Cysticercus tenuicollis cysts in sheep slaughtered at Sokoto abattoir, Sokoto state, Nigeria

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Abstract
A prospective study was conducted based on the principle of post mortem examination on sheep slaughtered at Sokoto abattoir for the presence of Cysticercus tenuicollis cysts. A total of 261 sheep were examined with 34 (13.03%) infected. Prevalence of infection increased with the age of the animals. Males had relatively higher prevalence than females. Infection was recorded in several visceral organs with omentum having the highest prevalence (35.29%) and the lungs the least (11.76%). The results suggest that C. tenuicollis is common and may constitute a health problem in sheep and a source of economic loss in the meat industry, thus emphasizing the need for proper meat inspection and handling of offals in the study area.

Keywords: Cysticercus tenuicollis, sheep, slaughter, sokoto, nigeria.

Introduction
Livestock may act as the intermediate hosts for the tapeworms of humans and other animals. Cestodes of the family Taeniidae which infect the dog (definitive host) are transmitted to a range of intermediate host species where they may cause hydatidosis, cysticercosis or coenurosis (Flisser et al., 1982; Eckert et al., 1984; Thompson & Lymbery, 1995). The larval tapeworms (metacestodes) develop as fluid-filled cysts that may act as space-occupying lesions and cause organ condemnation at meat inspection (Radostits et al., 2007).

The mature tapeworm, Taenia hydatigena, lays eggs which pass out in the faeces of the host and are ingested by the ruminant intermediate host during grazing. Ingested eggs hatch in the small intestine and later migrate to reach the liver and other visceral organs like the, lung, heart, kidney and intestines of the intermediate host in which they may not be a major cause of concern. There may be only signs of abdominal pain, colic, loss of appetite, emaciation and unthriftiness (Singh et al., 2003) although the migration of cysticerci in the liver may also cause hepatitis cysticercosa leading to haemorrhagic and fibrotic tracts and serofibrinous peritonitis (Soulsby, 1982; Blazek et al., 1985) and in very heavy infections, the migrating larvae destroy the hepatic cells with eosinophilic infiltration and severe inflammation that may prove to be fatal. Cysticercus tenuicollis infection may constitute a health problem to sheep and thus a source of economic loss in the meat industry (Flisser et al., 1982; Abidi et al., 1989).

Previous studies suggest that inspection of sheep at abattoirs represent one of the perfect and accurate methods of diagnosis of metacestodes infections (Gracey et al., 1999).

Materials and methods
The study was conducted in Sokoto state, Nigeria. The state shares borders with Niger Republic to the North, Kebbi state to the South, and Zamfara state to the East. Sokoto abattoir serves Sokoto town and neighboring villages with meats.

A total of 261 sheep comprising 183 males and 78 females were examined postmortem for the detection of C. tenuicollis cysts during slaughter and evisceration at the abattoir. Heart, esophagus, diaphragm, liver, kidneys, lungs, masseter muscle (internal and external), the peritoneal cavity and skeletal muscles were examined, palpated and incised for detection of C. tenuicollis. Positive samples were taken to Public Health and Preventive Medicine laboratory, Faculty of Veterinary Medicine, Usmanu Danfodiyo University, Sokoto for examination.

The samples collected were confirmed to be Cysticercus...
Results
Post mortem inspection of 261 sheep carcasses at Sokoto abattoir revealed *Cysticercus tenuicollis* cysts in 34 (13.03%) of the animals. Out of 184 male and 78 females examined, 25 (13.66%) and 9 (11.54%) were respectively infected. Among age groups, the prevalence of infection was 10.17%, 11.18% and 24.39% for sheep aged 6-12 months, 12-24 months and above 24 months respectively. Prevalence of cysts at various sites were liver, 11 (32.35%); omentum, 12 (35.29%); mesentery, 7 (20.59%) and lungs, 4 (11.76%) (Table 1).

| Table 1: Prevalence of *Cysticercus tenuicollis* in sheep slaughtered at Sokoto, Nigeria |
|----------------------------------|-----------------|
| **Number examined** | **No. (%) infected** |
| All animals | 261 | 34 (13.03) |
| Sex | | |
| Male | 183 | 25 (13.66) |
| Female | 78 | 9 (11.54) |
| Age (months) | | |
| < 12 | 59 | 6 (10.17) |
| 12-24 | 161 | 18 (11.18) |
| > 24 | 41 | 10 (24.39) |

| Table 2: Prevalence of *Cysticercus tenuicollis* in different organs of sheep (n=261) |
|----------------------------------|-----------------|-----------------|-----------------|-----------------|
| | Omentum | Liver | Mesentery | Lungs |
| No. positive (%) | 12 (35.29) | 11 (32.35) | 7 (20.59) | 4 (11.76) |
| Total no. of positive animals (%) | 34 (13.03) |
Discussion

The prevalence of 13.03% recorded in this study is relatively high probably because most sheep in the study area are reared in company of dogs the definitive hosts of the parasite. Dada & Belino (2006) recorded a higher prevalence of 21.4% in Kano in essentially the same geographical zone as the study area. Also, relatively higher prevalence of 16.7% and 23.27% were respectively reported from Turkey (Hasslinger and Weber-Werrington, 1988) and Egypt (El-Masry, 1986). On the other hand, similar or lower prevalence of 12.8% and 1.25% were respectively recorded in sheep in Iran (Radfar et al., 2005) and Saudi Arabia (El-Metenawy, 1999). As observed by Radfar et al. (2005), the grazing behavior and management system of the animals may be responsible for the differences in prevalence between this and the other studies. The present study suggest that the prevalence of infection increases with age of the animals, thus agreeing with the findings of Abu-Elwafa et al. (2009) which showed higher prevalence in aged than young animals. However, in the present study, there was no significant difference in prevalence between the sex groups.

Although C. tenuicollis is not zoonotic, it may be an important cause of economic loss in the meat industry since viscera harbouring them may be rejected for aesthetic reasons (Jibat et al., 2008). The threat these parasite poses to the small ruminants meat industry in Nigeria is evident due to the present situation of improper disposal of offal at abattoirs and backyard slaughter. The presence of freely roaming stray dogs on grazing land and the deep rooted habit of feeding dogs with ruminant offal, including are important risk factors. This may lead to the perpetuation of infection in the environment (Jibat et al., 2008). The financial loss from condemnation in the abattoir is considered high.

The results of this study suggest that infection of sheep with Cysticercus tenuicollis is common in Sokoto, Nigeria and that this may constitute economic and health problems in the meat industry.

References

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Plate III: C. tenuicollis in omentum of sheep (arrow).
Cysticercus tenuicollis in slaughtered sheep.

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