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Serological prevalence of bovine leptospirosis in Plateau State, Nigeria

EZEH (A. O.), ADDO (P. B.), ADESIYUN (A. A.), BELLO (C. S. S.), MAKINDE (A. A.). Prévalence sérologique de la leptospirose bovine dans l'État du Plateau au Nigeria. *Revue Elev. Méd. vét. Pays trop.*, 1989, 42 (4) : 505-508.

Des échantillons de sérums récoltés sur 1 537 bovins dans 14 zones des gouvernements locaux de l'État du Plateau au Nigeria ont été testés pour la recherche d'anticorps de leptospires, en utilisant 13 souches au moyen d'un test d'agglutination microscopique modifié. Deux cent vingt-deux (14,4 p. 100) des bovins testés avaient des titres d'anticorps de leptospire de 1:100 ou plus, vis-à-vis d'un ou de plusieurs des antigènes testés. Les taux de prévalence des anticorps vis-à-vis des différentes souches étaient les suivants : *hardjo* (35,6 p. 100), *pomona* (11,7 p. 100), *pyrogenes* (11,7 p. 100), *canicola* (9,5 p. 100), *grippotyphosa* (7,7 p. 100), *bratislava* (5,9 p. 100), *icterohaemorrhagiae* (5,9 p. 100), *ballum* (4,5 p. 100), *autumnalis* (3,6 p. 100), *bataviae* (2,3 p. 100) et *tarassovi* (1,8 p. 100). La prévalence sérologique de la leptospirose bovine dans les différentes zones administratives de l'État du Plateau au Nigeria différait significativement ($P < 0,05$; X^2). *Mots clés* : Bovin - Leptospirose - Anticorps - Diagnostic - Nigeria.

INTRODUCTION

Bovine leptospirosis is one of the major diseases causing significant economic losses to cattle industry throughout the world (11). The disease is caused by a variety of different pathogenic serovars which are morphologically indistinguishable and capable of causing similar signs and symptoms. Relatively little is known of *Leptospira* in African livestock (1). Few serological studies carried out have indicated that bovine leptospirosis is probably endemic in Nigeria (4, 7, 9, 13).

This study was undertaken to determine the serological prevalence rate of bovine leptospirosis in the 14 local government areas of Plateau State of Nigeria following numerous reports of birth of weak calves and undiagnosed abortion in cattle.

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MATERIALS AND METHODS

Blood samples

Blood samples were obtained from 10 per cent of cattle in 203 herds located in various local government areas of Plateau State. Approximately 10 ml of blood was collected from either the jugular or caudal vein of each animal after swabbing the bleeding site with methylated spirit. All serum samples obtained from clotted blood were properly labelled and stored at 4 °C until tested.

Screening antigens

Thirteen leptospiral serovars comprising *hardjo* (Hardjoprajitno), *pomona* (Pomona), *canicola* (Hond Utrecht IV), *grippotyphosa* (Moskva V), *pyrogenes* (Salinem), *autumnalis* (Akiyami), *bratislava* (Jez Bratislava), *ballum* (S102), *bataviae* (Van Tienen), *icterohaemorrhagiae* (RGA), *tarassovi* (Mitis Johnson), *celledoni* (Celledoni) and *shermani* (LT 821) were used as the screening antigens for the survey. The antigens were selected in accordance with the recommended list for detecting infections caused by an unknown serovar (8) and also based on serovars previously reported in Africa. All the antigens used for microscopic agglutination test (MAT) were grown in modified liquid Ellinghausen and McCullough EMJH medium (10) supplemented with five per cent sterile rabbit serum. The antigens were grown for 5-7 days at 30 °C in 1/2-oz screw-capped bottles and growth was assessed using Corning nephelometer (Corning Ltd., Halstead, Essex, England). A nephelometric reading of 25 units corresponding to approximately 2×10^8 leptospires per millilitre (14) was used for the microscopic agglutination test.

Microscopic agglutination test (MAT)

All serum samples were tested by the microscopic agglutination test (3) in disposable microtitre plastic plates first at a dilution of 1:100 against four pools comprising 13 live antigens.

All sera with titre to pooled antigens were retested in serial two-fold dilution system beginning at 1:100

through 1:3.200 against each antigen within the positively reacting pool. The end point or titre was taken as the highest dilution of the test serum at which 50 per cent or more of the leptospires agglutinated. If titres to more than one antigen occurred in the same sample (multiple reaction), all titres were recorded as contributing to the serological prevalences against different antigens.

RESULTS

A total of 1537 cattle from 203 herds were examined for leptospiral antibodies at a minimum titre level of 1:100 (Table I). The overall prevalence rate of bovine leptospirosis in Plateau State of Nigeria was 14.4 per cent with *hardjo* (35.6 per cent of the positive sera) as the predominant serovar detected serologically. The prevalence of leptospiral antibody to other individual serovars were *pomona* (11.7 per cent), *pyrogenes* (11.7 per cent), *canicola* (9.5 per cent), *grippotyphosa* (7.7 per cent), *bratislava* (5.9 per cent), *icterohaemorrhagiae* (5.9 per cent), *ballum* (4.5 per cent), *autumnalis* (3.6 per cent), *bataviae* (2.3 per cent) and *tarassovi* (1.8 per cent) (Table II). The serological prevalence of bovine leptospirosis in the various local government areas of Plateau State in Nigeria differed significantly ($P < 0.05$; χ^2). The prevalence rates ranged from 7.9 per cent in Awe to 28.0 per cent in Nassarawa.

DISCUSSION

Since vaccination against bovine leptospirosis is not yet being practised in Nigeria, a titre of 1:100 as detected in the present study was considered significant. The use of arbitrary significant titre has no merit in the investigation of the cattle-adapted serovar *hardjo* since the presence or absence of detectable serum antibodies was an unreliable guide to carrier status (6). While no antibodies due to serovar *hardjo* was detected in Plateau State (4) possibly due to fewer bovine samples (7, 8) examined, this serovar was the most prevalent in the present study, accounting for more than a third of the total reactors. It is possible that massive importation of exotic cattle breeds by governments and individuals under agrarian revolution policy without screening for leptospirosis might have contributed to the apparent change in the epidemiology of bovine leptospirosis in Plateau State. Serological surveys for leptospiral antibodies are more meaningful if all the serotypes known to occur in an area are used as antigens (12). Using a laboratory strain of *hardjo* as antigen, a prevalence of 53 per cent was reported but with a local *hardjo* field strain, a slightly higher prevalence of 58 per cent was obtained (2). Similarly, a local isolate of *hardjo* (Ab 56) consistently reacted at a higher titre than the commonly used World Health Organization reference strain (Hardjoprajitno) in the microscopic agglutination test (5).

Since the prevalent leptospiral serovars in Nigeria have not been fully identified, it is possible that the

TABLE I Distribution of major serological reactors to different leptospiral serovars in cattle in the 14 local government areas of Plateau State.

Local Government Area (L.G.A.)	Number tested	Number positive	Percent positive	Number of sera positive for <i>Leptospira</i> serovars*												
				<i>hard.</i>	<i>pom.</i>	<i>pyr.</i>	<i>ball.</i>	<i>can.</i>	<i>aut.</i>	<i>brat.</i>	<i>grip.</i>	<i>bat.</i>	<i>tar.</i>	<i>cell.</i>	<i>ict.</i>	<i>sher.</i>
Nassarawa	118	33	28.0	12	6	6	1	2	0	1	2	2	0	0	1	0
Shendam	102	21	20.6	7	3	2	1	2	1	1	2	0	1	0	1	0
Lafia	127	26	20.5	10	5	4	1	2	0	1	0	1	0	0	2	0
Akwanga	108	19	17.6	6	2	2	0	1	1	4	2	0	0	0	1	0
Barkin-Ladi	106	15	14.2	8	0	3	0	2	1	0	1	0	0	0	0	0
Langtang	78	10	12.8	5	1	1	0	1	0	1	0	0	0	0	1	0
Jos	236	30	12.7	7	3	4	2	2	2	2	2	1	1	0	3	0
Mangu	95	11	11.6	4	1	0	1	0	1	0	1	0	1	0	1	0
Bassa	131	15	11.5	4	1	2	1	4	0	1	1	0	0	0	1	0
Wase	87	9	10.3	4	1	0	0	0	1	1	2	0	0	0	0	0
Keffi	78	8	10.3	2	1	1	1	0	1	0	1	0	1	0	0	0
Pankshin	118	12	10.2	5	2	1	1	1	0	0	1	0	0	0	1	0
Kanam	77	7	9.1	3	0	0	1	1	0	0	2	0	0	0	0	0
Awe	76	6	7.9	2	0	0	0	2	0	0	0	1	0	0	1	0
Total	1,537	222	14.4	79	26	26	10	21	8	13	17	5	4	0	13	0

* *hardjo*, *pomona*, *pyrogenes*, *ballum*, *canicola*, *autumnalis*, *bratislava*, *grippotyphosa*, *bataviae*, *tarassovi*, *celledoni*, *icterohaemorrhagiae*, *shermani*.

TABLE II Distribution of antibody titres to leptospiral serovars in 222 positive bovine sera from 14 local government areas.

Leptospira serovar	Number positive	Per cent positive	Microscopic agglutination test (MAT) titre					
			1 : 100	1 : 200	1 : 400	1 : 800	1 : 1,600	1 : 3,200
<i>hardjo</i>	79	35.6	33 (36)	19	15	10	2	0
<i>pomona</i>	26	11.7	12 (14)	7	4	3	0	0
<i>pyrogenes</i>	26	11.7	9	11 (12)	4	2	0	0
<i>canicola</i>	21	9.5	8 (11)	5	6	0	2	0
<i>grippotyphosa</i>	17	7.7	7	7	3	0	0	0
<i>bratislava</i>	13	5.9	4	6	2	1	0	0
<i>icterohaemorrhagiae</i>	13	5.9	4	4	4	1	0	0
<i>ballum</i>	10	4.5	4	3	1	2	0	0
<i>autumnalis</i>	8	3.6	5	2	1	0	0	0
<i>bataviae</i>	5	2.3	2	3	0	0	0	0
<i>tarassovi</i>	4	1.8	2	1	1	0	0	0
<i>celledoni</i>	0	0.0	0	0	0	0	0	0
<i>shermani</i>	0	0.0	0	0	0	0	0	0
Total	222	14.4	90 (98)	68 (69)	41	19	4	0

Multiple reactions () = 9.

battery of antigens used in the present study was inadequate. The high prevalence of *hardjo*, *pomona*, *canicola* and *grippotyphosa* is not clear to understand because none of these serovars has previously been isolated in Nigeria.

However the prevalence rate of 14.4 per cent of bovine leptospirosis obtained is lower than 48.0 per cent and 72.0 per cent reported (9, 13) respectively in parts of Nigeria. The disparity in the prevalence rates may be due to the significant titre of 1:30 used by these workers in the interpretation of serological results. But DIALLO used a titre of 1:20 as significant titre and reported a lower prevalence rate of 11.9 per cent (4). It is concluded that bovine leptospirosis is probably

more widespread than few serological reports suggest.

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Serum samples obtained from 1,537 cattle in the 14 local government areas (LGAs) of Plateau State of Nigeria were screened for the presence of leptospiral antibodies using 13 serovars in a modified microscopic agglutination test (MAT). Two hundred and twenty-two (14.4 p.100) of the cattle tested had leptospiral antibody titres of 1:100 or higher to one or more of the test antigens. The prevalence rates of antibodies to individual serovars were : *hardjo* (35.6 p.100), *pomona* (11.7 p.100), *pyrogenes* (11.7 p.100), *canicola* (9.5 p.100), *grippotyphosa* (7.7 p.100), *bratislava* (5.9 p.100), *icterohaemorrhagiae* (5.9 p.100), *ballum* (4.5 p.100), *autumnalis* (3.6 p.100), *bataviae* (2.3 p.100) and *tarassovi* (1.8 p.100). The serological prevalence of bovine leptospirosis in the various local government areas of Plateau State of Nigeria differed significantly ($P < 0.05$; X^2). *Key words* : Cattle - Leptospirosis - Antibody - Diagnostic - Nigeria.

EZEH (A. O.), ADDO (P. B.), ADESIYUN (A. A.), BELLO (C. S. S.), MAKINDE (A. A.). Prevalencia serológica de la leptospirosis bovina en el Estado del Plateau en Nigeria. *Revue Elev. Méd. vét. Pays trop.*, 1989, 42 (4) : 505-508.

Se comprobaron muestras de sueros recogidos en 1537 bovinos en 14 zonas de los gobiernos locales del Estado del Plateau en Nigeria para determinar la presencia de anticuerpos contra las leptospiras, al utilizar 13 cepas con una prueba de aglutinación microscópica modificada. Doscientos veinte y dos (14,4 p.100) de los bovinos examinados tenían títulos de anticuerpos contra las leptospiras de 1:100 o más, para con uno o algunos de los antígenos comprobados. Eran las tasas de prevalencia de los anticuerpos para con diferentes cepas las siguientes : *hardjo* (35,6 p.100), *pomona* (11,7 p.100), *pyrogenes* (11,7 p.100), *canicola* (9,5 p.100), *grippotyphosa* (7,7 p.100), *bratislava* (5,9 p.100), *icterohaemorrhagiae* (5,9 p.100), *ballum* (4,5 p.100), *autumnalis* (3,6 p.100), *bataviae* (2,3 p.100) y *tarassovi* (1,8 p.100). La prevalencia serológica de la leptospirosis bovina en las diferentes zonas administrativas de dicha región mostraba una diferencia significativa ($P < 0,05$; X^2). *Palabras claves* : Bovino - Leptospirosis - Anticuerpo - Diagnóstico - Nigeria.

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