Ecological aspects of dogs in relation to rabies control and public health significance in North-west Cameroon

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ABSTRACT

The paper describes a survey carried out between May and November 2000 on the ecological parameters of dogs in relation to rabies control and associated environmental health problems in North-West Cameroon. Dog keeping was widely accepted in the region, indicating that the accessibility of dogs for antirabies vaccination could be high. However, a high degree of irresponsible dog ownership attitude was observed as many unwanted dog activities including biting, free roaming and environmental pollution, and poor antirabies vaccination practice were recorded. Further works on owned and stray dog populations in Cameroon together with full appreciation of the factors limiting rabies control are important for effective rabies control and other dog associated community health hazards.

Key words : Ecology, dog, owner attitude, public health, control, North-West Cameroon

RESUME

L'article décrit une étude menée entre mai et novembre 2000 sur les paramètres écologiques des chiens par rapport à la lutte contre la rage et les risques de santé publique dans le Nord-Ouest du Cameroun. La possession des chiens très répandue dans la région indique que l'accessibilité à la vaccination contre la rage pourrait être très élevée. Néanmoins, des taux importants des traits de possession non-désirée ont été observés avec pour consequences un grand nombre de chiens errant et leurs activités nocives élevées parmi lesquelles des morsures, la divagation et la pollution de l'environnement aussi qu'un faible taux de vaccination contre la rage. Des travaux futurs sur la population des chiens au Cameroun avec une parfaite appréciation des facteurs affectant la lutte contre la rage et d'autres problèmes de santé publique dus aux chiens sont importants pour le contrôle effectif de ces maladies.

Mots clé : Ecologie, chien, attitude de propriétaire, santé publique, contrôle, Nord Ouest du Cameroun.

INTRODUCTION

Irresponsible pet ownership has become an increasing concern for health professionals, at community, regional and national levels (Selby *et al.*, 1979). This concern is due on the one hand to environmental pollution by pets' solid and liquid wastes which are more specifically ejected by free roaming or stray animals in the community (Okoh, 1986). On the other hand, irresponsible pet owners are thought to be the major reason for pet overpopulation, free roaming pets and the associated community health problems (Djerassi *et al.*, 1973; Hummer, 1975; Collins, 1976), which are common in many developing countries.

In many developing countries where canine rabies is endemic, and at times even epidemic, many human deaths due to rabies are recorded annually (Acha & Arambulo, 1985; Tchoumboue *et al.,* 2002). From data collected over a 10-year period (1990 – 1999) in Cameroon, 0.85% positive canine rabies cases were found; out of a total of 38,784 quarantined suspected rabid dogs there was a death rate of 1.86% and up to 50 human deaths due to rabies occurred annually (Awah-Ndukum and Tchoumboue, 2002). Dogs, and cats to a minor extent, have since been incriminated as the main vector of the disease in Cameroon and the rabid areas are usually characterised by close relationships between dogs and people, suggesting that the prevention of rabies in humans can be achieved by controlling the disease in dogs. However, for the effort to be successive, the entire ecology of dogs must be studied (Beran, 1982, 1984; WHO, 1988), before the programme is implemented.

A knowledge of the number of owned dogs and abundance of stray dogs in a locality is important for planning antirabies vaccination campaigns and dog population management (WHO, 1984). The relevance of investigations of dog populations in Cameroon and elsewhere seems clear from studies already carried out in different parts of the world (Beck, 1973, 1974, 1975; Heussner & Grant, 1978; Nasser & Mosier, 1980; Rangel *et al.*, 1981; Beran, 1982; Okoh, 1986; WHO, 1988).

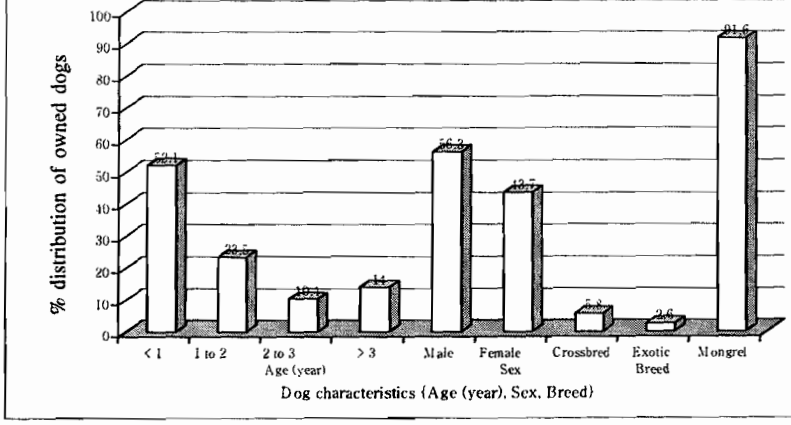
This study was therefore carried out in order to estimate the population density and dynamics of owned dogs, determine dog owner's attitude towards keeping dogs and futher ecological factors in North-West Cameroon which influence the control of rabies.

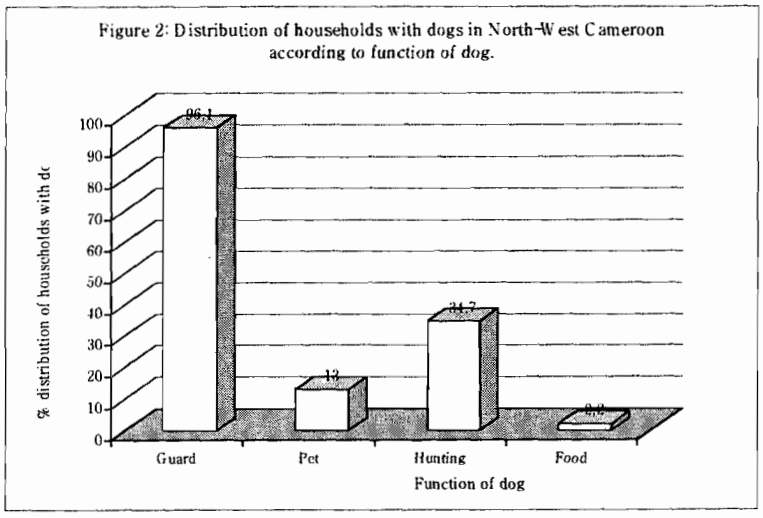
MATERIALS AND METHODS

The study was carried out between May and November 2000 in 2 localities (Bamenda and Wum) in North-West Cameroon (LN 5° - 7° and LE 9° - 11°) with an estimated human population of 185,000 (Estimate is based on the second census of Cameroon/United Nations Fund for Population Activities (UNFPA), which took place in 1987). A questionnaire based on WHO (1984) guidelines for dog rabies control was distributed to 448 randomly selected households in Bamenda (214) and Wum (234) areas to collect information on the households, dog ownership status, characteristics of owned dogs, attitudes of people towards keeping dogs and their practice of antirabies vaccination.

The proportions of the various parameters were calculated and reduced into Tables and Figures. The simple descriptive statistical method was used to present and analyse the data obtained. Chi-square and normal distribution techniques using Z–formula were applied to compare and determine the level of significant differences between the proportions (Nie *et al.*, 1970; Steel & Torrie, 1980).

Figure 1: Distribution of owned dogs in North-West Cameroon according to Age, Sex and Breed.



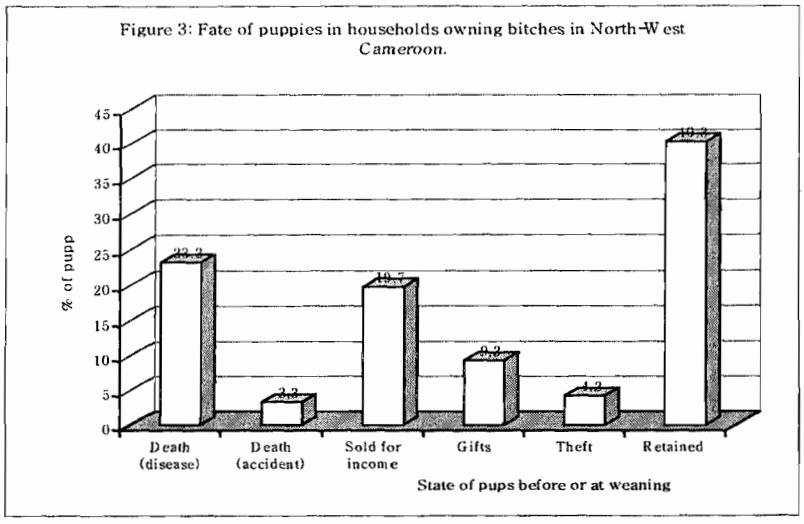


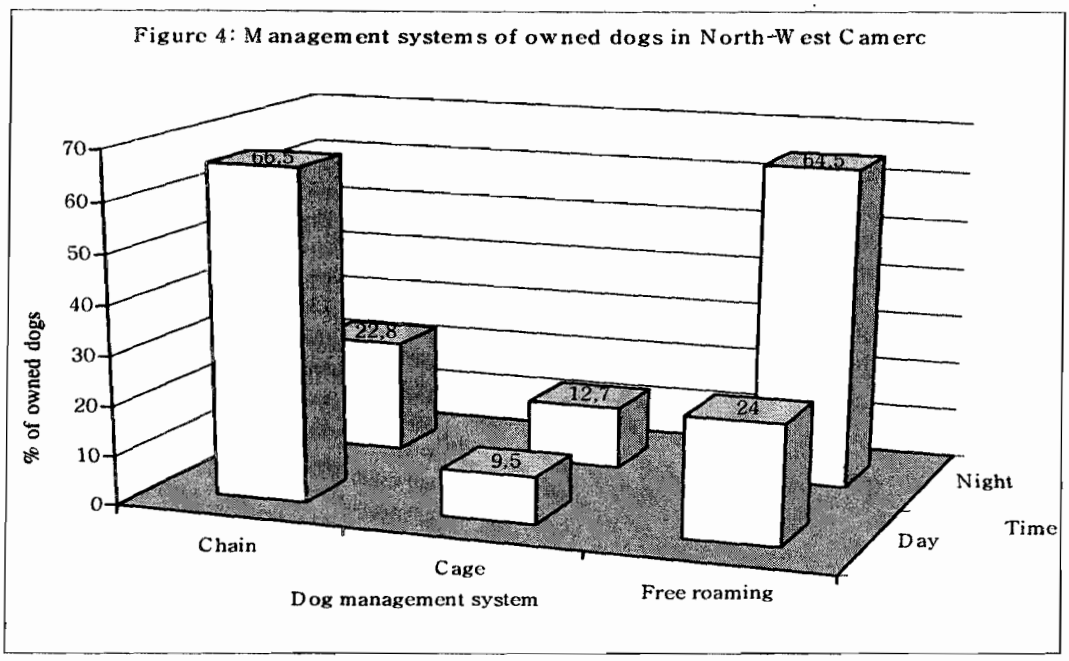
RESULTS

A total of 4,184 people (Bamenda, 1562 & Wum, 2622) lived in the 448 households sampled. Most of the occupants (58.2%) were less than 20 years old while the active working age group of between 20 to 55 years old made up about 36.3%. Occupationally some worked in the civil service (35.9%), agriculture (24.6%), business (21.9%) and other private activities (17.6%). More ($P < 0.05$) civil servants and businessmen than agriculturalists were observed in Bamenda than Wum. Also, a total of 316 (70.5%) (Bamenda, 151 & Wum, 165) households owned 549 dogs (Bamenda, 242 & Wum, 307), giving a dog to person ratio in the region of about 1: 8. Many (61.9%) of the owned dogs were 3 to 24 months old (mean age : 20 months), predominantly mongrels (91.6%) and mainly males (56.3%) (Figure 1). The sources of the animals ranged from raised bitches (12.7%), gifts (17.7%), purchase (57.9%) to adoption from the streets (11.7%).

Although 32.6% of the households without dogs disliked keeping dogs, 37.9% and 3.0% of them complained of economic and religious (or cultural) reasons respectively while 26.5% of them had owned dogs before or were about to acquire the animal. Dogs were being kept for several reasons such as guard, hunting and pet animals (Figure 2). Whereas more ($P < 0.05$) households in Bamenda kept dogs as guards than in Wum, in the latter place more dogs were being kept for hunting and a few as guards. Many dog keeping households (64.2%) also reared other animals. While the Bamenda community kept mainly cats and poultry, various livestock (goats, sheep, pigs, poultry and rabbits) were found in Wum households.

About 34.5% (109) of the households with dogs had mature female dogs which produced a total of 153 litters a year with an average litter size of 4.7 ± 2.5 (range, 1 – 7 puppies) and survival rate of 73.5%. The outcome of the puppies varied from lost to death and theft, given out as gifts or sold for income to being retained by households (Figure 3). Although 90.8% of dog owners fed their dogs, only 71.8% of them handled or nursed their animals. Most of the dogs were chained





(66.5%) or caged (9.5%) during the day but allowed to roam the neighbourhood (64.5%) at night (Figure 4).

Table 1 presents the characteristics of dogs in the neighbourhoods of North-West Cameroon. Although 21.4% of the total households sampled reported dog bite cases, the bites were mostly unprovoked (51.0%) and from unowned (25.0%) and unvaccinated but owned (44.8%) dogs. Many (66.7%) of the victims of dog bites were less than 20 years old and 13.5% of them were not presented for post-exposure treatment, especially ($P < 0.05$) in Wum area. Also, 76.7% of the biting dogs in Bamenda as against 27.3% in Wum were promptly presented for veterinary observation while the others were either not identified (Bamenda 13.3% & Wum 6.1%), killed (Bamenda 6.7% & Wum 12.1%) or no action was taken on them (Bamenda 3.3% & Wum 54.5%). The main biting sites were on the legs (62.5%) and arms (29.2%). More than 54.0% and 66.3% of the total households in Bamenda and Wum complained of an increasing presence of stray dogs in their neighbourhood, especially ($P < 0.05$) in Wum and many caused environmental pollution.

Although more than 91.1% of households in North-West Cameroon were aware that dogs can transmit rabies to man through their bites, yet only 60.4% of

Table 1: Dog characteristics in the neighbourhoods of North-West Cameroon (%).

Presenting characteristics	Wum	Bamenda	Total
Owned dogs	70.51[a]	70.56[a]	70.53[A]
	(165)*	(151)	(316)
Biting dogs	28.21[b]	14.02[c]	21.43[B]
	(66)	(30)	(96)
Stray dogs	63.67[a]	43.46[c]	54.02[C]
	(149)	(93)	(242)
Polluting dogs	71.79[a]	60.28[d]	66.29[A]
	(168)	(129)	(297)

a, b, c, d, A, B, C: same letter in a column or row is not statistically significant ($P > 0.05$)
a & d: both letters in a column or row are not statistically significant ($P > 0.01$)
*: number of dog owners

Table 2: Main reasons for non-antirabies vaccination of dogs by owners in North-West Cameroon (%).

Locality	Ignorant of the danger of rabies	Ignorant of the need to vaccinate	Lack of vaccines	High cost of vaccination	Lack of veterinary services
Bamenda	19.05^{ad}	28.57^{ad}	33.33^{ad}	45.24^{d}	35.71^{ad}
Wum	38.55^{ac}	54.22^{bcc}	55.42^{acc}	59.04^{dc}	49.40^{acc}
Total	32.00^{A}	45.60^{AB}	48.00^{B}	54.40^{B}	44.8^{AB}

a, b, c, d, e, A, B : same letter in a column or row is not statistically significant ($P > 0.01$)

dog owners had valid antirabies vaccination certificate for their dogs. The proportion of unvaccinated dogs was higher for Wum and was statistically significant ($P < 0.05$). The major reasons for the poor vaccination practices were: lack of veterinary services, ignorance of the need to vaccinate, high cost of vaccination and lack of vaccines (Table 2).

Using the 1999 human population figures, an estimated owned dog population of 27,273 (Bamenda 22,944 & Wum 4,329) in both localities was calculated for the study area.

DISCUSSION

The age distribution and activities of people in the sampled households of North-West Cameroon were similar to those recorded during the second census of Cameroon in 1987. More civil servants and businessmen than agriculturalists were seen in Bamenda than Wum. The finding was also closely analogous to the higher proportion of households keeping dogs as guards and / or hunters in these areas.

During the study, stabilised mongrels were predominant over the other breeds because they were affordable, easy to manage and better adapted to the environmental conditions of the region. Also, the dogs were mainly male and young due to their aggressive nature and the strong activities and protective functions they were required to carry out. Similar sex proportions have been reported in Tunisia, Guaquil and Sri-Lanka (WHO, 1988). However, the mean age of the dogs (20 months) in this study was quite dissimilar when compared with values in USA (4.5 years), Sri-Lanka (3.4 years) and Tunisia (2.5 years) (Beck, 1973; Nasser & Mosier, 1980; WHO, 1988).

Generally, dog keeping is accepted in North-West Cameroon, where there is a high "owned dog to man ratio" and the contact rate is high. Although Bamenda is more urbanised than Wum, North-West Cameroon is mainly rural compared to some other parts of the country, agreeing with the observation of Tong (1992) and Awah-Ndukum and Tchoumboue (2002). The results obtained in this study could therefore be likened to WHO's (1984) report that the ratio of "owned dogs to people" is higher in the more rural regions of a country. The favourable dog – man interrelationship and adaptability of the animals to the region must have contributed to the relatively high survival rate of puppies. The overall dog to human ratio of 1: 8 in this study was similar to the ratio observed in Sri-Lanka (1: 8) (WHO, 1988), but lower than that recorded in Jos, Nigeria (1: 4) (Okoh, 1986) and Tunisia (1: 3.5) (WHO, 1988). However, the ratio is within the 1: 10 to 1: 6 range generally reported by American and European countries (Kelly, 1980; Rangel *et al.*, 1981; Schnurrenberger *et al.*, 1981). Although dog ownership was widely practised in the region, many disliked activities were reported including barking and biting nuisance, odour and environmental pollution with solid and liquid wastes. These probably accounted for the hatred of dogs as observed during the study. Overall, the proportions of owned and polluting dogs were similar, suggesting that most of the polluting dogs were owned indicating a high degree of irresponsible dog ownership. Poor dog supervision may therefore be responsible for the reduced mean age of dogs recorded in this study compared to the values reported elsewhere (Beck, 1973; Nasser & Mosier, 1980; WHO, 1988).

Although, a significant proportion of the two communities of North-West Cameroon are aware of the existence and public health importance of rabies, a discouraging large proportion of households do not vaccinate their animals. The main reasons cited for the poor vaccination practice were the lack of veterinary services, high cost of vaccination which ranged from 2500

– 5000frs CFA (U.S.$ 3 – 7), ignorance of the need to vaccinate dogs against rabies and lack of vaccines. Lack of veterinary services was found to be the most important reason and closely related to the other factors affecting antirabies vaccination of dogs in the region. The finding agrees with those of Tchoumboue *et al.,* (2002) for West Cameroon where they also related the absence of veterinary services to the poor economic state of the country. The lack of vaccines recorded in this study was due to temporal shortage in the local markets which could also be linked to the poor economy. Furthermore, many households reported dog bite cases from unprovoked, unowned (stray) and even owned but unvaccinated dogs. The limbs had the highest number of bites especially the legs, similar to Chadli and Benlasfar (1984) finding in Tunisia, because they are the most exposed parts of the body to the biting dogs. Unfortunately, many victims and biting dogs were not presented for post-exposure examination and treatment. It is this factor which predisposes to the incidence of rabies and could be worse due to inadequate veterinary public health education.

Although many households reported free roaming owned and unowned dogs by day and by night times with unfavourable effects during the study, Awah-Ndukum *et al*, (personal communication) recorded significantly more households complaining about these negative effects than the actual number of dogs with the effects. These poorly supervised owned and / or stray dogs usually have access to unprotected households and neighbourhoods that may not be familiar to them. Also, inadequate disposal of garbage and refuse around households or dustbins accessible to dogs encourages the visit of these poorly supervised owned dogs as well as of unowned (stray) dogs. This could contribute to the observed high dog to man contact rate, which increases the possibility of rabies transmission, and the associated environmental pollution, which can facilitate the spread of other zoonotic diseases (Awah-Ndukum *et al.*, personal communication).

CONCLUSION

Information on stray dog population was not obtained in the study but dog keeping is widely accepted in North-West Cameroon indicating that the accessibility of dogs for mass antirabies vaccination campaign could be high. However, poor supervision of owned dogs, ignorance of the dangers of rabies and need to vaccinate, economic state of households and lack of veterinary services are important factors limiting rabies control in the region. Although dogs are important for security and game hunting in Cameroon, they are not liked by all. Irresponsible dog ownership is prevalent in the region and predisposes the community to environmental pollution and the risk of rabies outbreaks. Further works on the ecology of owned and unowned dogs are still needed to understand all the ecological factors that limit control of rabies and other dog related community health hazards.

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