

Corpological Examination: Faecal samples were directly collected from the rectum and transported to the laboratory in its fresh state and then 20gm of faces was weighted and diluted with some amount of water to form a paste. This was then placed on gauze lining sieve and

then was placed in the water surface in the glass funnel. Since Lungworm worm can be diagnosed by Baermann apparatus described by [18]. Then the whole apparatus was left for 24 h, then from the bottom of apparatus the first 6 ml was collected in calibrated centrifuge tube in which the total larvae was found. It was well mixed and with calibrated pipette 0.15 ml was taken and ejected in glass slide and on it 1% drop of iodine was added to kill any larvae. Then it was covered with cover slip and examined under the microscope for the first stage larvae Fraser and Urquhart [19].

Postmortem Examination: A total of 402 lungs along with trachea were collected from cattle slaughtered at Kombolcha ELFORA meat factory. The trachea and bronchi were cut open with fine blunt pointed scissors to detect parasites. Visible worms were then removed from the opened lungs and transferred to beakers containing saline. To recover non visible worms, opened lungs were soaked in worm saline overnight [20]. The lungs were palpated for the presence of nodules, which are usually grayish white in color, if present they are trimmed off and worms extracted from the tissue by gentle compressing a small non- calcified nodule or part of large nodule between two glass sides and then carefully teasing the worm away from the tissue with thumb forceps. The nodules were soaked in beaker containing worm water.

Data Analysis: Descriptive statistics was used for data summarization and presentation. The study variables were analyzed using statistical software called ***SPSS*** for window version 15. Categorical variables were analyzed using Chi-square and Fisher exact tests. The statistical significance of the study variables were evaluated at P<0.05.

RESULTS

Prevalence of Lungworm

Postmortem Observation: Of the total 402 cattle (173 from highland, 134 from midland and the rest 95 were from lowland) examined by postmortem inspection 11 (2.7%) were found to be positive for lungworm infection. Of 173 animals examined from highland 7 (4%) were positive and from 134 mid- land animals 3(2.2%) were positive, from 95 lowland animals 1(1.1%) was positive (Table 1). There was no significant difference (P>0.05) between the prevalence of lungworm in cattle from different altitudes. However, the highest prevalence was recorded in highland while the lowest recorded in midland while the list was recorded in lowland as shown in Table 1.

Table 1: Prevalence of *D.viviparous* in slaughtered cattle by altitude.

Altitude	No of examined Animals	Positive	Prevalence (%)
Lowland	95	1	1.1
Midland	134	3	2.2
Highland	173	7	4
Total	402	11	2.7

x^2 = 2.252 P> 0.05

Table 2: Prevalence of *D. viviparous* in slaughtered cattle by age groups

Age	No of examined Cattle	Positive	Prevalence
< 2 years	60	7	11.7
2-7 years	181	3	1.7
> 7 years	161	1	0.6
Total	402	11	2.7

x^2 = 21.477, P<0.05

Table 3: Prevalence of *D. viviparus* in Slaughtered cattle by sex.

	Sex (n=402)	
	Male	Female
No of examined	275	127
Positive	6	5
Prevalence	2.2	3.9

x^2 = 1.006, P>0.05

Table 4: Prevalence of *D. viviparus* in cattle by district.

District	No of examined	Positive	Prevalence (%)
Dessie Zuriya	34	2	5.9
Kombolcha	49	1	2
Degan	30	1	3
Harbu	32	0	0
Ressa	26	0	0
Chomiye	29	0	0
Total	200	4	2

x^2= 4.663, P>0.05

There was a significance difference (x^2= 21.4777, P< 0.05) in the prevalence of *D. viviparous* infection between the three age groups. The prevalence was highest in young cattle as shown in Table (2).

The study showed insignificant difference (x^2 = 1.006, P>0.05) in the prevalence of lungworm infection between male and female cattle. Out of 275 male cattle 6 (2%) were positive whereas out of 127 female cattle 5 (3.9%) were infected by *D. viviparous* as shown in Table (3).

Coproscopic Observation: Of the total 200 cattle examined by Baermann technique from six districts of South Wollo Zone 4(2%) were found to be infected with *D. viviparous* (Table 4).

The study showed insignificant difference (x^2= 4.663, P>0.05) in the prevalence of lungworm in cattle from different districts. However, highest prevalence was recorded in Dessie Zuria (5.9) followed by Degan (3.3%), Kombolcha (2%) and the rest with zero

Table 5: Prevalence of *D. viviparus* in cattle by sex and management systems

	Management (n=200)			
Sex (n=200)	Female	Male	Extensive	Semi-intensive
No examined	101	99	160	40
Positive	1	3	4	0
Prevalence (%)	1	3	2.5	0

x^2= 1.062, P>0.05

Table 6: Prevalence of *D. viviparus* in cattle by age groups.

Age	No examined	Positive	Prevalence (%)
Young	153	4	2
Adult	47	0	0
Total	200	4	2

x^2= 1.254, P>0.05

prevalence The study showed insignificant variation (x^2= 0.312, P>0.05) in the prevalence of lungworm in cattle kept under different management systems. Higher prevalence (2.5%) was recorded in cattle maintained under extensive management systems as shown in Table (5).

There was no Statistically significant (x^2=1.062, P > 0.05) difference in the prevalence in of lungworm between male and female cattle. The prevalence was higher in males (3%) than females (1%) as shown in Table (5).

There was significant difference (x^2 = 1.234, P<0.05) in the prevalence of *D. viviparus* in young and adult cattle groups. The prevalence was significantly higher in young age group (2%) than in adult cattle.

DISCUSSION

The present study showed the occurrence of infection by *D. viviparus* in cattle studied in around Kombolcha. In the study examination of 602 cattle for presence of *D. viviparus* using coprological and postmortem techniques revealed prevalence of 2 and 2.7%, respectively. The figure obtained from postmortem examination (2.7%) on age basis agrees with the reports by Abayneh [188] in Assela abattoir and Umur and Ozcan in kirkkale province, Turkey. This figure is higher (2.7%) than the prevalence obtained by Coproscopic examination (2%). This finding is consistent with that of Bulangamoi and Kongonyera in Nairobi abattoir, Chartier [21] in highlands of Zaire, Gupta and Gibbs 1969. In Canada and Alemu *et al* [4] from small ruminants in Ethiopia. One of the probable reasons attributes for such difference could be due to stage of parasites. In the pre-patent or post-patent phases or during hypobiosis, it is impossible to detect these parasites by faecal examination Fraser [22].

Other factors like the immune status, season and breed of animal may affect prolificacy of this parasite. Furthermore, egg lying may be inhibited by immune reaction of the host Hansen Brain [9].

The observation was significantly higher prevalence of *D. viviparus* in young age groups than adult cattle in the study could possibly explained by the fact that the young cattle were found to be more frequently affected than adult groups.

The result obtained from coprological examination also showed that the existence of statistically significant (P<0.05) on age basis. The higher prevalence was found (2%) in young age group. From the results it is evident that the prevalence of *D. viviparous* was higher in the young than adult cattle. This result is in agreement with the results by Fikadu (1986) in Nekemte, East Wollega (3.1%) and Fikiru[23] in West Wellegan (1.97%). Jithendran and Bahat [24] North West in Humid Himiliyan Region of India (1.9%); Fikru *et al.* [25] in West Oromia, Ethiopia (0.4%), Faris [26]in Holeta and its surroundings (1.5%). However it contrasts the work by Thomsborg*et al.*[27]in Tropical highlands of Tanzania (7%), Murphey *et al.*[28]in Ireland (14%), Lyony*et al.* [29] in Kentucky (7%), Hoglund *et al.*[30] in Sweden (11.8%) and Jimrnez *et al.* [31] in Costa Rica (10.8%). This variation in the prevalence of *D. viviparus* between the current and previous studies is most probably due to differences in altitude, breed and rainfall, hence humidity and temperature differences in different areas.

There was no statistically difference in the prevalence of *D. viviparus* in cattlekept underdifferent management systems. This could possibly attribute to the similarities in agro ecology in South Wollo due to lack of difference in humidity and temperature in the study districts. The International Livestock Center for Africa [**7**] in 1990 has also reported that well nourishment and watering lead to less risk of helminthes infection.

In this study there was no variation in the prevalence of *D. viviparus* in male and female cattle. This finding is in line with the observation of Regassa *et al.* [33] The study showed that the prevalence of *D. viviparus* was not significantly higher in cattle from different altitudes.

CONCLUSION

The study of lungworm infection in cattle by faecal and postmortem examination in six districts of South Wollo Zone and Kombolcha town in the administrative division of Amhara national regional state, revealed an overall prevalence of 2% and 2.7%, respectively. In

addition *D. viviparus* was detected in cattle of all age groups and both sexes. Also dictyocaulosis affected cattle kept in different management system and cattle kept in all agro ecology.

On the basis of the present findings, the following recommendations are forwarded:-

- Livestock owners should be educated about the occurrence, importance and means of control of *D. viviparus* in cattle.
- Detailed studies are warranted to assess the importance of *D. viviparus* in cattle of different breed, management system and agro ecology.
- Sensitive techniques like seroepidemiological methods should be used to establish the real prevalence in Ethiopia.

REFERENCES

1. Central Statistical year book Addis Abeba, Ethiopia. 24: 5-7. (CSA, 2004)
2. Sendros, D. and K. Tesfaye, 1997. Factors to be considered in the formulation of livestock breeding policy. 5th National Conference of ESPA, pp: 13-27.
3. Tesfaye, H., 1995. Short account on major activities during the externship program of ruminants. ILRAD, Nairobi, Kenya.
4. Alemu, S., E.G. Leykun, G. Ayelet and A. Zeleke, 2006. Study on small ruminant lungworms in Northern Ethiopia. Veterinary parasitology, pp: 1-6.
5. Azage, T. and G. Alemu, 1997. Prospect for peri-urban dairy development in Ethiopia. 5th National Conference of ESPA. Addis Abeba, Ethiopia, pp: 28-29.
6. Mboera, L.E.G. and J.J. Kitalyi, 1992. Small ruminant and development in Africa. ILCA, pp: 117.
7. ILCA (International Livestock Center for Africa),1990. Annual report 1989. ILCA, Addis Abeba, Ethiopia.
8. Torncy, P.M., 1989. Manual of Tropical Veterinary Parasitology. Helminth of Livestock and Poultry in Tropical Africa. The International Technical Center for Agricultural and Rural Corporation, C. A. B. International, pp: 81-85.
9. Hansen, J.O. and B. Perry, 1994. The epidemiology, diagnosis and control of helminthe parasites of ruminants. 2nd ed. Nairobi, Kenya; ILRAD.
10. Rodostitis, O.M., D.C. Blood and C.C. Gay, 1994. Veterinary Medicine. A text book of the disease of cattle, sheep, pig, goat and horses. 8th ed. Bailliere Tindal, pp: 6-11
11. De Leeuw, W.A. and J.B.W.J. Cornelissan, 1991. Identification and isolation of specific antigens with diagnostic potential from dictyocaulusviviparus. Veterinary parasitology, 39(1-2): 137.
12. Urquhart, G.M., G. Armur, J.L. Duncan, A.M. Dunn and F.W. Jennings, 1996. Veterinary parasitology Longman scientific and technical, New York, pp: 33-40.
13. Fikadu, S., 1986. Investgation on Ascaries and Helminthes of calves at Nekemte and its surrounding area. DVM thesis, FVM, AAU. Debrezeit, Ethiopia.
14. Tesfaye, H., 1995. Short account on major activities during the externship program of ruminants. ILRAD, Nairobi, Kenya.
15. Gobena, A.C., 1996. Bovine Tuberculosis: Evaluation of Diagnostic Tests, Prevalence and Zoonotic importance. AAU, FVM, Debrezeit, Ethiopia.
16. Desta, B., 1997. Seroepidemiological investigation of contagious bovine pleuropneumonia in Illubabor and Wellega (Western Ethiopia) DVM thesis, AAU, FVM, Debrezeit, Ethiopia.
17. South Wello Agricultural Bureau (SAB), 2000
18. Abayneh, L., 1999. Pulmonary lesion of cattle slaughtered at Assela abattoir. DVM thesis, AAU, FVM, Debrezeit, Ethiopia.
19. Urquhart, G.M., G. Armur, J.L. Duncan and F.W. Jenning, 1994. Veterinary Parasitology Longman English Language Society, pp: 39-58.
20. Urquhart, G.M., G. Armur, J.L. Duncan, A.M. Dunn and F.W. Jennings, 1996. Veterinary parasitology Longman scientific and technical, New York, pp: 33-40.
21. Chartier, C., 1990. Dominant characters of of helminth parasitisim in cattle in Ituri (Upper Zaire). I. The helminth fauna. Revue d' Elevageet de MedecineVeterinaire des pays Tropicux, 43: 75-84.
22. Fraser, C.M., 1991. The Merck Veterinary manual. A handbook of Diagnosis Therapy and Disease Prevention and Control for the Veterinarians. 7thed; Merck and Co; Inc, Rathway, NIT USA, pp: 714-717.
23. Fikru, R., 2001. Herd prevalence of contagious pleuropneumonia, Bovine Tuberculosis and Dictyocaulosis in Bodjiwereda, West Wellega. DVM thesis, AAU, FVM, Debrezeit, Ethiopia.
24. Jithendran, K. P. and T.K. Bhat, 1999. Epidemiology of parasites in Dairy Animals in the North West Humid Himalayan Region of India with Particular Reference to Gastrointestinal Nematodes. Tropical Animal Health and Production, 31: 205-214

25. Fikiru, R., S. Teshale, D. Reta and K. Yosef, 2006. Epidemiology of Gastrointestinal parasites of Ruminants in Western Oromiya, Ethiopia. Intern JAPPL. Res. Vet. Med., 4(1): 51-57.
26. Faris, D., 2005. A study on Endo and Ecto parasite of young cattle in Holleta and its surroundings. DVM thesis, AAU, FVM Debrezeit, Ethiopia..
27. Thamsborg, S.M., M.E. Boa, A.E. Makundi and A.A. Kassuku, 1998. Lungworm Infection (Dictyocaulosviviparus) on Dairy cattle Farms in Tropical Highlands of Tanzania. Tropical Animal Health and Production, 30: 93-96.
28. Murphy, T.M., K.N. Fahy, A. McAuliffe, A.A. Forbes, T.A. Cleeg and D.J. O'Brien, 2006. A study of helminth parasites in culled cows from Ireland. Preventive veterinary Medicine, 76: 1-10.
29. Lyons, E.T., D.J. Patterson, T. Johns, R.C. Gills, S.C. Tolliver, S.S. Collins and S. Stamper, 1993. Survey for Internal Parasites in Cattle in FentuCky. Veterinary parasitology, 58: 163-168.
30. Hoglud, J., S. Viring and M. Torntvist, 2004. Sero prevalence of Dictyocaulosviviparus in first grazing season calves in Sweden. Veterinary Parasitology, 125: 345-352.
31. Jimenez, A.E., V.M. Montencro, J. Hernandez, G. Dolz, L. Maronda, J. Galindo, C. Epe and T. Shinider, 2007. Dynamics of infectious with gastrointestinal parasites and Dictyocaulosviviparus in dairy and beef cattle from Costa Rica. Veterinary Parasitology, pp: 1-10.
32. Regassa, F., T. Sori, R. Dhuguma and Y. Kiros, 2006. Epidemiology of gastrointestinal parasites of ruminants in Western Oromiya, Ethiopia. Intern JAPPI Res. Vet. Med. 4(1): 51-57.