

Bovine Cysticercosis in The Gambia

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Keywords

Cattle – *Taenia saginata* –
Cysticercosis – Meat inspection –
ELISA – Gambia.

Summary

Surveys were carried out in the slaughterhouses of Abuko and Banjul and on 16 farms involving 391 cattle in the Central River Division of The Gambia. Using conventional meat inspection, 12 (0.75%) out of 1595 slaughter cattle were found infected with cysticerci of *Taenia saginata*. On-farm screening using an antigen detection ELISA revealed an average within herd seroprevalence of 21.3% (CI₉₅: 13.6; 29.0). Although official reports have not mentioned the occurrence of bovine cysticercosis in The Gambia for the last 10 years, these data clearly show that this zoonosis is present in the country. The discrepancy between the results of both techniques is due to the low sensitivity of classical meat inspection and the high sensitivity of ELISA for detection of circulating antigen.

■ INTRODUCTION

Bovine cysticercosis, caused by the metacestodes of *Taenia saginata*, occurs worldwide. It has been reported in cattle in several West African countries including Senegal, which surrounds The Gambia (9). However, there is a substantial lack of knowledge of the distribution, epidemiological pattern and zoonotic implication of this helminth infection in The Gambia. The very limited information available on cysticercosis in cattle for The Gambia is based on irregular records from the abattoirs or oral reports from local butchers, mentioning that cysts are occasionally found. Further details are not available. In addition, the veterinary services of The Gambia have not officially reported a single case of

bovine cysticercosis for the last 10 years (6). In view of obtaining baseline information on the occurrence of bovine cysticercosis in slaughtered and live cattle in The Gambia, an abattoir survey and an on-farm screening, respectively, were carried out in the Greater Banjul area of the Central River Division of The Gambia. The objective of the study was to estimate the prevalence of bovine cysticercosis in slaughtered (using meat inspection) and live cattle (using serological methods) in selected areas of The Gambia.

■ MATERIALS AND METHODS

Meat inspection

Routine meat inspection to detect cysticercosis was carried out in two main abattoirs located in Greater Banjul area, Abuko and Banjul. The inspection was carried out by meat inspectors of the abattoir and consisted in incisions of heart and masticatory and the ground of the tongue. The abattoirs were visited three times a week from October 2000 to March 2001. All cattle slaughtered on visit days (a total of 1595 animals) were examined. Cattle mainly belonged to the N'Dama breed. Most of them originated from the Central River Division. Few cattle were of zebu type originating from Senegal. The age and sex of the animals were recorded.

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On-farm screening

A survey was carried out on cattle in the Central River Division of The Gambia between July and September 2001. A stratified random sampling method was applied. The sampling frame consisted of herds supplying milk to the local market in Bansang. For practical reasons the authors excluded from the original herd list provided by local veterinary services all herds which were not accessible during the rains. Out of the list 16 herds were randomly selected. In each selected herd up to 30 cattle (expected within herd prevalence $\geq 10\%$; level of confidence 95%) aged six months and over were sampled according to Thrusfield (12), and stratified by age. In three of the sixteen farms sampled, additional samples were also taken. All serum samples collected were screened for the presence of circulating antigen of *T. saginata* using an antigen detection ELISA. A total of 391 samples from 16 herds were examined.

Antigen detection ELISA

The serum was examined by a monoclonal-antibody-based antigen detection ELISA (Ag-ELISA) as described by Bandt et al. (1) and modified by Dorny et al. (2). A positive reference serum (experimentally infected animal) and eight negative reference sera (originating from farms without a history of bovine cysticercosis) were included in each ELISA plate. The optical density (OD) of each serum sample was compared with a set of eight negative reference samples at a probability level of $P = 0.001$ to determine the result of the test (11).

RESULTS

During meat inspection cysticerci were found by meat inspectors/veterinarians in 12 of the 1595 (0.75 %) cattle examined. In two animals more than one cyst was found, whereas in the remaining ten cattle only one cyst was detected during meat inspection. In two cases cysts were found in the heart muscle, in all other occasions in parts of the muscle masseter. Results of on-farm screening showed an overall individual animal prevalence of 19.2% (CI_{95} : 15.3; 23.1) and an average within herd seroprevalence of 21.3% (CI_{95} : 13.6; 29.0). There was a high variation between farms (Figure 1). The seroprevalence of cysticercosis was higher in male (30.6%; CI_{95} : 21.6; 39.6) than in female (14.8%; CI_{95} : 12.7; 16.9) cattle ($p < 0.01$). Individual seroprevalences were not influenced by the age of animals (Table I).

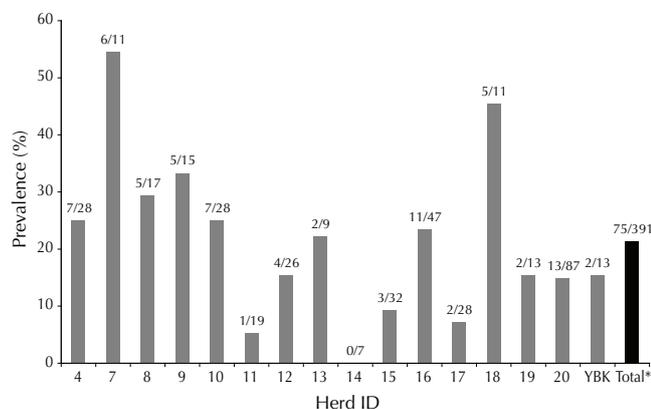


Figure 1: Within herd seroprevalence of bovine cysticercosis in Central River Division, The Gambia.

* Overall individual prevalence.

Table I

Seroprevalence (Ag-ELISA) of bovine cysticercosis according to age in farm cattle in Central River Division, The Gambia

Age class (in years)	N	Seroprevalence of cysticercosis
0.5–1	3	0%
1–3	186	21.5% (CI_{95} : 15.6; 27.4)
4–6	125	12.8% (CI_{95} : 6.9; 18.7)
> 6	77	24.7% (CI_{95} : 15.1; 34.3)

DISCUSSION

There was a very striking discrepancy between the prevalence found by meat inspectors (0.75%) and that revealed by Ag-ELISA (19.2%). Although the figures cannot be compared directly with each other because cattle which were examined by both techniques were not the same, most of them originated from the same region (Central River Division) and were kept under similar husbandry conditions. It is known that the classical “knife and eye” technique only detects a small fraction of infected cattle (4, 5). The sensitivity of Ag-ELISA on the other hand is quite high (92.3%) in cattle harboring more than 50 cysts, but very low (12.8%) if the cyst burden is lower than 50 (13). Ag-ELISA, however, only detects living cysticerci, which implies that it underestimates the real prevalence of cysticercosis (1). A similar discrepancy between both techniques was also observed by other authors in Belgium (2) and in Nigeria (3), who found 12 and 4 times more infected animals, respectively, by Ag-ELISA than by meat inspection. Furthermore, detailed examination of the hearts and masticatory muscles of slaughter cattle at the abattoir of Dakar allowed to detect cysticerci in 5.8 and 15.7% of them, respectively, whereas routine meat inspection detected only 1.4% infected animals (9). As bovine cysticercosis has been reported in the past in Senegal, both north and south of The Gambia (9, 10, 14, 15), it is not surprising that it also occurs in the latter country.

In this study the seroprevalence of cysticercosis was significantly higher in male than in female cattle, which was difficult to explain given the fact that both sexes were grazing on the same pastures and thus exposed to a similar challenge with *T. saginata* eggs. The age of the animal, however, had no impact on the seroprevalence, which was in contradiction with studies in Europe, where higher numbers of seropositive cattle were found with increasing age (2), and with studies in Africa, where the seroprevalence was higher in young animals (7, 8).

As beef is usually well cooked before consumption in The Gambia, the public health risk for the consumer is clearly reduced. However, if a sufficient meat core temperature during cooking is not guaranteed, which might be the case for barbecue and *shawarma*, a significant public health risk for the consumer might exist. The same applies for unhygienic handling of meat during preparation.

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Résumé

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Cysticercose bovine en Gambie

Des recherches ont été menées dans les abattoirs d'Abuko et de Banjul ainsi que sur 391 bovins répartis sur 16 exploitations dans la région de Central River en Gambie. En utilisant des méthodes conventionnelles d'inspection de viande, 12 (0,75 p. 100) bovins sur 1 595 bovins abattus ont été trouvés infectés avec des cysticerques de *Taenia saginata*. Des recherches dans des fermes ont montré une séroprévalence des troupeaux de 21,3 p. 100 (CI₉₅: 13,6; 29,0) en utilisant un test Elisa de détection d'antigène. Bien que les rapports officiels n'aient pas mentionné ces dix dernières années l'existence de la cysticercose bovine en Gambie, les résultats de cette étude mettent clairement en évidence la présence de cette zoonose dans le pays. La divergence entre les résultats des deux techniques est due à la faible sensibilité de l'inspection de viande classique et à la haute sensibilité de l'Elisa pour la détection d'antigène en circulation.

Mots-clés : Bovin – *Taenia saginata* – Cysticercose – Inspections des viandes – Test Elisa – Gambie.

Resumen

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Se llevaron a cabo encuestas en los mataderos de Abuko y Banjul, así como en 16 fincas concerniendo 391 cabezas en la división del Río Central en Gambia. Mediante inspección convencional de la carne, 12 (0.75%) de las 1595 cabezas sacrificadas estaban infectadas con cisticercos de *Taenia saginata*. Las encuestas en las fincas, realizadas mediante un antígeno de detección ELISA, revelaron un promedio de prevalencia intra hato de 21,3% (CI₉₅: 13,6; 29,0). A pesar de que los reportes oficiales no mencionan la incidencia de cisticercosis bovina en Gambia durante los últimos 10 años, los presentes datos muestran claramente que esta zoonosis está presente en el país. La discrepancia entre los resultados de ambas técnicas es debido a la baja sensibilidad de la inspección clásica de carne y a la alta sensibilidad del ELISA para la detección del antígeno circulante.

Palabras clave: Ganado bovino – *Taenia saginata* – Cisticercosis – Inspección de la carne – ELISA – Gambia.