Relative occurrence of Fasciola Species in Cattle, Sheep and Goats slaughtered at Dagoretti Slaughterhouse in Kenya

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Abstract
A cross sectional survey was carried out in Nairobi’s Dagoretti slaughterhouse, where routine post-mortem meat inspection was done. All the liver flukes detected in cattle, sheep and goats were collected and transported to the laboratory for analysis to determine the relative occurrence of Fasciola gigantica and Fasciola hepatica in slaughtered cattle, sheep and goats by observing their size and morphology. The study showed that all the liver flukes collected in Dagoretti were F. gigantica. A total of 1584 cattle, 989 sheep and 954 goats originating from five out of the eight provinces of Kenya were slaughtered at Dagoretti slaughterhouse with age and sex ratio of 73% male and 27% female respectively. The intermediate hosts for F. gigantica and F. hepatica are Lymnaea natalensis and Lymnaea truncatula respectively (Bitkaramire, 1969). F. gigantica is thought to be the most important species in ruminants in Kenya although F. hepatica is also known to occur. The relative occurrence of these two species has however, not previously been determined in any part of the country or even the whole country and hence the need for this study. The prevalence of the two Fasciola parasite species was determined through a study of the size and morphology of the parasites collected from livers of cattle, sheep and goats.

Materials and Methods
Dagoretti slaughterhouse is constituted by a group of slaughterhouses. This makes Dagoretti the largest slaughterhouse in Kenya. The animals slaughtered in Dagoretti come from almost every part of the Republic of Kenya. Liver flukes from infected livers of the three livestock species were collected and differentiated into species using their size and morphological features (Reinecke, 1983; Soulsby, 1986). The relative occurrence of the two Fasciola species from Cattle, sheep and goats slaughtered at Dagoretti slaughterhouse was determined. During a period of two months, visits were made to the slaughterhouse to collect samples of liver flukes. During these visits, the livers of all the slaughtered animals were inspected for the presence of liver fluke. A minimum of 6 liver flukes was picked from every infected liver with the exception of livers with less than 6 liver flukes. The flukes were preserved in universal bottles containing 70% alcohol and transported to the laboratories at the Faculty of Veterinary Medicine, University of Nairobi for examination. Details that were recorded during meat inspection for each animal from which fluke samples were collected were: age, sex, origin of the animal, number of liver flukes present in the liver and extent of the liver damage. In the laboratory, the liver flukes collected were measured and classified into species based on the size and morphological features described by Reinecke (1983) and Soulsby (1986). The liver flukes were transferred to petri dishes and spread on the table placing them on a clean white paper. A transparent thin glass was placed on top of the liver flukes and their sizes measured using a ruler. Liver flukes that were less than 40 mm in length, leaf shaped with broad shoulders and pointed posterior ends were classified as F. hepatica. The Fasciola that were more than 40 mm in length, more elongate than leaf shaped, with sloping shoulders and had a rounded posterior were classified as F. gigantica. Other characteristics used were that flukes that were grey in colour when preserved in 70% alcohol were classified as F. gigantica while those that were transparent were classified as F. hepatica.

Introduction
Fasciolosis is a worldwide parasitic liver infection of wild and domestic ruminants caused by trematodes of the genus Fasciola. The disease is caused mainly by two species of Fasciola, namely: Fasciola gigantica and Fasciola hepatica (Blood et al., 1994). The two species are known to cause the disease in domestic ruminants in Kenya (Ogamba-ongoma, 1969). Adult worms of this genus parasitize the bile ducts of various definitive hosts, mainly ruminants (Soulsby, 1986). In Kenya the intermediate hosts for F. gigantica and F. hepatica are Lymnaea natalensis and Lymnaea truncatula respectively (Bitkaramire, 1969). F. gigantica is thought to be the most important species in ruminants in Kenya although F. hepatica is also known to occur. The relative occurrence of these two species has however, not previously been determined in any part of the country or even the whole country and hence the need for this study. The prevalence of the two Fasciola parasite species was determined through a study of the size and morphology of the parasites collected from livers of cattle, sheep and goats.

Fasciola hepatica is leaf shaped, broader anteriorly than posteriorly with a pointed cone shaped, projection that is followed by a pair of broad shaped shoulders. It is greyish brown in colour, changing to grey when preserved in 75% alcohol (Soulsby, 1986). F. gigantica resembles F. hepatica but is readily recognized by its large size being 25 - 75 mm in length and up to 12 mm in breadth. The anterior cone is smaller than that of F. hepatica, the shoulders are not as prominent and the body is more transparent (Soulsby, 1986).
the 147 cattle with fasciolosis showed extensive damage of the liver. The three animals were females. Six of the 147 cattle (4%) had less than two liver flukes and their livers did not show any gross visible liver damage. Eight (5.4%) cattle out of the 147 had between 50 and 100 liver flukes, whilst 130 (88.4%) had between 6 and 35 liver flukes. The results obtained with cattle are summarized in Table 1.

<table>
<thead>
<tr>
<th>Origin</th>
<th>N. Eastern</th>
<th>Central</th>
<th>Nairobi</th>
<th>Western</th>
<th>R. Valley</th>
<th>Eastern</th>
<th>Coast</th>
<th>Nyanza</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infected (%)</td>
<td>3 (17.6%)</td>
<td>34 (20%)</td>
<td>0 (0%)</td>
<td>6 (14.3%)</td>
<td>22 (16.3%)</td>
<td>1 (0.6%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>147 (0.7%)</td>
</tr>
<tr>
<td>F. gigantica</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>

**Sheep**

During the post mortem meat inspection, livers from a total of 989 sheep were inspected, of which 80 (8.1%) had liver flukes. In the 8 sheep with fasciolosis, no visible liver damage was detected and all collected liver flukes were *F. gigantica*. Among the 8 sheep with fasciolosis, 5 (62.5%) were males, while 3 (37.5%) were females. Among the 8 sheep with fasciolosis, 7 (87.5%) originated from Rift Valley province and 1 (12.5%) from Central province. Out of the 989 sheep inspected 156 (15.8%) came from North Eastern, 5 (0.5%) Central province, 73 (7.4%) Eastern province and 755 (76.5%) came from Rift Valley. The results obtained with sheep are summarized in Table 2.

Table 2. Number of sheep slaughtered in Dagoretti abattoir during the study period, province of origin and the number of sheep found to be infected, and the prevalence of fascioliosis.

<table>
<thead>
<tr>
<th>Origin</th>
<th>N. Eastern</th>
<th>Central</th>
<th>Nairobi</th>
<th>Western</th>
<th>Rift Valley</th>
<th>Eastern</th>
<th>Coast</th>
<th>Nyanza</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infected (%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>4 (0.6%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>4 (0.4%)</td>
</tr>
<tr>
<td>F. gigantica</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>4 (0.6%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>4 (0.4%)</td>
</tr>
<tr>
<td>F. hepatica</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
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</tbody>
</table>

**Discussion**

This study indicated that all the cattle, sheep and goats that were found to be infected with *Fasciola* during the meat inspection carried out at Dagoretti slaughterhouse had *F. gigantica*. Although the majority of the cattle...
inspected originated from RiR Valley province, the results of this study indicate that F. gigantica is the predominant species of Fasciola infecting cattle, sheep and goats in Kenya. This is in agreement with the report of Bitakaramire (1969). No sex relationship was established between the prevalence of fasciolosis in any of the livestock species in this study and the conclusion made was that all sexes have equal opportunity of being infected. All slaughtered animals were adults and their age was not influencing the extent of liver fluke infection. Mitchell, (1968) reported that Kenya and Uganda are inhabited solely by F. heptatica while Tanzania is exclusively inhabited by F. gigantica. However, Bitakaramire (1968) reported that in Kenya, fasciolosis of cattle is mainly due to F. gigantica. In Kenya, although there has been reference to F. heptatica (Froyd, 1959), the important species of Fasciola causing fasciolosis in cattle, sheep and goats is F. gigantica. This Fasciola spp is endemic in most districts of Kenya.

Conclusion
Fasciola gigantica was the only species of Fasciola recovered from infected livers from all three species of livestock examined at Dagoretti slaughterhouse. The occurrence of F. heptatica in cattle, sheep and goats in Kenya must be minimal or none.

Reference: