



Knowledge, Attitude and Practices of Horse Handlers and Grooms Towards Brucellosis in Horses in Kaduna State, Nigeria

Baba, A.Y.¹; Saidu, S.A.²; Kaltungo, B.Y.³; Salisu, U.S.^{4*}; Babashani, M.³; Buhari, H.U.⁵

¹Department of Veterinary Medicine, University of Ilorin. ²Department of Veterinary Medicine, Ahmadu Bello University Zaria. ³Veterinary Teaching Hospital, Ahmadu Bello University, Zaria. ⁴Department of Animal Science, Federa University, Dutsinma. ⁵Samaru College of Agriculture, Division of Agric Colleges, Ahmadu Bello University, Zaria. *Corresponding author: Email: usalisu@fudutsinma.edu.ng, Mobile: +234 8099446387

SUMMARY

A study was carried out to determine the knowledge, attitude and practices of grooms towards brucellosis in Kaduna State, Nigeria. Structured questionnaires were administered to 40 horse owners and grooms' men in three Local Government Areas (LGAs); Sabon Gari, Zaria and Igabi; of Kaduna State, Nigeria to access knowledge, attitude and practices towards brucellosis in horses. Results from structured questionnaire showed only 37.50% (95% CI) of the respondents were aware of brucellosis, of this 22.50% (95% CI) ascribed their sources of information on the disease to be the media, 10.00% (95% CI) from experienced grooms while 5.00% (95% CI) said they heard of the disease from professionals who attended to the veterinary care of their horses. Of the respondents, only 15.00% (95% CI) were aware that brucellosis is zoonotic and mentioned that it could be contracted via ingestion of contaminated material (12.50%) and contact (2.50%). On attitude of respondents towards brucellosis, 15.00% (95% CI) reported lending out their stallions for breeding to other stables. Only 2.50% (95% CI) did not borrow stallions for breeding because they considered brucellosis and trichomoniasis as reproductive diseases that could result from the use infected stallions. The study also reported 52.50% (95% CI) and 40.00% (95% CI) of the respondents were in the habit of lending and borrowing out grooming tools respectively. They lend and borrow out tool despite mentioning that such acts are capable of leading to diseases such as ulcerative lymphangitis (95.00%), ringworm (72.50%), dermatophilosis (5.00%) and thrush (7.50%). 67.50% (95% CI) of respondents mentioned that they participated in durbars and other tournaments with their horses and reported such participation could result in diseases like ulcerative lymphangitis (25.00%) and wounds (27.50%). 50.00% (95% CI) of the respondents grazed their horses where other animals grazed and reported that even where there were reports of abortions by such animals their horses did not come down with brucellosis. All the respondents reported giving their horses' routine veterinary medical care, especially against babesiosis. The implication of this finding is that *Brucella* organisms may be spread among horse handlers and the grooms due to inadequate knowledge on brucellosis. The findings revealed poor knowledge

attitude and practices towards brucellosis on the part of horse handlers and grooms. It was concluded that there is a need to create awareness amongst groomsmen and horse owners on the presence of brucellosis in horses as well as the dangers of zoonotic infection.

KEY WORDS – Brucellosis, KAPs, Grooms, Horses

INTRODUCTION

Brucellosis is a contagious disease caused by members of the genus *Brucella* which is a Gram negative, facultative intracellular bacterium and can infect many animal species and man (Corbel, 1997; Young, 2000). Members of the genus are small (0.5-0.7 by 0.6-1.5µm), non-motile, encapsulated, and coccobacilli (Ryan and Ray, 2004). Genetically, ten species of the genus *Brucella* have been documented and they include *B. abortus*, *B. melitensis*, *B. suis*, *B. ovis*, *B. canis*, and *B. neotome*, *B. pinipedialis*, *B. ceti*, *B. muris* and *B. inapinata*. Of these *Brucella abortus* is the species of *Brucella* documented to cause brucellosis in horses (Kaltungo et al., 2013). Brucellosis has been reported in many animal species in Nigeria (Falade et al., 1975; Okoh et al., 1978; Falade and Shonekan, 1981; Adamu and Ajogi, 1995; et al., 2010; Ehizibolo et al., 2011; Ardo and Abubakar, 2016; Baba, 2016; Tijani et al., 2017; Kaltungo, 2018; Njoga et al., 2018; Ado, 2019; Baba, 2019; Buhari, 2019). These reports seem to indicate that brucellosis is endemic and problematic in Nigeria.

Horses are one of the most valuable animals in Nigeria (Musa, 2013). They are used for ceremonial processions, polo and racing among others (Mshelia, 2013; Musa, 2013). They are also kept by the police and army for defense and security operations (RIM, 1992). They have also been used under the traditional setting for drought power in the production of local sugar commonly referred to as “Mazar Kwaila” in Kaduna State in particular (RIM, 1992) as well as the sole means of long distance journeys before the advent of modern transport facilities (Mshelia, 2013). The domestic equine population in Nigeria is made up of 340,000

horses and 940,000 donkeys (RIM, 1992; Anon, 1994). In Kaduna State, the horse population is estimated to be 2,500 (Aliyu, 2014). More than 90% of the estimated equine population is located within the semi and sub-humid zones of the country where they are used either as beasts of burden (for transport, threshing and caramel production) or in the case of horses for sports and ceremonial purposes such as durbar as well as the production of sugar (RIM, 1992; Mshelia, 2013; Musa, 2013). There is increasing use of horses for ceremonies, especially in Kaduna State during durbars where many horses are gathered. The grooms are known to be very close to these horses due to their activities in grooming them. They interchangeably borrow grooming tools from one horse to another. Therefore, horses with lesions around the polls and withers may be groomed, and without the grooming tools being properly washed and disinfected could be used on another horse (Mshelia, 2013). These therefore, could lead to spread of the disease. Polo and horse racing are both national and international programmes that involve either the movement of racing horses or horse owners in and out of the country which could be a potential means for the spread of equine brucellosis. Rust (2012) reported that brucellosis caused by *Brucella abortus* is a zoonotic and infectious illness to which humans became exposed as a result of domestication of animals and the establishment of animal husbandry as an important element following civilization. The fact that the grooms are closely associated with horses, especially polo and racing ones through their grooming activities, can result in serious public health hazards, particularly if these grooms are not aware of the disease in horses. Diseases such

as bacterial, viral, protozoan and parasitic diseases have been shown to influence the role of horses in contributing to the national economy and private horse owners. To what extent brucellosis causes such effect in horses seems not to be fully investigated in Kaduna State. The seeming paucity of information on equine brucellosis among horses as well as the KAPs of horse owners, horse handlers and grooms on the disease informed the decision to conduct this study.

Materials and Methods

Study Area

The study was conducted in three Local Government Areas of Kaduna State, Nigeria. Kaduna state is located in the northwest geopolitical zone of Nigeria. It lies between latitudes 6° and 11° north and longitudes 7° and 44° east, and is 1995 ft above sea level. It has distinct wet and dry seasons within the Guinea Savannah zone and part of the Sudan Savannah in Nigeria. The state shares boundaries with Katsina and Zamfara states to the north, Plateau and Bauchi states to the east, Nasarawa State and the Federal Capital Territory to the south, Niger State to the west and Kano state to the northeast, Kaduna state is made up of 23 LGAs and occupies about 48,473.25 sqkm, with a human population of over 6,006,562 people according to the 2006 census figures (KDSG, 2008).

Questionnaire design and administration

A structured, pre-tested questionnaire was used in the study to access for KAPs to brucellosis amongst horse owners and handlers in the study area. The

questionnaires were completed for all the selected stables on a single visit. The questionnaire comprised mostly closed ended (categorical) questions to ease data processing, and improve precision of responses. The questions were translated to the grooms in Hausa language. The important stable and animal level data recorded included location of the flock, animal management practices, animal sourcing management, breeding and reproduction practices, management of aborted fetuses, and information or awareness on brucellosis in animals and man. All grooms and horse handlers at all stables visited for sampling of horses for prevalence studies were administered questionnaires.

Data Analysis

Data obtained were presented in tables and analysed using SPSS version 20.0 statistical package. Descriptive statistics, Chi square and Fishers Exact tests were used to test for association between categorical variables. P values <0.05 were considered significant.

RESULTS

Respondents' Knowledge on Brucellosis Grooms awareness and sources of information on brucellosis

A total of 40 respondents from Igabi, Sabon Gari and Zaria filled out questionnaires (Table 1). Of the 40 respondents, 17 (42.50%) respondents were from Igabi LGA, 8 (20.00%) and 15 (37.50%) were from Sabon Gari and Zaria LGAs respectively.

Table I: Grooms Awareness and Sources of information on Brucellosis in three LGAs of Kaduna State, Nigeria

LGA	No of Respondents	Awareness of Brucellosis		Sources of Awareness		
		Aware No (%)	Not aware No (%)	Media No (%)	Experienced grooms No (%)	Professionals No (%)
Igabi	17 (42.50)	7 (41.18)	10 (58.82)	4 (23.53)	2 (11.76)	1 (5.88)
Sabon Gari	8 (20.00)	2 (25.00)	6 (75.00)	2 (25.00)	0 (0.00)	0 (0.00)
Zaria	15 (37.50)	6 (40.00)	9 (60.00)	3 (20.00)	2 (13.33)	1 (6.67)
Total	40 (100)	15 (37.50)	25 (62.50)	9 (22.50)	4 (10.00)	2 (5.00)

Awareness: Fisher's exact test = 1.079, df = 2; p = 0.700

Source of awareness: Fisher's exact test = 3.362; df = 2; p = 0.913

Of the 40 respondents, 15 (37.50%) were aware of brucellosis as a disease while 25 (62.50%) were not. Furthermore, 9 (22.50%) of these respondents reported that their sources of awareness on brucellosis was the media, 4 (10.00%) reported other horse owners and grooms as their source of information while 2 (5.00%) others indicated professionals as their sources of information on brucellosis.

Seven (41.18%) of the respondents from Igabi were aware of brucellosis while 2 (25.00%) and 6 (40.00%) of those from Sabon Gari and Zaria respectively were aware of the diseases. On their sources of awareness on brucellosis, 4 (23.53%), 2 (11.76%) and 1 (5.88%) of the seven respondents from Igabi LGA respectively reported their sources of information on Brucellosis as the media, experienced grooms and professionals respectively. The 2 (25.00%) of the respondents from Sabon

Gari who were aware of the disease reported their source of information to be the media. 3 (20.00%) of the 6 respondents from Zaria LGA indicated the media as their source of information on brucellosis while 2 (13.33%) and 1 (6.67%) of them respectively indicated other grooms and professionals as their sources of information on brucellosis.

Grooms knowledge on brucellosis transmission and its zoonotic nature

Of the 40 respondents, 6 (15.00%) reported brucellosis as being zoonotic while 34 (85.00%) were not aware the disease is zoonotic (Table II). Of those aware of the zoonotic nature of the disease 5 (12.50%) of them considered ingestion as a means of transmission of the disease while 1 (2.50%) of them mentioned contact as a means of transmission of the disease. 5 (12.50%) of the respondents considered night sweats as a sign of the disease while 3 (7.50%) of them regarded fever as the chief sign of the disease.

Table II: Grooms knowledge on brucellosis being zoonotic and means of transmission of brucellosis in three LGAs of Kaduna State, Nigeria

LGA	No of Respondents	Brucellosis		Means of Infection		Recognition of Brucellosis		
		Zoonotic	Not Zoonotic	Ingestion	Contact	Night sweats	Fever	Others
Igabi	17 (42.50)	2 (11.76)	15 (88.24)	2 (11.76)	0 (0.00)	2 (11.76)	2 (11.76)	0 (0.00)
Sabon Gari	8 (20.00)	1 (12.50)	7 (87.50)	1 (12.50)	0 (0.00)	1 (12.50)	0 (0.00)	0 (0.00)
Zaria	15 (37.50)	3 (20.00)	12 (80.00)	2 (13.33)	1 (6.67)	2 (13.33)	1 (6.67)	0 (0.00)
Total	40 (100)	6 (15.00)	34 (85.00)	5 (12.50)	1 (2.50)	5 (12.50)	3 (7.50)	0 (0.00)

Zoonotic brucellosis; Fisher’s exact test = 0.322; df = 2; p = 0.921. Means of infection: Fisher’s exact test = 0.354; df = 2; p = 0.925. Recognition: Fisher’s exact test = 1.349; df = 2; p = 0.989

Only 2 (11.76%) out of the 17 respondents in Igabi LGA indicated brucellosis being zoonotic and both reported ingestion as the means of transmission of the disease and believed the signs of the disease in man included fever and night sweats (Table II). As for respondents in Sabon Gari LGA, one (12.50%) of them indicated that brucellosis is zoonotic and that it is transmitted by ingestion. The respondent further indicated that the only clinical sign of the disease is night sweating. Of the 15 respondents from Zaria LGA, 3 (20.00%) responded that Brucellosis is zoonotic. Two (80.00%) and 1 (6.67%) of these respondents respectively said that the disease is transmitted by ingestion and contact respectively (Table II).

As to the sign of the disease, 2 (13.33%) and 1 (6.67%) respectively said that signs of brucellosis in man were night sweat and fever.

Respondents’ knowledge on signs of brucellosis in horses and action taken

Responses on signs of brucellosis included abortion, poll evil and fistulous withers. Six (15.00%) respondents out of 40 indicated abortion as the sign they use to identify brucellosis while five (12.50%) and eight (20.00%) of them respectively pointed out poll evil and fistulous withers (Table III). All the 40 respondents reported that they had never encountered any of these signs in their horses and as such there was no need to take any action and they did not take any precaution to prevent the disease.

Table III: Respondents knowledge on signs and attitude towards brucellosis in horses in three of Kaduna State, Nigeria

LGA	Signs of brucellosis			Encountered cases		Action taken		
	Abortion	Wound location		Yes	No	Report to Clinic	Self Treatment	Do Nothing
		Poll	withers					
Igabi	5 (29.41)	0 (0.00%)	3 (17.65)	0 (0.00)	17(100.00)	0 (0.00)	0 (0.00)	0 (0.00)
Sabon Gari	0 (0.00)	0 (0.00)	2 (25.00)	0 (0.00)	8 (100.00)	0 (0.00)	0 (0.00)	0 (0.00)
Zaria	1 (6.67)	5 (33.33)	3 (20.00)	0 (0.00)	15(100.00)	0 (0.00)	0 (0.00)	0 (0.00)
Total	6(15.00%)	5(12.50%)	8(20.00%)	0(0.00%)	40(100.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)

Signs; Fisher’s exact test = 9.703; df = 2; p = 0.05

Table IV: Grooms knowledge and attitude towards brucellosis as a reproductive disease in three LGAs of Kaduna State, Nigeria

LGA	Abortion in Stable		Determination of causes of abortion		Encountered testicular swellings		Action taken on enlarged testicles		
	Yes	No	Yes	No	Yes	No	Clinic	Traditional Medicine	Do nothing
Igabi	1 (5.88)	16(94.12)	1 (5.88)	16(94.12)	3 (17.65)	14(82.35)	3 (17.65)	0 (0.00)	0 (0.00)
Sabon Gari	0 (0.00)	8(100.00)	0 (0.00)	8 (100.00)	0 (0.00)	8(100.00)	0 (0.00)	0 (0.00)	0 (0.00)
Zaria	1 (6.67)	14(93.33)	0 (0.00)	15(100.00)	3 (20.00)	12(80.00)	2 (13.33)	1 (6.67)	0 (0.00)
Total	2 (5.00)	38(95.00)	1 (2.50)	39 (97.50)	6 (15.00)	34(85.00)	5 (12.50)	1 (2.5)	0 (0.00)

Abortion: Fisher's exact test = 0.723; df = 2; p =0.998. Causes: Fisher's exact test = 1.532; df = 2; p =0.977

Enlarged testicles: Fisher's exact test = 1.260; df = 2; p =0.702

Respondents' knowledge of brucellosis as a reproductive disease

Only two (5.00%) of the 40 respondents indicated ever having abortion in their stables of which only one (2.50%) reported determining the cause of the abortion (Table 4). One (5.88%) of the respondents that had abortion in their stables was from Igabi LGA while the second respondent was from Zaria LGA. The respondent that reported determining the cause of abortion was from Igabi LGA. Furthermore, six (15.00%) of the respondents mentioned their stallions developing testicular swellings, five (12.50%) of them sought professional advice while the last one (2.50%) used traditional medicaments to treat the condition. Three (17.65%) of the respondents that reported encountering testicular swellings were also from Igabi LGA and three from Zaria LGAs. Of the five respondents that reported seeking professional help for their horses with testicular swellings, three (17.65%) and 2 (13.33%) were from Igabi and Zaria LGAs respectively (Table IV). The respondent who reported using traditional methods to treat testicular swellings was from Zaria LGA.

Respondents' Knowledge of brucellosis as a zoonotic disease

Six (15.00%) out of the 40 respondents in the study reported that they were aware that brucellosis is zoonotic (Table V). Three

(50.00%) of these were from Igabi LGA while one (16.67%) and two (33.33%) were from Sabon Gari and Zaria LGAs respectively. Among those that indicated knowing the disease as being zoonotic, 4 (10.00%) indicated fever as one of its signs while 6 (15.00%), and two (5.00%) said that signs of the disease in man to include night sweat and headache respectively and none of the respondents from all the LGAs regarded abortion and weakness as signs of the disease in man (Table V). Two (50.00%) of the respondents who said fever was one of the signs of brucellosis in man were from Igabi LGA while one (25.00%) each was from Sabon Gari and Zaria LGAs respectively. Similarly, 3 (50.00%) of the respondents who considered night sweat as being a sign of brucellosis were from Igabi LGA while one (16.67%) and two (33.33%) were respectively from Sabon Gari and Zaria LGAs. One (50.00%) of the respondents from Igabi and Zaria LGAs considered headache as being a sign of brucellosis while none of those in Sabon Gari LGA indicated so.

Respondents' knowledge on transmission of brucellosis from animals to man

Of the 40 respondents, one (2.50%) of them said that brucellosis could be transmitted from animals to man through the consumption of contaminated meat while six

(15.00%) others said transmission via ingestion of contaminated milk was the main source of transmission of brucellosis from animals to man (Table VI).

Respondents' Attitude to Brucellosis Responses of grooms on ownership and breeding of mares

Of the 40 respondents, 17 (42.50%) reported having mares in their stables. Out of these six (15.00%) indicated that they bred their

mares and that they had stallions in their stables (Table VII). None of the respondents indicated borrowing stallions while one (2.5%) of them reported he was in a habit of sending his mare to stallions in other stables for breeding. On the role of borrowing or sending mares to stallions in other stables, one each of the respondents (2.5%) indicated diseases that could be transmitted included brucellosis and trichomoniasis respectively.

Table V: Respondents' knowledge of brucellosis as a zoonosis in three LGAs of Kaduna State, Nigeria

LGA	Brucellosis in man		Signs of brucellosis in man				
	Yes	No	Fever	Night sweat	Abortion	Weakness	Headache
Gabi	3 (50.00)	14(41.18)	2 (50.00)	3 (50.00)	0 (0.00)	0 (0.00)	1 (50.00)
Sabon Gari	1 (16.67)	7 (20.59)	1 (25.00)	1 (16.67)	0 (0.00)	0 (0.00)	0 (0.00)
Zaria	2 (33.33)	13(38.24)	1 (25.00)	2 (33.33)	0 (0.00)	0 (0.00)	1 (50.00)
Total	6 (15.00)	34(85.00)	4 (10.00)	6 (15.00)	0 (0.00)	0 (0.00)	2 (5.00)

Fisher's exact test = 0.372; df = 2; p = 0.921. Signs: Fisher's exact test = 1.564; df = 2; p = 0.899

Table VI: Respondents' knowledge on transmission of brucellosis from animals to Man in three LGAs of Kaduna State, Nigeria

LGA	No. of Respondents	Method of Transmission		
		Meat Consumption (%)	Milk Consumption (%)	Do not Know (%)
Igabi	17	1 (5.88)	3 (17.64)	14 (82.35)
Sabon Gari	8	0 (0.00)	1 (12.50)	7 (87.50)
Zaria	15	0 (0.00)	2 (13.33)	13 (86.67)
Total	40	1 (2.50)	6 (15.00)	34 (85.00)

Fisher's exact test = 9.322; df = 2; p = 0.076

Respondents' attitude on use of stable equipment

All the 40 (100%) respondents reported having grooming tools in their stables and 21 (52.50%) of them were in the habit of lending out their grooming tools to others while 16 (40.00%) of them indicated that they occasionally borrowed grooming tools from others (Table VIII). Furthermore, all the grooms observed that grooming tools could serve to transmit diseases. Among

these diseases, 38 (95.00%) of them reported ulcerative lymphangitis while 29 (72.50%), two (5.00%) and three (7.50%) respectively reported ringworm, dermatophilosis and thrush as the diseases that can be transmitted by grooming tools (Table VIII).

Table VII: Respondents’ practices on Breeding of Mares in three LGAs of Kaduna State, Nigeria

LGA	Ownership of Mares		Breeding of Mares		Ownership of Stallion		Borrowing of Stallion		Sending Mare to Stallion		Sexually transmitted diseases considered			
	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)	TB (%)	Brucellosis (%)	Trichomoniasis (%)	None (%)
Igabi	13 (76.47)	4 (23.53%)	3 (17.65%)	14 (82.35%)	3(50.00)	14 (82.35%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
Sabon Gari	2 (25.00%)	6 (75.00%)	1 (12.50%)	7 (87.50%)	1 (12.50%)	7 (87.50%)	0 (0.00%)	0 (0.00%)	1 (12.50%)	0 (0.00)	0 (0.00%)	1 (12.50%)	0 (0.00%)	0 (0.00%)
Zaria	2 (13.33%)	13 (86.67%)	2 (33.33)	13 (86.67%)	2 (33.33)	13 (86.67%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	1 (6.67%)	0 (0.00%)
Total	17(42.50%)	23(57.50%)	6 (15.00%)	34(85.00%)	6 (15.00%)	34 (85.00%)	0 (0.00)	0 (0.00)	1 (2.50%)	0 (0.00)	0 (0.00)	1 (2.50%)	1 (2.50%)	0 (0.00%)

Table VIII: Respondents’ husbandry Practices in three LGAs of Kaduna state, Nigeria

LGA	Grooming Tools		Lending Grooming Tools		Borrowing Grooming Tools		Transmission of Disease via Grooming Tools		Possible Disease through Grooming Tools			
	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)	Ulcerative lymphangitis	Ringworm	Dermatoph- ilosis	Thrush
Igabi	17 (43.59)	0 (0.00)	3 (17.65)	14 (82.35)	3 (17.65)	14 (82.35)	17 (100.00)	0 (0.00)	17 (100.00)	16 (94.11)	1 (5.88)	0 (0.00%)
Sabon Gari	8 (20.51)	0 (0.00)	8 (100.00)	0 (0.00)	6 (75.00)	2 (25.00)	8 (100.00)	0 (0.00)	8 (100.00)	8 (100.00)	1 (12.5)	0 (0.00%)
Zaria	14 (93.33)	1 (6.67)	10 (66.67)	5 (33.33)	7 (46.67)	8 (53.33)	15 (100.00)	0 (0.00)	13 (86.67)	5 (33.33)	0 (0.00)	3 (100.00%)
Total	39(97.50)	1 (2.50)	21 (52.5)	19(47.50)	16(40.00)	24(60.00)	40 (100.00)	0 (0.00)	38 (95.00)	29 (72.50)	2 (5.00)	3 (7.50%)

Table IX: Respondents practices on disease spread through durbar participation in three LGAs of Kaduna State, Nigeria

LGA	Participation in Durbar		Disease Encountered				
	Yes (%)	No (%)	Ulcerative Lymphangitis	Epizootic Lymphangitis	Wounds	Brucellosis	Others
Igabi	7 (41.76%)	10(58.82%)	1 (5.88%)	0 (0.00%)	7 (41.76%)	0 (0.00%)	0 (0.00%)
Sabon Gari	5 (62.50%)	3 (37.50%)	2 (25.00%)	0 (0.00%)	3 (37.50%)	0 (0.00%)	0 (0.00%)
Zaria	15(100.00%)	0 (0.00%)	7 (46.67%)	0 (0.00%)	1 (6.67%)	0 (0.00%)	0 (0.00%)
Total	27 (67.50%)	13(32.50%)	10 (25.00%)	0 (0.00%)	11(27.50%)	0 (0.00%)	0 (0.00%)

Fisher's exact test = 1.349; df = 2; p = 0.989

Table X: Grooms grazing practices in three LGAs of Kaduna State, Nigeria

LGA	Horse grazing with other animals		Grazing where other animals aborted		Any abortion by mares	
	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)
Igabi	6 (35.29)	11 (64.71)	0 (0.00)	17 (100.00)	0 (0.00)	17 (100.00)
Sabon Gari	7 (87.50)	1 (12.50)	0 (0.00)	8 (100.00)	0 (0.00)	8 (100.00)
Zaria	7 (46.67)	8 (53.33)	1 (6.67)	14 (93.33)	0 (0.00)	15 (100.00)
Total	20 (50.00)	20 (50.00)	1 (2.50)	39 (97.50)	0 (0.00)	40 (100.00)

Grazing: Fisher's exact test = 3.362; df = 2; p = 0.110. Other animals aborted: Fisher's exact test = 1.784; df = 2; p = 0.875. Abortion in mares: Fisher's exact test = 1.349; df = 2; p = 0.892

Table XI: Grooms practices with regard to veterinary care in three LGAs of Kaduna State, Nigeria

LGA	VET MEDICAL CARE		DISEASE CONDITIONS ROUTINELY SOUGHT FOR CARE		
	Yes (%)	No (%)	Babesiosis (%)	Wound (%)	Lameness (%)
Igabi	17 (100.00)	0 (0.00)	17 (100.00)	3 (17.65)	17 (100.00)
Sabon Gari	8 (100.00)	0 (0.00)	8 (100.00)	2 (25.00)	6 (75.00)
Zaria	15 (100.00)	0 (0.00)	15 (100.00)	8 (53.33)	6 (40.00)
Total	40 (100.00)	0 (0.00)	40 (100.00)	13 (32.50)	29 (72.50)

Conditions: Fishers exact test = 4.332; df = 2; p = 0.084

Diseases spread through participation in tournaments

Among the 40 grooms, 27 (67.50%) of them reported having participating in durbars (Table IX). Ten (25.00%) of them reported their horses coming down with ulcerative lymphangitis while 11 (27.50%) reported their horses encountering wounds from various sources following durbars. Among those that reported their horses coming down with ulcerative lymphangitis, one (5.88%) was from Igabi LGA while two (25.00%) and seven (46.67%) were from Sabon Gari and Zaria LGAs respectively. As for those that reported their horses being injured, seven (41.76%) were from Igabi LGA while three (37.50%) and one (6.67%) were from Sabon Gari and Zaria LGAs respectively. None of them reported their horses coming down with brucellosis, epizootic lymphangitis or other conditions through participation in tournaments (Table IX).

Respondents' Practices with regard to brucellosis

Respondents' grazing practices with regard to brucellosis

Twenty (50.00%) of the respondents reported grazing their horses with other species of animals. One (2.5%) of the respondents indicated grazing his horses in areas where other animals were said to have previously aborted (Table X). None of the respondents reported any abortion in his stable. Six (35.29%) of the respondents from Igabi LGA reported grazing their horses with other animals while seven (87.50%) and seven (46.67%) each of the respondents from Sabon Gari and Zaria LGAs indicated doing so. Furthermore, the only respondent who reported grazing his horses where other animals aborted was from Zaria LGA.

Respondents' practices with regard to veterinary care

All the 40 respondents interviewed reported seeking veterinary assistance on the ailments

of their horses (Table XI). These services were in connection with cases of babesiosis, wound management and cases of lameness. Thus, all the respondents sought for veterinary services in all their cases of babesiosis while 13 (32.50%) and 29 (72.50%) sought for veterinary care on wounds and lameness respectively (Table XI). All the respondents in the three LGAs routinely sought for veterinary attention on babesiosis while only three (17.65%), two (25.00%) and eight (53.33%) of the respondents from Igabi, Sabon Gari and Zaria respectively sought for veterinary attention on wounds in their horses. Furthermore, all the respondents from Igabi LGA sought for veterinary care on cases of lameness of their horses while six (40.00%) each of the respondents from Sabon Gari and Zaria LGAs respectively sought for veterinary care for their horses.

DISCUSSION

From the study, more respondents were unaware of brucellosis as a disease than those that were aware of it. Those that were aware of brucellosis reported their sources of knowledge on the disease to the media, more experienced grooms among them and health professionals. This is not surprising as the Department of Veterinary Medicine in the Faculty of Veterinary Medicine, Ahmadu Bello University Zaria in the past usually organized training programmes on livestock diseases to livestock owners, horse owners and their grooms' inclusive (Saidu *et al.*, 1980; Saidu, 1986). As to their mentioning professionals as their sources of information on horse diseases, most owners of polo and racing horses usually enlist the services of a veterinarian to render routine veterinary medical care to their horses. With regard to signs of brucellosis in horses, some of the respondents reported abortion and wounds at the poll and withers. This seeming knowledge could be associated with or

linked to their identification of the media and other sources of information as mentioned above. Furthermore, their knowledge on the disease in humans could similarly be through these sources of information. However, it is to be understood that the fact that most of them did not regard the disease to be zoonotic could be translated to more problems as they can be exposed to the agents knowingly or ignorantly with attending consequences. This is in agreement with the work of Salisu *et al.* (2018), who found out that there is very poor knowledge of camel brucellosis amongst stakeholders as a result they had a “*laissez faire*” attitude towards the disease and no practices towards prevention of infection either to them or their animals. The few that regarded the disease to be zoonotic were able to identify the signs of the disease in man and this can also be due to their exposure to the training programmes as mentioned above. Similarly, their association of means of transmission of the disease from animals to man could be from the sources mentioned above as well as the regular radio and television programmes by the National Agricultural Extension Research Liaison Service of the Ahmadu Bello University, Zaria. Furthermore, the Nigerian Veterinary Medical Association also carried out training programmes for livestock owners and professionals and information on the disease could similarly trickle down to them (Jahun, 2011).

The attitude of the respondents to brucellosis was captured through their breeding methods, use of grooming tools and participation in tournaments. Thus some (15%) of the respondents indicated lending out or borrowing stallions for breeding their mares or even sending their mares to stallions for breeding. This act is capable of spreading the disease, should any of them, mare or stallion be infected with *Brucella* organisms. Corbel (2006) reported that such acts are capable of transmitting the disease from herd to herd. With regard to borrowing

or lending out grooming equipment, at least 40% of the respondents indicated doing so even though they knew that such acts were capable of leading to transmission of the disease in their stables. Their identification of diseases like ulcerative lymphangitis, ringworm, dermatophilosis and thrush as diseases that can be spread through lending or borrowing grooming tools did not stop them from doing so. This could be as they had never had serious cases as a result of such habits or they could be disinfecting the tools in between use since there is evidence that they used to get routine training as observed earlier on. Their participation in tournaments has been shown to lead to diseases like ulcerative lymphangitis and wounds, though they reported never encountering brucellosis. This could be that during such tournaments no breeding programmes were arranged to warrant any horse acquiring infection through coitus.

From the study, the practices of the grooms with respect to grazing showed that they grazed their horses where other animals were being grazed and even in areas reported to be grazed by animals that had previously aborted. This is capable of spreading brucellosis, should the abortions be due to brucellosis. This agrees the study carried out by Kaltungo (2018) and Buhari (2019) who attributed the spread of brucellosis in flocks of sheep and goats in Sokoto and Kaduna State respectively to extensive management system of the flocks. Bale (1980) reported that the system of husbandry greatly influences the spread of brucellosis. Furthermore, Hinton *et al.* (1977) reported that mares co-grazing with cattle could come down with brucellosis with subsequent abortion. This corresponds with the survey carried out by Baba *et al.* (2019) in Horses Ilorin Metropolis in which horses and sheep were seen grazing in the same environment. In addition, the possibility of animals to come down with the disease is great since the FAO (2005) reported that the organisms

can survive in pasture for up to 144 days at 20°C and even in urine for up to 40 days.

It was thus concluded that a greater percentage of horse owners and handlers in the study area were unaware of brucellosis as a disease that could affect their horses and also as a zoonotic disease that could be transmitted to them. As a result, they frequently lend out and borrow grooming equipment and allowed mix grazing of their horses with other species of animals thus exposing them to infection with brucellosis amongst other diseases.

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