Contents lists available at ScienceDirect

Asian Pacific Journal of Tropical Biomedicine

journal homepage:www.elsevier.com/locate/apjtb

Document heading

A survey of zoonotic diseases in trade cattle slaughtered at Tanga city abattoir: a cause of public health concern

Swai ES[1*], Schoonman L[2]

[1]*Veterinary Investigation Centre (VIC), Box 1068, Arusha, Tanzania*

[2]*Tanga Dairy Trust (TADAT), Box 1720, Tanga, Tanzania*

ARTICLE INFO

Article history:
Received 25 May 2011
Received in revised form 5 June 2011
Accepted 24 June 2011
Available online 28 January 2012

Keywords:
Abattoir
Slaughter stock
Zoonoses
Risk
Tanga
Tanzania
Brucellosis
Toxoplasmosis
Leptospirosis
Antibody
Seroprevalence
Zoonotic disease

ABSTRACT

Objective: To estimate the prevalence of hydatidosis, cysticercosis, tuberculosis, leptospirosis, brucellosis and toxoplasmosis in slaughtered bovine stock (aged ⩾3 years) at Tanga city abattoir, Tanzania. **Methods:** Prevalence estimation of the five zoonotic diseases was undertaken through an active abattoir and sero-survey was carried out in Tanga city, during the period of January 2002 and March 2004. Serum samples collected from a sub-sample (n=51) of the slaughter stock were serologically screened for antibodies against brucellosis, leptospirosis and toxoplasmosis using Rose Bengal plate test, microscopic agglutination test (for 5 serovars of *Leptospira interrogans*) and Eiken latex agglutination test, respectively. The same animals were tested for tuberculosis using the single intradermal tuberculin test. **Results:** Post mortem examination of 12 444 slaughter cattle (10 790 short horn zebu and 1 654 graded) over a period of twenty two months, showed a prevalence of 1.56% (194) for hydatidosis, 1.49% (185) for cysticercosis and 0.32% (40) for tuberculosis. In all three zoonoses, a statistically significant difference in infection rates was noted between the short horn zebu and graded breeds (P<0.05). The overall seroprevalences of animals with brucellosis, toxoplasmosis and leptospirosis antibodies were found to be 12%, 12% and 51%, respectively. The most common leptospiral antibodies detected were those against antigens of serovars *Leptospira hardjo* (29%), *Leptospira tarassovi* (18%), *Leptospira bataviae* (4%) and *Leptospira pomona* (0%). With regard to tuberculosis, 10% (n=5) of the animals tested were classified as non-specific reactors or inconclusive. **Conclusions:** The study findings suggest that brucellosis, toxoplasmosis and leptospirosis are prevalent in Tanga and provide definitive evidence of slaughtered stock exposure to these zoonotic agents with concurrent public health consequences.

1. Introduction

Infections that are naturally transmitted from vertebrates animals to humans and vice versa are classified as zoonoses[1,2]. In the livestock sector the different types of farm animals are capable of carrying a wide range of zoonotic pathogens. In the beef sector, zoonotic pathogens are normally present in slaughtered stock, raw hides/skin, blood, meat and the farm environments, but are often difficult to diagnose. Moreover, animals brought for slaughter into urban areas come from villages where disease control regimens are weak, uncoordinated and very often not available. Animal health delivery services in rural setting are hampered by remoteness, poor infrastructure and lack of qualified veterinary staff, inadequate transport, and insufficient funds to support surveillance operations or purchase reagents and drugs. The lack of veterinary services to these livestock-rearing areas poses a substantial risk of widespread occurrence of disease in the livestock population and concurrent human exposure to zoonotic disease agents. There is a further risk that many of the slaughtered animals brought to the abattoir may be harbouring chronic or sub clinical infections which are rarely detected during routine ante-mortem examination.

Zoonoses can be transmitted to humans by several routes that include: consumption of infected raw blood, milk and meat; by direct contact with infected animals through handling abortions, slaughters, dystocia and parturitions;

*Corresponding author: Swai ES, Veterinary Investigation Centre (VIC), Box 1068, Arusha, Tanzania.
Tel: +255-27-2545266
Fax: +255-27-2545264
E-mail: ESswai@gmail.com
Foundation Project: Supported by a grant from Royal Dutch Embassy, Dar-es-Salaam, Tanzania (grant No. RNE/T-032).

and indirectly from infected farm environments[3,4]. However, most meat-borne zoonoses are acquired through the consumption of infected and under cooked blood and meat[5].

Currently in Tanzania, there is limited documentation of zoonoses in slaughtered stock[6,7]. Lack of awareness of meat-borne zoonoses can put the lives of livestock producers, abattoir workers and the general public at risk from infection. Considering that most backyard slaughter slabs and abattoirs are not adequately regulated and given that there is a higher level of contact with raw meat, it can be argued that there is an even greater risk of meat-borne zoonoses in this type of facility. Therefore, it is imperative that cattle owners, traders, butchers and policy makers are made aware of the risks posed by meat-borne zoonoses that are prevalent in their areas. The information provided should also explain how zoonoses are transmitted in order to enable those at risk to make informed decisions as to how they might best protect themselves[8,9]. Frequently detected and reported abattoir diseases or conditions include fascioliasis, cysticercus of *Taenia saginata* (*Cysticercus bovis*), tuberculosis and hydatidosis[10,11]. This paper focuses on these zoonotic diseases and others such as toxoplasmosis, leptospirosis and brucellosis that are relevant to human and livestock health. The above diseases are of long-standing public health concerns, and are the most widely reported in the Tanzanian dairy and traditional cattle sectors[6,7]. This study was conducted to generate epidemiological data to better understand the public health implication of zoonoses in slaughtered cattle in Tanga.

2. Materials and methods

2.1. Study area

The study was conducted at Tanga city abattoir located 330 km north east of Dar-es-Salaam, the main capital of Tanzania. This abattoir provides the daily beef requirements of the inhabitants of Tanga and neighbouring areas. Geographically the city is located between latitude 4 ° 21′ and 6 ° 14′ S and longitude 36 ° 11′ and 38 ° 26′ E. It experiences tropical climatic conditions, typified by hot and humid weather throughout the year. Annual rainfall is approximately 1 100 mm/year with two distinct rainy seasons: the long rain season, which fall between April and May, and the short rain season between October and November. The mean annual temperature and humidity on average range are from 23 ℃ to 33 ℃ and 60% to 70%, respectively. Smallholder mixed farming dominates 80% and livestock is an integral part of the farming system[7].

2.2. Study animal and design

The study animals were cattle brought for slaughter from all districts of Tanga region and nearby districts of Kilimanjaro, Arusha and Morogoro. Some animals were transported to the abattoir using vehicles and others were trekked in. The study design employed in this work was an active abattoir survey, carried out from June 2002 to March 2004.

2.3. Animal selection and data collection

Sampled slaughter cattle (for seroprevalence estimates) were selected on two randomly selected days. After arrival to the abattoir, age, sex, breed, number and origin of the animals were recorded in a purposively designed recording form. The age was determined based on dentition and owner′s information[12,13]. For quality control purpose of the data, these forms were collected regularly and discussed with the meat inspector in charge. It was not possible to get the exact records on owner, origin for each slaughter animal during the period due to the lack of reliable animal identification methods and poor recording systems at the farm and marketing points making it difficult to relate the findings to a particular locality. In addition to the collection of abattoir data, serum samples were collected from a sub-sample of slaughtered animals to assess the level of exposure to some of the zoonotic diseases like brucellosis, toxoplasmosis and leptospirosis. The same animals were also skin-tested for bovine tuberculosis.

2.4. Meat inspection protocol

Post mortem examinations were carried out by para-veterinarians using standard procedures recommended by FAO/UNEP/WHO[14] as well as described in the meat hygiene (meat, abattoir and butcheries) regulations under CAP 16 & 17 of the laws of Tanzania[15] and as described by Gracey *et al*[16]. Post mortem examination procedure employed visual inspection, palpation, and systematic incision of each carcass, visceral organs particularly the lung, liver, spleen, kidney, and heart and targeted disease lesions were consistent with cysticercus of *Taenia saginata* (*Cysticercus bovis*), tuberculosis and hydatidosis.

2.5. Sample collection, handling and screening

Approximately 10 mL of blood was collected from the jugular vein of each selected animal using a plain vacutainer tube (Becton Dickson, UK). Each sample was labelled using codes describing the specific animal and owner. The tube was set tilted on a table over night at a room temperature to allow clotting. Next morning, the clotted blood in the tubes was centrifuged at 3 000 g for 20 min to obtain clear serum. The obtained serum was stored at −20 ℃ until tested by Rose Bengal plate test (RBPT), microscopic agglutination test (MAT) and Eiken latex agglutination test (LAT).

2.6. Rose Bengal plate test

All sera samples were screened using RBPT antigen (VLA Weybridge, UK). The test procedure recommended by Alton