Prevalence and Financial Losses Associated with Porcine Cysticercosis in the Kumasi Metropolis of Ghana

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Abstract

An active abattoir survey was conducted from January to May, 2015 at two pig slaughter points in the Kumasi metropolis of Ghana to determine the prevalence of Porcine Cysticercosis (PCC). Ante mortem examination was conducted on 4121 randomly selected pigs and their sex and breed recorded. Their carcasses were then subjected to veterinary post mortem examinations and the number infected with PCC recorded. The overall prevalence of PCC was 2.31%. Female pigs (4.59%) were more affected than males (1.44%). The Ashanti Black pig (8%) was more affected than cross breeds (0.5%). An amount of 104,528.11 Ghana cedis was lost due to PCC. Intensive rearing of pigs and proper disposal of human excreta will reduce the incidence of PCC in the Kumasi metropolis.

Key words: Porcine, Prevalence, Financial, Loss, Cysticercosis

Introduction

Pigs play a major role in the socio-economic life of Ghanaians. The pig population of Ghana is estimated to be 536,000 (MOFA/SRID, 2011). Pig rearing is faced with a myriad of problems including parasitic zoonoses such as taeniasis, trichinellosis and cysticercosis. Porcine cysticercosis (PCC) refers to infection with the larval stage of the adult tape worm Taenia solium, whose definitive hosts are humans. PCC is rarely associated with clinical signs of disease and most cases are detected during routine post mortem inspections at slaughter. The economic losses due to this disease include reduced market weight at slaughter and condemnations of affected organs or carcasses at slaughter. The consumption of pork by humans may be associated with a number of health risks including taeniasis and trichinellosis. According to Zoli et al (2003), the true prevalence of porcine and human cysticercosis in central and West Africa remains underestimated due to unreliable slaughterhouse data and inadequate diagnostic
facilities in the public health sector. The significance of PCC as a serious agricultural and public health problem have been documented by various authors (Karshima et al., 2013, Waiswa et al., 2011, Phiri et al., 2003). Information on the prevalence of PCC in Ghana is scanty. This study therefore seeks to investigate the prevalence, direct financial losses and likely public health implications of PCC in the Kumasi metropolis of Ghana.

Materials and Methods
This study was conducted in the Kumasi metropolis which is located 265 km north of Accra and is the capital of the Ashanti region of Ghana with an estimated population of 2,035,064 (Ghana Statistical Service, 2012). The study animals were pigs brought for slaughter at the Kumasi Abattoir company Limited (KACL) and at Dakwajom in the Kumasi metropolis. An average of 30 pigs were randomly selected and examined during each visit from January to May, 2015. A total of 4,121 pigs were identified by ear tags and categorized by sex and breed and Ante mortem and post mortem examinations as well carcass judgement conducted using standard procedures (FAO, 1995). The direct annual financial losses (Ghana cedis, GHc) due to carcass condemnation were estimated using the formula set up by Ogurinade and Ogurinade, 1980.

\[
\text{DAL} = \sum \text{AC} \times \text{AP} \times \text{CR}
\]

Where DAL= Direct annual financial loss due to carcass condemnation
AC= Annual pig slaughter rate of Abattoir
AP= Average price of condemned pig carcass at the market
CR= carcass condemnation rate at the abattoir

Data generated was analyzed using descriptive statistics and presented in Tables and Figures.

Results and Discussions
The results for the prevalence of PCC in the Kumasi metropolis are shown in Table 1. The prevalence rate ranged from 1.56 % in May to 3.04 % in April. The overall prevalence for the study period was 2.31%. All the positive cases of PCC were recorded at KACL. These findings are similar to a prevalence of 3.2% in the Adamawa state, Nigeria (Biu and Ijudai, 2012). The overall prevalence is considerably lower than a previous report of 11.7% by Permin et al (1999) in the Upper East region of Ghana. The reason for this difference is that the former was based on a survey of scavenging pigs in Northern Ghana. Higher prevalence rates of 46% and 23.67% have been reported in the Jos metropolis of Nigeria (Weka and Ikeh, 2009) and in the Nay Pyi Taw area, Myanmar (Khaing et al.,2015) respectively.
Table 1: Prevalence of Cysticercus Cellulosae in Slaughtered Pigs within the Kumasi Metropolis

<table>
<thead>
<tr>
<th>Month, 2015</th>
<th>No examined KACL</th>
<th>No infected</th>
<th>No examined Dakwajom</th>
<th>No infected</th>
<th>Total No examined</th>
<th>Frequency &amp; % Infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>715</td>
<td>19</td>
<td>125</td>
<td>0</td>
<td>840</td>
<td>19(2.27)</td>
</tr>
<tr>
<td>February</td>
<td>674</td>
<td>16</td>
<td>90</td>
<td>0</td>
<td>764</td>
<td>16(2.09)</td>
</tr>
<tr>
<td>March</td>
<td>982</td>
<td>27</td>
<td>140</td>
<td>0</td>
<td>1122</td>
<td>27(2.41)</td>
</tr>
<tr>
<td>April</td>
<td>611</td>
<td>23</td>
<td>145</td>
<td>0</td>
<td>756</td>
<td>23(3.04)</td>
</tr>
<tr>
<td>May</td>
<td>489</td>
<td>10</td>
<td>150</td>
<td>0</td>
<td>639</td>
<td>10(1.56)</td>
</tr>
<tr>
<td>Total</td>
<td>3471</td>
<td>95</td>
<td>650</td>
<td>0</td>
<td>4121</td>
<td>95(2.31)</td>
</tr>
</tbody>
</table>

According to Zirintunda and Ekou, 2015, the prevalence of PCC in free range pigs slaughtered in the Soroti district of Uganda was 18.0%. The absence of positive cases at Dakwajom may be due to the inability of routine methods of meat inspection to diagnose all cases of PCC as observed by Phiri et al (2006) in Zambia. They reported that PCC was detected in 18.5% and 47.7% cases by routine meat inspection and carcass dissection respectively.

The prevalence of PCC in slaughtered pigs in the Kumasi Metropolis by sex is presented in Table 2.

Table 2: Prevalence of Cysticercus Cellulosae in Slaughtered Pigs within the Kumasi Metropolis According to Sex

<table>
<thead>
<tr>
<th>Sex</th>
<th>No of pigs examined</th>
<th>No of pigs Positive</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>2989</td>
<td>43</td>
<td>1.44</td>
</tr>
<tr>
<td>Female</td>
<td>1132</td>
<td>52</td>
<td>4.59</td>
</tr>
<tr>
<td>Total</td>
<td>4121</td>
<td>95</td>
<td>2.31</td>
</tr>
</tbody>
</table>

PCC was more prevalent in female pigs (54.74%) than in males (45.26%). Female pigs are usually kept for longer periods than males and are therefore more predisposed to PCC. In addition the former has more increased nutritional requirements especially during pregnancy and lactation. They spend longer times scavenging for feed and are therefore more susceptible to infection. This finding is similar to that of Biu and Ijudai (2012) in Nigeria but contradicts the findings of Sikasunge et al (2008) that age and sex had no influence on the prevalence of PCC. In respect of breed, Ashanti black pigs (83.16%) were more infected than cross breeds (16.84 %) (Table3). The former are reared as free roaming pigs which scavenge for feed and subsequently are more likely to have access to feed contaminated with tape worm segments in human excreta. In some cases the pigs feed directly on human excreta, especially in communities, where...
toilet facilities are either scarce or absent. On the other hand, cross bred pigs are housed and have no access to feed contaminated with human excreta.

**Table 3:** Prevalence of Cysticercus Cellulosae in Slaughtered Pigs within the Kumasi Metropolis According to Breed

<table>
<thead>
<tr>
<th>Breed</th>
<th>No of pigs examined</th>
<th>No of pigs Positive</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ashanti black</td>
<td>986</td>
<td>79</td>
<td>8.01</td>
</tr>
<tr>
<td>Cross breed</td>
<td>3135</td>
<td>16</td>
<td>0.51</td>
</tr>
<tr>
<td>Total</td>
<td>4121</td>
<td>95</td>
<td>2.31</td>
</tr>
</tbody>
</table>

This finding differs from that of Saravanan *et al* (2014) who concluded that PCC was more prevalent in cross bred pigs than the local breeds in India. A similar view was held by Sikasunge *et al* (2008) who reported that cross bred pigs were 72% more likely to be affected by PCC than the local breeds. Biu and Ijudai, 2012, reported that in the Adamawa state of Nigeria, PCC infection was higher in the Hampshire breed (3.5%), followed by native breeds (3.3%) and absent in the landrace breed (0%). These findings seem to suggest a breed susceptibility to PCC. Economic losses incurred due to PCC are presented in Table 4.

**Table 4:** Carcass condemnation and direct financial loss due to Porcine Cysticercosis in the Kumasi Metropolis

<table>
<thead>
<tr>
<th>Type of condemnation</th>
<th>No of carcasses condemned</th>
<th>Condemnation rate (%)</th>
<th>Unit price(GHc)</th>
<th>Financial loss(GHc)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole carcass</td>
<td>51</td>
<td>1.25</td>
<td>1080</td>
<td>7622<em>1080</em>0.0125=102,897.00</td>
</tr>
<tr>
<td>Partial carcass</td>
<td>44</td>
<td>1.07</td>
<td>20</td>
<td>7622<em>20</em>0.0107=1631.11</td>
</tr>
<tr>
<td>Total</td>
<td>95</td>
<td></td>
<td></td>
<td>104,528.11</td>
</tr>
</tbody>
</table>

During the study period a total of 51(1.25%) carcasses were totally condemned, while 44(1.07%) were partially condemned. The total annual slaughter for pigs (7622) was calculated as the average of slaughter figures for the period 2010-2014. The financial loss incurred due to condemning a pig carcass weighing 90 kilogram’s was estimated to be GHc 1080.00, while the loss per partially condemned carcass was GHc 20.00. The total direct financial loss due to carcass condemnation was calculated as described by Ogurinade and Ogurinade, 1980 (Table 4). This amounted to GHc104, 528.11 (29,035.59 USD) (1 USD=3.6 cedis at the time of writing this report). This value is lower than of 559,945 euros due to PCC for Ghana as reported by Zoli *et al* (2003). The reason for the difference in financial loss is due to the period of estimation and prevalence rate used. The former value was conservatively calculated for the whole year using a prevalence rate of 11.7 % (Permin *et al*., 1999).

In other studies, Praet *et al* (2009) estimated that the total annual cost due to human cysticercosis and PCC was 10,255,202 Euros. PCC was responsible for 4.7% of this total cost. According to Nkwenguilila
(2014), the estimated annual monetary loss due to PCC in Tanzania was USD 144,449.00. These reports all indicate that PCC has both financial and public health implications.

PCC is closely associated with taeniasis and human cysticercosis especially in rural communities. A number of authors have associated the incidence of epilepsy with the rearing of pigs and PCC (Chacha et al., 2014, Millogo et al., 2012, Blocher et al., 2011, Quet et al., 2010).

Humans become infected with taeniasis when they consume raw or poorly cooked measly meat. Bimi et al (2012) reported a taeniasis prevalence of 13.15% in the Bunkpurugu-Yunyoo District of Northern Ghana. They showed that pork handlers and their immediate family were more at risk of contracting the infection. The incidence of taeniasis was directly linked to free roaming pigs and the absence of toilet facilities for inhabitants. They also observed that about 19% of all slaughtered pigs were infected with parasitic cysts.

**Conclusion**

The overall prevalence of Porcine Cysticercosis (PCC) in the Kumasi metropolis was 2.31%. The estimated direct annual financial losses due to PCC were 104,528.11 Ghana Cedis. The incidence of PCC can be minimized by intensive rearing of pigs and proper disposal of human excreta.

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**References**


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