FULL PAPER

Sokoto Journal of Veterinary Sciences
(P-ISSN 1595-093X E-ISSN 2315-6201)
Aiyedun & Olugasa /*Sokoto Journal of Veterinary Sciences* (2012). 10(2): 1-6
http://dx.doi.org/10.4314/sokjvs.v10i2.1

Identification and analysis of dog use, management practices and implications for rabies control in Ilorin, Nigeria

JO Aiyedun[1&2] & BO Olugasa[2*]

[1]*Faculty of Veterinary Medicine, University of Ilorin, Ilorin, Nigeria*
[2]*Department of Veterinary Public Health and Preventive Medicine, Faculty of Veterinary Medicine, University of Ibadan, Ibadan, Nigeria.*

*Correspondence: Tel.: +2348035824221, E-mail: b.olugasa@ui.edu.ng

Abstract
Dog use and associated management practices were investigated in Ilorin, the capital city of Kwara State, Nigeria from August to October 2010. All identified 16,348 household compounds in the city were investigated. Five hundred (500) questionnaires were directly administered at household and compound levels to capture data on socio-economic profile of dog owners, reasons for keeping dogs and types of management system practiced. The results indicated that majority [621, n = 1,258 (49.4%)] of dogs were kept primarily for security of premises. Some 205 (16.3%) were kept for breeding and commercial ventures, 184 (14.6%) were kept as pets, 103 (8.2%) were kept essentially for game hunting, 98 (7.8%) were used for multiple purposes and 47 (3.7%) were raised as source of meat. Dog management ranged from intensive (kennel confined) [331, (26.3%)], to extensive (free-roaming) system in 927 (73.7%) dogs. Dogs were kennel confined mostly [207, (16.5%)] in high income residential areas, while all dogs in transit areas were free-roaming. A positive correlation (r^2=0.74) exists between extensive practice and dogs for meat production which were left to scavenge freely in the city. The implication of dog use and management practices in relation to rabies control in Ilorin city and its environs is discussed in this paper. Status of community hygiene and environmental health is contributory to rabies risk in the city. Improved community hygiene is needed to complement effective vaccination coverage of dogs for rabies control in the city.

Keywords: dog use, environmental health, Ilorin city, Nigeria, management practices, rabies control, rabies risk,

Introduction

Human-dog bond is a deep connection between two species that exists like no other in the animal world. Human-dog relationship has existed for several centuries with several advantages and some known disadvantages (Cutt *et al.*, 2007). In the industrialized countries, dogs have been put to remarkably high adaptation to human needs in health promotion, adjustment of the elderly, recovery from illnesses, guiding the blind, assisting the deaf, assisting persons that are impaired in their mobility, as well as to alert epileptic patients that a seizure is imminent. In that instance, the owner can sit down or take some medications before a seizure strikes (Cutt *et al.,* 2007, Gillum & Obisesan, 2010). Dogs have been trained to turn on/off lights, pick up objects, and pull wheel chairs for those who are physically challenged. Police dogs have been trained to protect officers, as well as sniffing out drugs, explosives, and other dangerous chemicals beyond what the human can do. Dogs trained for search and rescue missions use their powerful sense of smell to locate people, lost or injured.

In Nigeria, however, studies that were conducted on use of dogs have shown that people keep dogs for various reasons, including companionship as pet, house guard, assistance for hunting of wildlife, and as food animal that is eaten by some people. Their perceived economic and social worth thus depends on the community values attached to their use, which varies from one place to another (Oboegbulem & Nwakonobi, 1989). The functions and value attributed to dogs as a result of the

culture and ecological setting of the people contributes to the condition in which dogs are kept, and the degree of supervision they receive within human community (WHO & WSPA, 1990; WHO, 2002). As such the sizes of different segments of a dog population depend heavily on the proportion of human population keeping, tolerating or rejecting dogs in their neighbourhood.

Proper identification and management of the positive and negative aspects of the relationship between humans and dogs is a vital responsibility for veterinary public health services in a community. Dogs have been established as associated with human rabies and the domestic transmission of rabies in developing countries through bites of rabid dogs (Meslin *et al*., 1994; Dedmon, 2008). Thus, dogs have been reported to be the principal vectors and reservoirs of rabies in Africa (Cleaveland *et al.*, 2007). Rabies is a highly fatal disease that is recognized as a neglected disease by the World Health Organization (WHO). Rabies is perhaps more accurately described as a disease of neglected communities (Cleaveland *et al.*, 2007). The neglect includes a situation wherein humane and professional care for quality production and health of dogs are not adequately attended to. This situation is commonly seen in developing countries, where dog distribution and density in a community may vary due to availability of shelter, water, food, cultural practices, especially societal customs (Beran, 1982).

The present study was carried out in Ilorin city, Nigeria in view of its potentials to clarify some aspects of rabies incidence in humans within the city (Aiyedun, 2011). Various studies were recently conducted using serological survey (Olugasa *et al.*, 2011), population census (Aiyedun & Olugasa, 2012) and geo-spatial analysis of human cases presented at the University of Ilorin Teaching Hospital (Olugasa *et al.*, 2009) on dog and human rabies in Ilorin city. This study was important to provide a trace-back on dogs use and management in relation to human exposure to rabies in the city. This is capable of presenting a less technical explanation of some aspects of rabies incidence in humans, and their spatial distribution in the city compared to the use of cluster analysis and antibody levels. The findings will complement the earlier studies.

Materials and methods

The study area

Ilorin, the capital city of Kwara State is located in the North Central geo-political zone of the country. It lies on latitude 8^{o}, $31^{'}$N and longitude 4^{o} $35^{'}$E. Kwara State shares boundaries with Oyo, Ekiti, Kogi, Niger and Osun States. Geographic area of Ilorin is an estimated 50.2 km^2, approximately 400 km from the Federal Capital Territory, Abuja. The city comprise three major land use areas namely, residential areas (low income traditional settlements, medium income residential areas and high income government residential areas), non-residential areas (government offices, recreational, commercial, industrial and educational areas) and transit areas (vehicle terminals for cars, buses and lorries). (Olorunfemi & Odita, 1998; Olugasa *et al.,* 2011; Aiyedun & Olugasa, 2012). Ilorin lies within the guinea savanna ecological belt of Nigeria, and shares ecosystem with Borgu game reserve to the north and Old Oyo Park to the South.

Dog population in the city was estimated to be 1,258 (Aiyedun & Olugasa, 2012). The 2006 national census report indicates that human population in Kwara State was 2,371,089. Among this is Ilorin city alone that has a total of 777,667 persons (FGN Official Gazette, 2007). The city consists of three Local Government areas, namely; Ilorin East with 204,310 people, Ilorin South with 208,691 people and Ilorin West with 364,666 people. Its strategic location as the gateway between the northern and southwestern parts of the country makes it easily accessible to all parts of the country by air, road or rail transport.

House-to-house questionnaire survey

Questionnaire for gathering dog population data and for assessing human attitude towards dog was designed. The questionnaire survey was done on the same areas as of street count. An adult and literate member of the household was interviewed using questionnaire designed for dog population survey (WHO & WSPA, 1990). The questionnaire consist of two parts: part one covers information about the household and biodata of dog, part two was concerned with management of dogs and cases of dog bite. In some cases the questionnaire was read to the respondents and the answers they gave were filled in appropriately. The interviews were conducted in the local language and English depending on the situation, the time for the interviews varies from approximately 10-15minutes. Households with dogs were asked about the number of dogs owned, their ages and sexes. Their reasons for keeping dogs, methods of feeding and dog movement restriction their dogs were asked. All the

households were asked about the presence of other dogs, (owned or free-roaming) at their homes andpremises. Each household interviewed was asked about the number of people living on the premises, their waste disposal method, Presence of an incinerator, toilet facility and if they would like to own more dogs. Statistical summary for each street was recorded on the back page of the questionnaire to conclude on dog use and management practices. Questionnaires were distributed at the ratio of one to thirty-three (1:33) roof-tops. Two questionnaires were administered per street, on the average. A total of five hundred (500) questionnaires were administered in all. The number of questionnaires was decided based on a merger of level of accuracy and logistic convenience.

Statistical analysis

Detailed descriptive statistics and measures of association were computed using the Microsoft Excel application software. Correlation coefficient (r^2) was calculated between dog use and management practices.

Results

A total of 621 (49.4%) dogs were kept primarily for security use. Some 205 (16.3%) were kept for breeding and sales of puppies as a commercial venture. Some 184 (14.6%) dogs were kept for companionship as pets, while some 103 (8.2%) were kept for hunting of wildlife. There were 98 (7.8%) dogs that were kept for more than two purposes combined (multipurpose). Some 47(3.7%) dogs were kept and used for meat production. (Table 1).

Management system varied from intensive management of 331 (26.3%) dogs that were kept in confined premises and/or in kennels in which the dog depended wholly on the owner to provide all its needs, to some other 927 (73.7%) that were free-roaming on either extensive or semi-intensive management system. There were 207 (16.5%) of these city resident dogs that were kept in intensive management system within residential areas of the city. All dogs in the transit areas were free-roaming and on extensive management (Table 2). A positive correlation (r^2 = 0.74) was established between extensive or semi-intensive management system and dogs used for hunting and those for meat purposes, which were left to freely scavenge for food.

Garbage collection points were identified within the study area that served as gathering points for dogs to eat from communal wastes. A total of 273 were identified. Among these were some 98 collection points that were weekly collected. Some other 120 garbage collection points were collected monthly and 55 others that were left indefinitely to accumulate with garbage without collection within the study area. Non-residential area (commercial, educational, food market and abattoir premises) had highest number of garbage collection points with some 145, followed by transit areas with 90 and residential area with 38. (Table 3). Fifteen major markets were identified within the study area. Eleven of these operated on daily basis, while 4 others operated at 5-day interval. Non-residential areas had 7 major markets, out of which 5 operated daily and 2 operated on 5-day interval. Transit areas has 3 major markets, 2 of them operated daily, one operated 5-day interval. Residential area has 5 major markets, of which 4 operated daily and one operated at 5-day interval. Out of the markets that operate daily, 6 operate in the morning from 7:00 a.m. to 12noon, while 5 operated in the evening from 5:00 p.m. and 10:00 p.m. (Table 4)

Table 1: Reasons for keeping dogs in Ilorin, Nigeria (August- October, 2010)

Land use area	Security	Breeding	Pet	Hunting	Meat	Multi-purpose	Total
Transit area (vehicle terminals)	92 (7.3%)	86 (6.8%)	26 (2.1%)	31 (2.5%)	9 (0.7%)	24 (1.9%)	268 (21.2%)
Residential	197 (15.7%)	95 (7.6%)	90 (7.2%)	52 (4.1%)	17 (1.4%)	29 (2.3%)	480 (38.2%)
Non-residential	332 (26.4%)	24 (1.9%)	68 (5.4%)	20 (1.6%)	21 (1.7%)	45 (3.6%)	510 (40.5%)
Total	621 (49.4%)	205 (16.3%)	184 (14.6%)	103 (8.2%)	47 (3.7%)	98 (7.8%)	1,258(100%)

Table 2: Dog management systems across land use areas in Ilorin, Nigeria (August - October, 2010)

Land use area	Confined	Free-roaming	Total
Transit area (vehicle terminals)	-	268 (21.3%)	268 (21.3%)
Residential area	207 (16.4%)	273 (21.7%)	480 (38.2%)
Non-residential area	124 (9.9%)	386 (30.7%)	510 (40.5%)
Total	331 (26.3%)	927(73.7%)	1,258 (100%)

Table 3: Waste collection frequency among land use areas in Ilorin Nigeria (August-October 2010

Land use area	Weekly collection	Monthly collection	Indefinite collection	Total
Transit area (vehicle terminals)	13	42	35	90
Residential area	30	8	-	38
Non-residential area	55	70	20	145
Total	98	120	55	273

Table 4: Major public food markets within land use areas of Ilorin, Nigeria (August - October, 2010)

Land use area	Number of Markets	Frequency of marketing	
		Daily	Five-day interval
Transit area (vehicle terminals)	3	2	1
Residential area	5	4	1
Non-residential area	7	5	2
Total	15	11	4

Discussion

Dog use and management practices were studied from August to October, 2010 in Ilorin city, Nigeria and found that majority of dogs were kept on extensive management system in the commercial and transit areas of the city free-roaming in search of food and engaged in breeding and territorial interactions, while minority were kept on intensive management. Majority of dogs on intensive or semi-intensive management system were in the high income residential areas where they were used as house security guard. Coexistence of extensive and semi-intensive management of dogs connected dogs used for hunting wildlife with city resident dogs.

These findings on dog use and management systems contrast with what obtains in industrialized countries (Cutt *et al.,* 2007), but helps remarkably to explain the density obtained around the market and abattoir in the Central Pata Market area of Ilorin city (Olugasa *et al.,* 2009) and corroborate the spatial statistics findings on identified hotspot of rabies transmission to humans in this transit city, especially among children commuting to schools along the Pata abattoir area in Ilorin city. Clustering of dogs at this location was primarily to eat abattoir wastes, including beef trimmings, bones, offal and blood of slaughtered animals. It may be explained that this convergence heightened the risk of contact with rabid dogs at this location (Olugasa *et al.,* 2011). The practice whereby household pets occasionally followed their owners to market place, keeping their company as people engaged in buying and selling promoted contact between dogs in the community and increased risk of disease spread (El-Yuguda *et al.,* 2007).

The presence of several poorly managed garbage collection points in the city also aided clustering of extensively managed dogs. Garbage collection points that were weekly or monthly disposed off, including those that were allowed to pile-up indefinitely on

major streets provided foci for free–roaming dogs to congregate for food and to mate, thus served as environmental risk factor associated with human rabies exposure as identified by Olugasa *et al.* (2009*)* and Olugasa *et al.* (2011). Non-residential areas with high number of garbage collection points were associated with high number of free-roaming dogs. This also corroborates the report by Oboegbulem & Nwakonobi (1989). This underscores the link between hygiene of the environment and rabies exposure dynamics in an apparently neglected community with high human population in Nigeria.

Effective control of rabies in dog will thus remain interlinked with general hygiene of the city environment as this contributes to the proliferation of street-sustained dogs that are usually inaccessible to inoculators in mass vaccination campaigns (Olugasa *et al.,* 2011). A more effective and efficient garbage disposal system, coupled with increased precision in vaccination coverage of free-roaming dogs during government instituted campaign will positively impact on rabies control in Ilorin. Reduction of food and harbourage supporting scavenging dogs in residential areas and control of specific habitat in non residential areas have been shown to have great importance in dog population control (Beran, 1982).

In conclusion, there appears to be a link between general community neglect of the hygiene of the common environment, contemporary lawlessness that has become well known in Nigerian cities and rabies risk. The law that prohibits free roaming of dogs on the street still needs to be actively propagated through campaigns on the media and in professional enforcement by animal health authorities. The present situation makes it very difficult to effectively control human and dog exposures to rabies in Ilorin, Nigeria. There is need for dedicated attention to save the naïve children that go to school or run errands especially within the identified rabies hotspot in Ilorin.

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