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Q fever antibodies in food animals of Nigeria : a serological survey of cattle, sheep, and goats

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RÉSUMÉ

Anticorps de la fièvre Q chez les animaux de boucherie au Nigeria : enquête sérologique chez les bovins, les moutons et les chèvres

Des recherches faites en Nigeria du Nord, dans trois abattoirs et une usine à viande, chez des animaux de boucherie apparemment sains, ont mis en évidence par le procédé d'agglutination capillaire de Luoto, la présence d'anticorps dans 249 des 2 341 sérums prélevés, soit 10,6 p. 100 au total avec 11 p. 100 des résultats positifs pour les bœufs, 16,5 p. 100 pour les moutons et 8,8 p. 100 pour les chèvres.

Ces résultats indiquent que les animaux de boucherie de la région ont un large contact avec la fièvre Q.

INTRODUCTION

Q. fever is primarily a disease of man and occurs most commonly among those exposed to animals or animal products, such as ; slaughter house workers, meat processing employees, dairy workers, livestock farmers and veterinarians (2, 15, 20). It has also been reported in those consuming raw milk from infected cows and those living in the neighbouring areas of dairies (22). A world wide infection in workers in laboratories where the aetiological agent is studied has also been reported (11). The disease is caused by a Rickettsia organism, *Coxiella burnettii (Rickettsia burnettii)* which has a wide range of hosts. In cattle, sheep, and goats, Q. fever infection is generally thought to be inapparent although few reports exist in literature of abortions in sheep due to *C. burnettii* (1, 16, 19). Other domestic animals and some wild life including rodents and birds may also harbour the organism and they serve as reservoirs of human infections (7, 8, 18, 20).

Since the first report of the disease in Australia in 1937 by BURNET and FREEMAN (4) it has been found to exist in several other parts of the world (6, 10, 12, 13). In Nigeria, no information is available even though the disease has been reported in the neighbouring countries (9, 14).

The organism is transmitted from host to host by ticks (5), but unlike the other Rickettsia infections, it can commonly be transmitted in the absence of an arthropod vector (16).

Because the vectors of *C. burnettii* exist in this country, because of the reports of the disease in the neighbouring countries of Tchad, Niger, Togo and Sudan, and because of the lack of information in this country, it was decided to carry out a survey for the presence of Q. fever antibodies in apparently healthy slaughter animals. This paper reports on the serological studies made from three abattoirs and a meat processing plant in northern Nigeria.

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MATERIALS AND METHODS

Blood samples were collected from food animals (cattle, sheep and goats) at the time of slaughter or by jugular venipuncture at ante-mortem examinations from Samaru, Zaria and Kaduna abattoirs. Blood samples were collected similarly from cattle only in Bauchi meat processing plant because sheep and goats are not slaughtered routinely in this plant.

The cattle were all zebus of different breeds and came from many parts of the Northern States of Nigeria and from neighbouring countries. The goats were of the Sokoto red breed and the sheep were of the Ouda and Yankasa breeds, that is, breeds that are most common in northern Nigeria.

The samples were collected at two different periods. The first period covered between March and July, 1971 and the second was between October, 1973 and April, 1974.

Blood samples were allowed to clot at room temperature and sera were decanted into McCartney bottles with screw-caps. The sera were tested immediately or in some cases stored at — 20 °C until they were tested. The method of capillary agglutination test (C.A.T.) described by LUOTO (1953) was used to test for evidence of Q. fever infection.

The antigen was made from the Ohio 314 strain of *C. burnettii* and was obtained from the W. H. O. Q. fever reference Centre (*).

RESULTS

Table I shows the total number of animals tested from each area of serum collection and positive reactors. The results show that Q. fever C.A.T. positive sera were present among all the areas of sample collection and there is an evidence of previous infection in all species of animals tested.

The data in table II shows the titers of the positive samples. It indicates that none of the positive samples had a titer of less than 1 : 4 dilution. On the whole, frequency of infection was 11 p. 100 in cattle, 16.5 p. 100 in sheep and 8.8 p. 100 in goats.

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Table 1 : Q-Fever Capillary Agglutination Test (CAT) Results on Sera of Slaughter Animals in Three Abattoirs and One Meat-Processing Plant in Northern Nigeria.

Sample Origin	Number of Sera Tested			Number Positive			Percentage Positive		
	Cattle	Sheep	Goats	Cattle	Sheep	Goats	Cattle	Sheep	Goats
Samaru Abattoir	372	66	130	51	9	10	13.7	13.6	7.7
Zaria "	522	70	616	50	16	52	9.6	22.9	8.4
Kaduna "	178	59	98	18	7	12	10.1	11.9	12.3
Bauchi Packing Plant	230	0	0	24	0	0	10.4	0	0

Table 2 : Distribution of Antibody Titers in Positive Q-Fever Sera from Three Abattoirs and One Meat-Processing Plant in Northern Nigeria.

Sample Origin	Total N° of Sera Tested	Total N° of Positive (Whole serum)	TITERS									
			1:2	1:4	1:8	1:16	1:32	1:64	1:128	1:256	1:512	1:1024
Samaru Abattoir	568	70	0	10	6	10	7	17	15	4	0	1
Zaria Abattoir	1 208	118	0	13	11	17	17	31	21	6	2	0
Kaduna Abattoir	335	37	0	4	3	11	4	6	3	4	2	0
Bauchi Packing Plant	230	24	0	1	2	7	4	2	3	4	1	0

DISCUSSION

Two hundred and forty nine out of 2 341 (10.6 p. 100) blood samples from cattle, sheep and goats examined serologically by the Luoto capillary agglutination test (C.A.T.) for Q. fever were found positive.

Information on the incidence and distribution of the disease in Nigeria prior to this work was none existing (14). The results of the work reported here were obtained from the northern area of Nigeria and by far, the greatest number of samples were obtained in Zaria and Samaru. The results of this survey indicate the presence of *Coxiella burnettii* among food animals (cattle, sheep and goats) in Nigeria. Several serological techniques have been applied for the diagnosis of Q. fever but the two commonly used are the complement fixation test (C.F.T.) developed by BENGTSON (3), and the capillary agglutination test (C.A.T.) of LUOTO (17). The problems involved in the use of the C.F.T. for the serological diagnosis of Q. fever have been dealth with by certain workers (21). The C.A.T. is considered to be superior over the C.F.T. because it is simple to carry out, requires no special skill, uses undiluted serum for testing and the reaction is specific. But in the C.F.T., it is normal practice to use diluted serum because of the non-specific reactions encountered when serum diluted less than 1 : 16 is used for the test. Hence, it is possible that many positive sera whose titers are less than 1 : 16 could be reported negative by the C.F.T. Hence the C.A.T. had been used in the investigation.

Q. fever is an important zoonotic disease. Although the agent of the disease subsists in nature through a cycle in arthropods and lower vertebrates, human infection has not been traced to this cycle. However, it is generally accepted that man is infected from carrier animals. The reason for this is that *C. burnettii* is excreted in milk and is harboured in placental or foetal fluid of infected cattle, sheep and goats (16, 22). It is not surprising that hides, feed, bedding and atmospheric dust of animal environment are polluted with this Rickettsia organism and serve as source of infection to man by inhalation, ingestion and perhaps wound contamination. Although Q. fever has not been diagnosed in man in this country, its existence is not unlikely.

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SUMMARY

Q-fever antibodies in food animals of Nigeria : a serological survey of cattle, sheep, and goats

Q. fever investigations were carried out in Northern Nigeria in apparently healthy slaughter animals. Serum samples were obtained from the animals and tested for the presence of antibodies against Q. fever using the Luoto method of capillary agglutination test. Positive titers were found in the sera of the slaughter animals in the 3 abattoirs and a meat processing plant which were included in these investigations. Antibodies were detected in 249 of 2 341 animals (10.6 p. 100) tested. On the whole frequency of infection was 11 p. 100 in cattle, 16.5 p. 100 in sheep and 8.8 p. 100 in goats.

The findings suggested wide contact of food animals with Q. fever. Implication of the zoonotic potential of this disease in this country is discussed.

RESUMEN

Anticuerpos de la Fiebre Q en los animales de corte en Nigeria : encuesta serologica en los bovinos, los ovinos y las cabras

Investigaciones hechas en Nigeria del norte, en 3 mataderos y una fabrica de carne, en animales de carne, al parecer sanos, evidenciaron por el método de

aglutinación capilar de Luoto, la presencia de anticuerpos en 249 de 2 341 sueros tomados, es decir 10,6 p. 100 en resumidas cuentas con 11 p. 100 de resultados positivos para los bovinos, 16,5 p. 100 para los ovinos y 8,8 p. 100 para las cabras.

Dichos resultados indican que los animales de corte de la region tienen un gran contacto con la Fiebre Q.

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