

Seroprevalences of brucellosis, Q-fever and toxoplasmosis in slaughter livestock in Trinidad

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Key words

Meat animal - *Brucella abortus* - *Coxiella burnetii* - *Toxoplasma gondii* - Serum - Prevalence - Agglutinin - Abattoir - Trinidad.

Summary

Serum samples obtained from livestock (cattle, chickens, pigs, sheep, goats and water buffaloes) slaughtered at various slaughter houses in Trinidad were screened for agglutinins to three zoonosis causing pathogens. Of a total of 751 sera tested, 2 (0.3 %) originating from chickens were positive for *Brucella abortus* agglutinins using the Rose Bengal test (RBT), but both were negative by the tube serum agglutination test (SAT). Thirty-six (4.8 %) of 749 sera were positive for *Coxiella burnetii* agglutinins by the capillary agglutination test (CAT) with the highest prevalence, 11.3 %, detected in pig sera and the lowest, 0 %, found in sheep and goat sera. The difference was not statistically significant ($P \geq 0.05$; χ^2). Of the 131 sera tested, 26 (19.8 %) contained *Toxoplasma gondii* agglutinins with prevalences ranging from 5.5 % in pigs to 42.9 % in goats. It was concluded that livestock in Trinidad are free of *B. abortus* infections, but *C. burnetii* and *T. gondii* infections exist and are being documented for the first time in the island.

INTRODUCTION

Livestock are well known sources of important zoonoses which infect humans either through direct contact or by the consumption of their contaminated products (3, 4, 7, 8, 16, 17).

Although studies in other countries have determined the prevalence of several diseases, particularly zoonoses such as brucellosis, toxoplasmosis and Q-fever (14, 20, 22, 23), there is a dearth of information on the status of these infections in livestock in Trinidad. Cazabon (11) detected *Brucella abortus* agglutinins in a serum sample obtained from cattle over two decades ago in Trinidad while *B. ovis* agglutinins were detected in some sheep imported into Trinidad from Grenada in 1992 (10). There is therefore a need to monitor livestock for important infectious agents.

The present study was conducted to determine the seroprevalences of *Brucella abortus*, *Coxiella burnetii* and *Toxoplasma gondii* in several livestock species using the abattoirs and slaughter houses as sample sources.

MATERIALS AND METHODS

Between October 1992 and October 1995, blood samples were collected into universal bottles without anti-coagulant during the slaughter of livestock at slaughter houses or abattoirs located in San Juan, Tunapuna and Port-of-Spain (table I). The sex of all various species animals was recorded at that time.

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TABLE I

Prevalence of agglutinins to *Brucella abortus*, *Coxiella burnetii* and *Toxoplasma gondii* in slaughter livestock

Animal species	Occurrence of agglutinins to:					
	<i>B. abortus</i>		<i>C. burnetii</i>		<i>T. gondii</i>	
	Nbr. tested	Nbr. () positive	Nbr. tested	Nbr. () positive	Nbr. tested	Nbr. () positive
Chicken	266	2 (0.8) ¹	266	3 (1.1) ²	ND	-
Cattle	256	0 (0.0)	256	11 (4.3) ³	55	15 (27.3)
Pig	153	0 (0.0)	151	17 (11.3) ⁴	55	3 (5.5)
Buffalo	53	0 (0.0)	53	5 (9.4) ⁵	ND	-
Sheep	16	0 (0.0)	16	0 (0.0)	14	5 (35.7)
Goat	7	0 (0.0)	7	0 (0.0)	7	3 (42.9)
Total	751	2 (0.3)	749	36 (4.8)	131	26 (19.8)

() : Percent

¹ The two samples were positive by RBT but negative by the serum agglutination test (SAT)

² Samples positive only when undiluted

³ Eight samples were positive undiluted, 1 sample had a 1:2 titre, while 2 samples had a 1:4 titre.

⁴ Sixteen samples were positive only when undiluted while 1 sample had a 1:2 titre

⁵ All samples were positive undiluted only

ND: not done

In addition, blood samples of chickens slaughtered at a roadside pluckshop in St. Augustine were collected. All clotted blood samples were kept at 4°C overnight and the sera, harvested following centrifugation, were stored at -20°C until needed.

To detect *B. abortus* agglutinins, the Rose Bengal test (RBT) was used in all screened sera. The RBT-positive samples were subjected to the serum agglutination test (SAT) as described earlier (21). The *B. abortus* SAT antigen and positive control sera were kindly provided by the Veterinary Diagnostic Laboratory (VDL), University of Iowa, Iowa, USA.

C. burnetii agglutinins were detected in sera by the use of the capillary agglutination test (CAT) described by Luoto (19). All samples were initially screened undiluted but all positive sera were subsequently diluted two-fold and retested. For all tests, positive and negative control sera, also provided with the CAT antigen by VDL, were used.

The card agglutination test was used to detect *T. gondii* agglutinins using test kits containing positive and negative control sera.

■ RESULTS

The prevalences of agglutinins to *B. abortus*, *C. burnetii* and *T. gondii* in slaughter livestock are shown in table I. Of the 751 serum samples tested, only 2 (0.3 %) were positive for *B. abortus* agglutinins using RBT but both were negative by SAT.

Thirty-six (4.8 %) of 749 and 26 (19.8 %) of 131 serum samples were positive for *C. burnetii* and *T. gondii* agglutinins, respectively.

The prevalence of *T. gondii* agglutinins was statistically significantly ($P \leq 0.001$; χ^2) higher than that of *B. abortus* and *C. burnetii* agglutinins. *C. burnetii* agglutinins had the highest prevalence, 11.3 % (17 of 151), in pigs and the least prevalence, 0 %, in sheep (0 of 16) and goats (0 of 7) but the difference was not statistically significant ($P \geq 0.05$; χ^2). Seroprevalences of toxoplasmosis in goats (42.9 %), sheep (35.7 %) and cattle (27.3 %) were significantly higher ($P \leq 0.05$; χ^2) than was found in pigs (5.5 %). Sex of livestock and sample sources (abattoir or slaughter house) did not significantly ($P \geq 0.05$; χ^2) affect the prevalences of agglutinins to *B. abortus*, *C. burnetii* and *T. gondii* (data not shown).

■ DISCUSSION

It was significant that all 751 samples tested were negative for *B. abortus* agglutinins using SAT although two samples were positive by RBT. The findings agree with published reports elsewhere of RBT-positive sera found to be SAT-negative (5, 15). The livestock population is free of brucellosis, as confirmed by SAT, the standard test (21) for detecting *B. abortus* infections. Cazabon (11), however, reported in 1978 having detected one positive bovine with a significant titre of *B. abortus* agglutinins. This study findings are in agreement with the results of studies on goats and sheep in the US Virgin Islands (6) and in livestock in Nigeria (5) where all samples were negative for *B. abortus* agglutinins using SAT. The need for a regular serological surveillance for brucellosis in countries like Trinidad and Tobago, which are free of brucellosis, cannot be overemphasized. Neither can the enforcement of strict regulations for livestock importation be ignored. The recent serological detection of *B. ovis* agglutinins in sheep in quarantine following importation from Grenada (10) is a further reminder of the need to have these measures in place.

C. burnetii, the Q-fever causative agent, has been known to cause diseases in animals but, more importantly, it may cause zoonoses if it is inhaled or consumed via contaminated milk (1, 2, 7). From the present study, *C. burnetii* infections appear to be widespread with four of the six species testing positive for *C. burnetii* agglutinins. The 4.8 % detected prevalence is however lower than the 10.6 % seroprevalence found in cattle, sheep and goats (2) and 59.8 % in dairy cows (3) in Nigeria. It is nevertheless pertinent to mention that in the Nigerian studies (2, 3) *C. burnetii* agglutinins titres ranged from 1:8 to > 1:256, whereas in the present study all positive samples had titres of 1:4 or less, suggesting that current infections are uncommon. However, these are the first documented *C. burnetii* infections in livestock in Trinidad or any Caribbean country.

The detection of *T. gondii* agglutinins in 19.8 % of the serum samples tested is significant with regard to public health. Toxoplasmosis is another important zoonosis which causes variable clinical manifestations in animals and humans (12, 13, 18, 25). Of the cattle samples tested in the present study, 27.3 % were positive for *T. gondii* agglutinins, a prevalence higher than the 16 % detected in Bangladesh (24), 11.9 % in Mexico (14) and the 22 % in Thailand (27). Also, the seroprevalence of *T. gondii* in sheep in this study, 35.7 %, is much higher than the 17.8 % reported in Bangladesh (24) and 2.8 % found in sheep in Zimbabwe (22). It is however slightly lower than the 37.9 % found in sheep in Mexico (26). The seroprevalence of toxoplasmosis in Trinidadian pigs (5.5 %) is higher than that detected in pigs in Zimbabwe (22) where all serum samples tested were negative, but it is a little lower than the 8.9 % prevalence found in pigs in Mexico (14).

In conclusion, although Trinidad may be considered to be brucellosis-free, the need for a constant serological surveillance and enforcement of strict quarantine measures for selective importation of livestock cannot be overemphasized. It is important that both *T. gondii* and *C. burnetii* in Trinidad livestock have been documented for the first time. Both pathogens may impact on the health status of residents.

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Résumé

Adesiyun A.A., Cazabon E.P.I. Séroprévalences de brucellose, fièvre Q et toxoplasmose chez des animaux de boucherie à Trinidad

Des échantillons de sérum provenant de vaches, poules, porcs, moutons, chèvres et buffles abattus dans différents abattoirs de Trinidad ont été analysés pour la présence d'agglutinines de trois agents responsables de zoonoses, *Brucella abortus* (BA), *Coxiella burnetii* (CB) et *Toxoplasma gondii* (TG). Des 751 sérums testés, 2 (0,3 p. 100) provenant des poules étaient positifs pour BA par le test de Rose Bengal (RBT) mais négatifs par le test de séroagglutination en tube (SAT). Trente-six (4,8 p. 100) des 749 sérums étaient positifs pour CB par le test d'agglutination en tube capillaire (CAT) avec la plus forte prévalence (11,3 p. 100) observée chez les porcs et la plus faible, 0 p. 100, observée chez les chèvres et les moutons (différence non significative : $P \geq 0,05$; χ^2). Des 131 sérums testés, 26 (19,8 p. 100) étaient positifs pour TG avec une prévalence allant de 5,5 p. 100 chez les porcs à 42,9 p. 100 chez les chèvres. En conclusion, les animaux d'élevage de Trinidad n'ont pas été infectés par *B. abortus*. En revanche, il est montré pour la première fois que les infections causées par *Coxiella burnetii* et *Toxoplasma gondii* étaient présentes sur l'île.

Mots-clés : Animal à viande - *Brucella abortus* - *Coxiella burnetii* - *Toxoplasma gondii* - Sérum - Prévalence - Agglutinine - Abattoir - Trinidad.

Resumen

Adesiyun A.A., Cazabon E.P.I. Seroprevalencias de brucelosis, fiebre Q y toxoplasmosis en ganado de matadero de Trinidad

Se obtuvieron muestras de suero de animales domésticos de producción (bovinos, aviar, porcinos, ovinos, caprinos y búfalos de agua) sacrificados en varios mataderos de Trinidad y se examinaron con aglutininas de tres zoonosis. Se examinó un total de 751 sueros, de los cuales 2 (0,3 p. 100), ambos de origen aviar, fueron positivos para aglutininas de *Brucella abortus* mediante el Test de Rose Bengal, pero ambos fueron negativos usando el test de aglutinación serológica en tubo (SAT). Treinta y seis (4,8 p. 100) de los 749 sueros fueron positivos para *Coxiella burnetii* por aglutinación capilar (CAT), con la prevalencia más elevada, 11,3 p. 100, detectada en suero porcino y la más baja, 0 p. 100, en ovinos y caprinos. La diferencia no fue estadísticamente significativa ($P \geq 0,05$; χ^2). De los 131 sueros examinados, 26 (19,8 p. 100) presentaron aglutininas de *Toxoplasma gondii* con una prevalencia que varió de 5,5 p. 100 en cerdos a 42,9 p. 100 en cabras. Se concluye que los animales domésticos de producción de Trinidad están libres de *Brucella abortus*, pero *C. burnetii* y *T. gondii* existen, y son reportadas por la primera vez en la isla.

Palabras clave : Animal de carne - *Brucella abortus* - *Coxiella burnetii* - *Toxoplasma gondii* - Suero - Prevalencia - Agglutinina - Matadero - Trinidad.