

**UNIVERSITY OF NAIROBI,  
COLLEGE OF AGRICULTURE AND VETERINARY SCIENCES,  
FACULTY OF VETERINARY MEDICINE**

**BVM 5 PROJECT REPORT**

**PROJECT TITLE: TO ASSESS THE AWARENESS OF TICK BORNE  
DISEASES AMONG THE DOG OWNERS IN NAIROBI COUNTY AND  
SURROUNDING AREAS.**

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**REGISTRATION NUMBER: J30/2039/2010**

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**DEPARTMENT OF CLINICAL STUDIES**

## **DECLARATION**

I hereby declare that this project is my original work and has never been submitted or presented, to the best of my knowledge, to any other institution for the award of any degree.

SIGNED:.....DATE.....

MWANGI ANTHONY MAINA

This project has been submitted with the approval of a University of Nairobi Supervisor.

SIGNED:.....DATE.....

DR. ANDREW THAIYAH

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## ABSTRACT

The purpose of this study was to assess the awareness of tick borne diseases among the dog owners in Nairobi county and its environs. Ticks are important parasites that transmit tick-borne diseases to hosts through their infestation. Regular checking of both the dogs and their kennels is paramount to effectively control the spread of the diseases. On the other hand, dog owners need to know the importance of regular changing of the tick control method to avoid resistance by the ticks. The cost of treatment of the diseases and the drugs to control the ticks makes them to be of economic significance.

Routine procedures conducted to the dogs by the twenty owners were studied by use of questionnaire and interview and results documented. The number of dog owners who kept the dogs as pet, security and both the security and the pet were 3, 4, and 13 respectively. The total number of dogs was 144 males and 187 females. The dogs below one year were 47 and those above one year were 284.

All of them were aware that ticks can infest the dogs. Nineteen of the clients were aware that ticks cause diseases to the dogs and washed their dogs; 13- weekly, 6- monthly. 17 clients used shampoo, one used soap and the other used water alone.

All the clients knew how to control ticks; 9 used dudukrin, 7- steladone, 2- Tixfix, one used spot-on and the other sevin. Sixteen of the clients checked for the presence of ticks on their dogs; 5- daily, 5- weekly, 4- monthly and 2- periodically.

The number of clients whom their dogs were diagnosed of tick borne diseases were seven. Six of them washed their dogs weekly and the other one monthly. Four of the clients never changed the tick control method while the other three changed the method. Three clients found ticks after washing the dog while the other four didn't find ticks. Three clients never sprayed the kennels of their dogs while the other four clients sprayed the kennels.

However, some results had comparison; two clients never sprayed the kennels, didn't change the tick control method and consequently they found the ticks on the dog(s) after washing regardless of the weekly washing of the dog(s). On the other hand, two of the clients sprayed the kennels of the dog(s), changed the tick control method and consequently did not find the ticks after washing of the dog(s).

The clients who sprayed the kennel(s) were eleven; 5- weekly, 3- monthly and three occasionally.

The clients who changed the tick control method were eight; 2 -monthly, 3- after every three months, one after six months and two annually. Finally, the number of clients who saw the ticks on the dog(s) after washing were eight.

95% of the client sample in the small animal clinic were aware of the causes of tick borne diseases i.e. tick causes diseases to the dogs.

100% of the client sample in the small animal clinic knew how to control tick borne diseases.

Therefore, the occurrence of tick borne diseases is related to; frequency of washing the dog(s), spraying of the kennels and change of the tick control method.

# CHAPTER 1

## 1.0 Introduction

Tick-borne diseases are diseases caused by the ticks after feeding on the hosts. The ticks are in the class arachnida. All the ticks are blood sucking parasites. Members of the family Ixodidae, or hard ticks, have a shield or scutum that covers the entire dorsal surface of the male but only part of the dorsal surface of the female. The eggs are laid in a single clutch of thousands. The larvae, the single nymphal stage, and the adults of Ixodidae feed only once each, several days being required for engorgement (Muller et al, 1989)

Ixodids usually live outdoors and attach to passing host animals. There are two molts: the first from larva to nymph and the second from nymph to adult. Species that complete both molts without leaving the host are called one- host ticks, species whose engorged nymphs drop off to molt are called two- host ticks and those whose nymphs and larvae drop off to molt are called three- host ticks. *Rhipicephalus sanguineus* is a three- host tick whose larvae, nymphs and adults all engorge on dogs (Radostits et al, 2000)

Two and three- host ticks can transmit disease organisms interstadially, that is, infection acquired by a larval tick is carried through the molt to the nymphal stage and then conveyed to the host that the nymph feeds upon. On the other hand, infection acquired by the nymph is carried through the molt and conveyed to the host that the adult tick feeds upon.

In transovarial transmission, the disease organisms are passed from the adult female tick to her larvae through infection of her ovaries. This is the only mechanism that allows the one- host tick such as *Boophilus spp* to serve as vectors (Chandler et al, 1991)

Some ticks such as *Amblyomma spp* have long hypostomes. Those with short hypostomes are compensated by secreting a cement in which the mouthparts are embedded and which attaches them securely to the skin (Moorehouse,1973).

**Parasites:** *Rhipicephalus sanguineus*. The larvae, nymphs and adults of *R. sanguineus*, the brown dog tick, all feed on dogs and sometimes on man. The tick cannot survive the winter outdoors in the north. Therefore, they take advantage of central heating and generate enormous population in homes, kennels and veterinary hospitals. If enduring results are to be achieved, elimination of these ticks must include acaricidal treatment of both the dog and the home or kennel. Development from the egg to larvae may be completed in slightly over two months under favourable conditions; unfed adults may survive for well over an year (Ettinger et al, 1995).

**Transmission:** *Rhipicephalus sanguineus* transmits canine piroplasmosis ( *Babesia canis* ) transovarially and tropical canine pancytopenia ( *Ehrlichia canis* ) interstadially.

**Physical examination:** A general physical examination of patients is recommended. A dog that constantly scratches may have ecto-parasites or allergies. As the animal is first approached and petted, the skin may be examined. The skin over the head, thorax, abdomen and limbs are examined for the presence of ecto-parasites.

Systematic examination of the skin and adequate lighting is paramount. Close inspection and palpation of the skin and hair coat are necessary to identify ticks. The dorsal aspect of the body is inspected by viewing it from the rear. All parts of the head, lateral trunk and the extremities are then inspected (Birchard et al, 2006)

## **1.1 Objectives of the study**

### **1.1.1 General Objective**

The general objective of this study was to investigate the awareness of tick- borne diseases among the dog owners in Nairobi county and surrounding areas.

### **1.1.2 Specific objectives**

- ❖ To determine the percentage of the clients that knows the causes of tick borne diseases in the small animal clinic.
- ❖ To determine the percentage of the clients that knows how to prevent the tick borne diseases in the small animal clinic.

## CHAPTER 2

### 2.0 Literature review

#### 2.1 Vectors

Hard ticks are the vectors. Dogs tolerate ticks quite well with only occasional discomfort, pruritus and erythema at the site of attachment. In most cases, the dog is presented for examination because the owner suddenly notices a 'cyst' or 'growth'. In severe infestation, generalized pruritus may be present (Ettinger, 1989)

The ticks may be removed manually by grasping the capitulum as near to the skin as possible using mosquito forceps. Swabbing the capitulum first with ether facilitates removal.

Subsequently, the dog should be treated with a suitable parasitocidal shampoo or spray to kill any other ticks overlooked in the coat. Incorrect removal may leave the capitulum in the skin and a foreign-body granuloma may develop. Occasionally, such reactions occur when the mouth parts have been properly removed (Radostits et al, 2000)

### 2.2 CANINE BABESIOSIS

Synonyms; canine piroplasmosis, infectious haemoglobinuria.

#### 2.2.1 Definition

It is a tick-transmitted disease caused by the protozoan

#### 2.2.2 Vector

The vectors include a number of tick species, the most important of which is the brown dog tick, *Rhipicephalus sanguineus*.

### **2.2.3 Epidemiology**

Occur in both tropical and subtropical regions due to the distribution of the vector ticks (parasite of warmer climates). *B. canis*, *B. vogeli* and *B. gibsoni* are the species known to infect dogs and wild canids. *B. canis* is the most common worldwide (Feldman et al, 2006)

### **2.2.4 Transmission**

The brown ear tick, *Rhipicephalus sanguineus*, is the principal vector in the transmission of *B. canis* and *B. vogeli*. Both transstadial and transovarial transmission occurs in ticks.

### **2.2.5 Pathophysiology**

An initial parasitemia develops within a day or two after infection and lasts for about four days. Later, alternating parasitaemia and dormancy occur at variable and unpredictable intervals. Replication of the *B. canis* is through binary fission in the erythrocytes. This results to both intravascular and extravascular hemolysis.

Hemolysis causes hypoxia that leads to microvascular damage. This causes disseminated intravascular coagulation, which may involve smaller vessels and capillaries of many organs, including the brain resulting to neurological manifestation of canine babesiosis.

Trophozoites of *B. canis* can also be found in the endothelial cells of lungs and the liver and in macrophages and neutrophils. There is both splenomegally and hepatomegally due to passive congestion and hyperplasia of the mononuclear- phagocyte system (Jain,1986)

### **2.2.6 Clinical signs**

The dog is presented with pyrexia, icterus, weakness and loss of condition, depression, anorexia, pale mucous membranes, emesis, dark brown urine and splenomegally.

### **2.2.7 Diagnosis**

*B. canis*, *B. vogeli* and *B. gibsoni* are the species known to infect dogs and wild canids. They are usually observed as paired, piriform trophozoites in infected erythrocytes. The infected red blood cells are more likely to be seen in microcapillary blood (e.g. from the ear), near the buffy coat of centrifuged blood and towards the periphery of blood smears.

Diagnosis is confirmed by the demonstration of the large (2.5x5.0 micrometers) single or paired intra- erythrocytic piriform organisms in thin smears stained with Giemsa. The blood smears usually reveal anisocytosis, poikilocytosis, polychromasia and nucleated erythrocytes consistent with a regenerative anemia (Jain, 1986)

As infected erythrocytes are difficult to find, serological tests are being developed for the detection of the *B. canis* antibody.

### **2.2.8 Differential diagnosis**

Autoimmune hemolytic anaemia

Blood loss anemia

Toxic hemolytic anemia

### **2.2.9 Therapy**

It involves supportive therapy and antibabesial chemotherapy to eliminate the organisms.

Supportive therapy helps to combat shock, anemia and metabolic acidosis.

Glucocorticosteroids, broad-spectrum antibiotics eg chloramphenicol are recommended for dogs presented in shock. Rapid intravenous administration of sodium bicarbonate is recommended in dogs with severe anemic shock.

Treatment using antibabesial drugs should be initiated once the patient is stable.

The drugs used are; Diminazine aceturate at 3.5mg/kg IM or SQ, Imidocarb dipropionate at 5mg/kg IM orSQ. A second dose of imidocarb is done after 14 days from the initial dose (Radostits et al, 1995)

### **2.3.0 Control**

Prophylaxis is dependent on protecting vulnerable animals from tick infestation. Regular treatment of both dogs and kennels with a suitable acaricide will help.

### **2.3.1 Prognosis**

It is guarded to poor for the acute cases

## **2.4 CANINE EHRLICHIOSIS**

Synonym; Tropical pancytopenia

### **2.4.1 Definition**

It is an acute to chronic intracellular tick- borne infectious disease of dogs.

### **2.4.2 Vector**

The brown dog tick, *Rhipicephalus sanguineus* transmits *Ehrlichia canis*

### **2.4.3 Epidemiology**

It occurs in temperate, tropics and subtropics in accordance with geographical distribution of the vectors. *E. equi* is suggested that it is pathogenic in dogs, invading primarily neutrophils

( Madewell et al, 1982 )

### **2.4.4 Transmission**

*Rickettsia canis* was the name used for the causative agent in the older literature

( Malherbe,1948). Later, this agent was designated *Ehrlichia canis* (Coles,1953)

The ticks transmit *E. canis* transtadially but not transovarially.

The transmission occurs when the infected ticks ingest a blood meal and the salivary secretions containing the organisms contaminate the feeding site. Transmission can also occur due to blood transfusion from an infected dog to a susceptible dog (Muller et al,1989).

#### **2.4.5 Pathophysiology**

The organism is found in the cytoplasm of leukocytes especially monocytes and neutrophils.

The acute stage is characterized by a generally normal hemogram but may show a mild leukocytosis or leucopenia, and thrombocytopenia. As the disease progress, bone marrow hypoplasia develops, causing more marked thrombocytopenia, leuukopenia and anemia.

*E. canis* enters the blood stream or lymphatics and localizes in reticulo-endothelial cells of the liver, spleen and lymph nodes where it replicates in mononuclear macrophages and lymphocytes; lymphoreticular hyperplasia occurs in these organs. Neurological manifestations are ataxia, cerebral and vestibular signs (Birchard et al, 2006)

#### **2.4.6 Clinical signs**

Pyrexia, anorexia, lymphadenopathy, pale mucous membrane, oculonasal discharge, dyspnea, petechiae and ecchymoses cutaneous lesions due to loss of vascular integrity.

Hematologic changes in acute phase: slight leucopenia, thrombocytopenia.

#### **2.4.7 Chronic condition**

Petechiae and ecchymotic hemorrhages of the skin and mucous membrane.

Hemorrhagic diathesis including epistaxis, hematuria, hematemesis, melena and hematochezia due to persistent thrombocytopenia.

Neurologic meningoencephalitis.

Renal failure and weight loss

#### **2.4.8 Diagnosis**

Indirect immunofluorescence test

Demonstration of the organisms in blood, bone marrow or biopsy specimens of other tissues and antibodies in serum by an indirect immunofluorescent test (Ristic et al.,1972) In the blood, it is found as cytoplasmic inclusions primarily in monocytes and lymphocytes (Ewing et al., 1971). Inclusions occur most commonly during the acute phase but may be infrequent and transient. Examinations of buffy coat smears may increase the likelihood of finding the organism.

#### **2.4.9 Differential diagnosis**

Tumours, i.e. basal cell carcinomas and cysts.

Immune-mediated thrombocytopenia

Salmon poisoning

Brucellosis

#### **2.5 Therapy**

Doxycyclines (Greene, 1984)

Acute phase: 5mg/kg once daily PO for 7-10 days or 5 mg/kg once daily IV for 5 days. Chronic phase: 10mg/kg PO SID for 7-14 days. May cause nausea, therefore give after meal.

Imidocarb dipropionate at 5mg/kg

Corticosteroids 5mg/kg daily for 3-5 days.

### **2.5.1 Tick control**

Tick control is paramount in the prevention of *E.canis* and achieved by;

Spray kennels and dip dogs every 1-2 weeks

Quarantine and de-tick new arrivals

It should be noted that *E.canis* has been confirmed as causing disease in a human (zoonotic).

## **2.6 Economic impact of Babesiosis and Ehrlichiosis in dogs**

### **2.6.1 Treatment cost**

The drugs that treat the diseases are expensive. Imizol injection needs to be repeated after two weeks. If several dogs of a client are diagnosed of these conditions, it becomes too expensive.

On the other hand, tick control method requires acaricides that are also costly.

### **2.6.2 Wastage of time**

The clients set time to seek for the medication of the dogs. If they are at work, they need to seek permission for the same.

### **2.6.3 Death**

In acute cases, the owner risks to lose the dog(s) due to death. This is a loss for the client had bought the dog(s) plus the costs of treatment.

### **2.6.4 Loss of genetics**

If either the sire or the dam that was of desirable characteristics dies due to the disease, genetics are lost.

## **CHAPTER 3**

### **3.0 Study design and methodology**

#### **3.1 Study site**

The study was done in the College of Agriculture and Veterinary Sciences (CAVS) .It is a campus of the University Of Nairobi that is the only university in Kenya offering the Bachelor of Veterinary Medicine. The campus has a faculty of veterinary medicine which runs a small animal clinic with a 24 hour services offered by the clinicians who are part of the faculty. This campus is located 15 km west of the main campus and Central Business District of Nairobi city off Waiyaki way.

#### **3.2 Study population.**

The population of this study was the clients in the small animal clinic who brought their dog for any procedure such as; de-worming, vaccination, treatment, x- ray, surgery and boarding.

#### **3.3 Sources of data**

Interviews and use of the questionnaires (Appendix 1) were the methods employed to collect the data in the small animal clinic. The method was first pre-tested and administered later. Some of the clients preferred to be asked the questions than filling in the questionnaire. In that case, I asked the questions as I filled in the questionnaire thus interview. Others comfortably filled in the questionnaires.

Collection of the data was done during my small animal rotation followed by the research week. Any other time that I was free during the other rotations was used to collect the data. I managed to collect data from twenty clients who attended the clinic.

### **3.4 Data analysis**

Data from the interviews and the questionnaires was subjected to analysis to answer research questions. Some data was manually analysed while some was fed in the Microsoft excel for analysis.

## CHAPTER 4

### 4.0 Results and Discussions

#### 4.1 Results

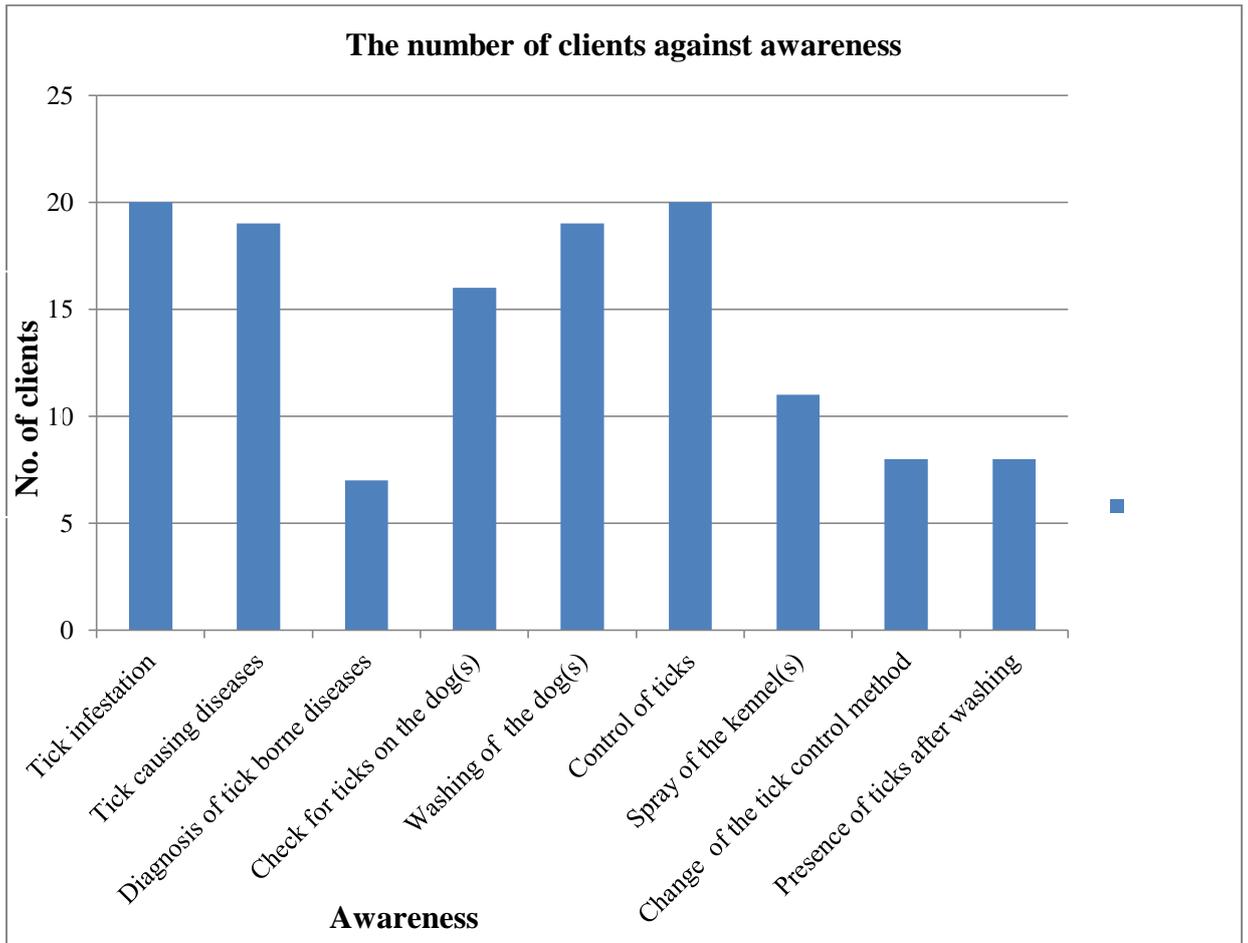
The number of clients who were either interviewed or filled the questionnaires were twenty. All of them were aware that ticks can infest the dogs. Nineteen of the clients were aware that ticks cause diseases to the dogs and washed their dogs; 13 weekly, 6 monthly. 17 clients used shampoo, one used soap and the other used water alone.

All the clients knew how to control ticks; 9 used dudukrin, 7 steladone, 2 Tixfix, one used spot-on and the other sevin. Sixteen of the clients checked for the presence of ticks on their dogs; 5 daily, 5 weekly, 4 monthly and 2 periodically.

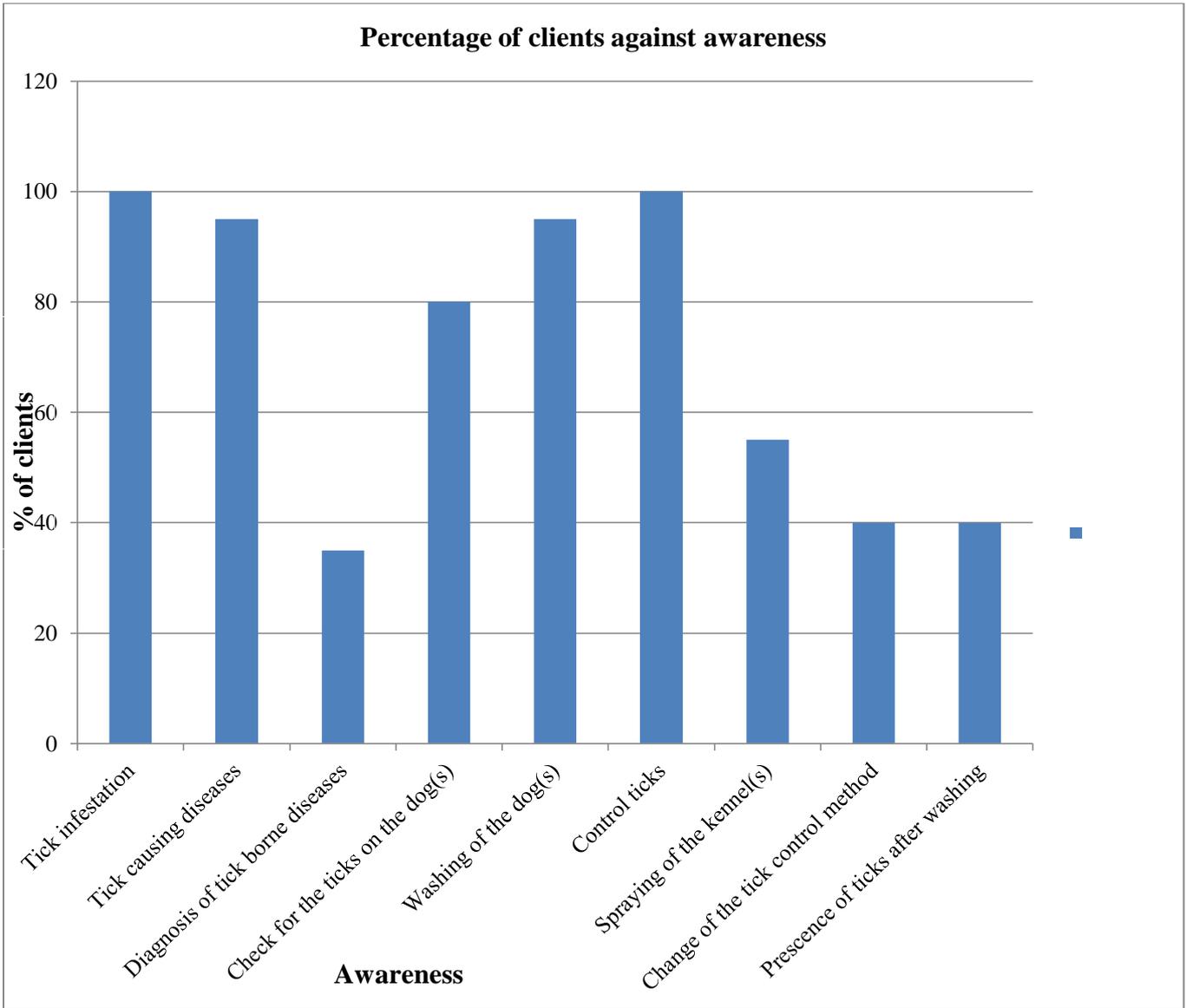
The number of clients whom their dogs were diagnosed of tick borne diseases were seven. Six of them washed their dogs weekly and the other one monthly. Four of the clients never changed the tick control method while the other three changed the method. Three clients found ticks after washing the dog while the other four didn't find ticks. Three clients never sprayed the kennels of their dogs while the other four clients sprayed the kennels. However, some results had comparison; two clients never sprayed the kennels, didn't change the tick control method and consequently they found the ticks on the dog(s) after washing regardless of the weekly washing of the dog(s). On the other hand, two of the clients sprayed the kennels of the dog(s), changed the tick control method and consequently did not find the ticks after washing of the dog(s).

The clients who sprayed the kennel(s) were eleven; 5 weekly, 3 monthly and three occasionally.

The clients who changed the tick control method were eight; 2 monthly, 3 after every three months, 1 after six months and 2 annually. Finally, the number of clients who saw the ticks on the dog(s) after washing were eight. The results are summarized in figure 4.1



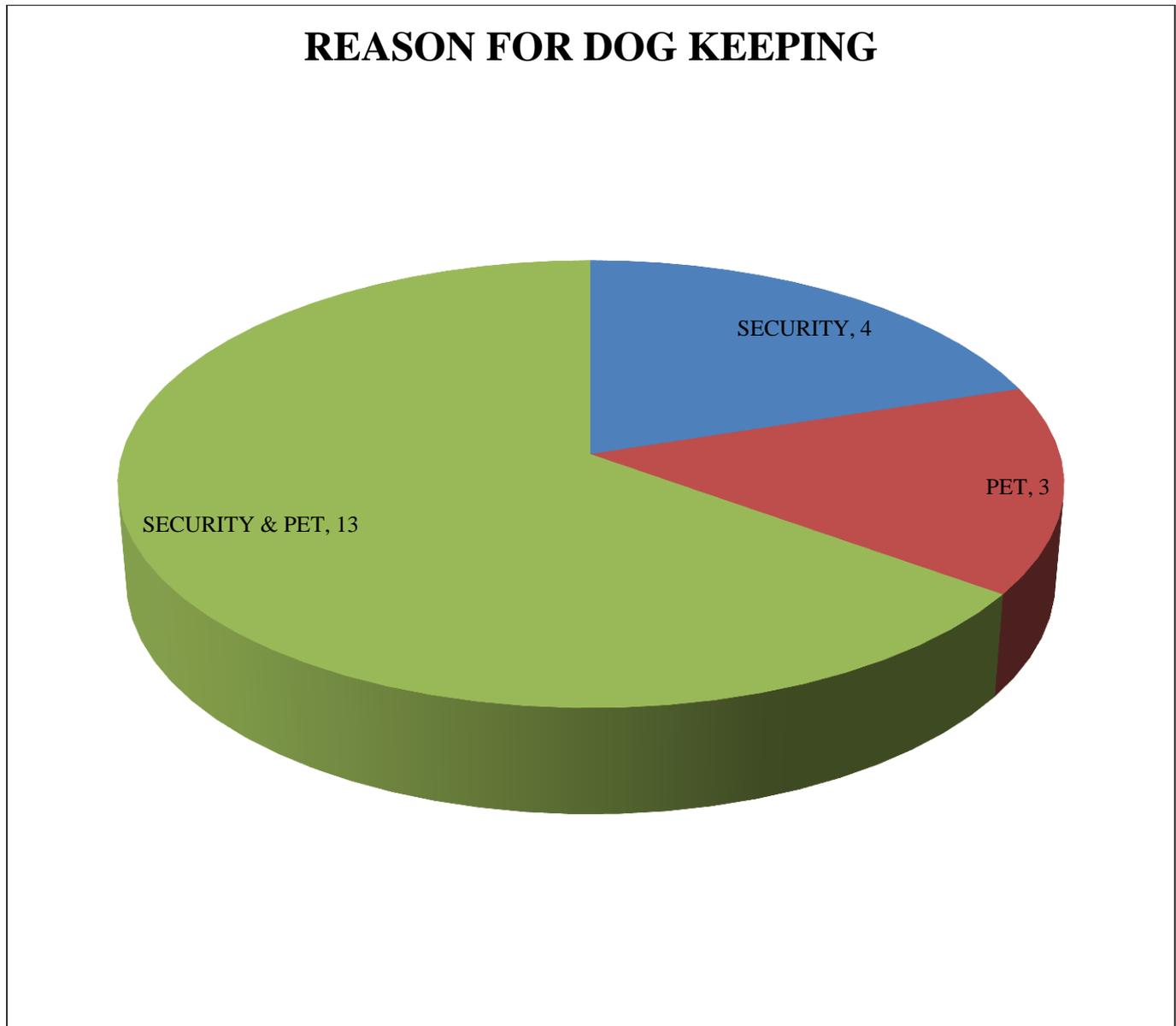
**Figure 4.1 Graph showing the number of clients and awareness of various aspects**



**Figure 4.2 Graph showing percentage of clients and awareness of various aspects**

Awareness on; Tick infestation, tick causing diseases, washing of the dogs and control of the ticks was highest in the graph above.

Figure 4.3 shows the reasons cited for keeping dogs. The number of dog owners who kept the dogs as pet, security and both the security and the pet were 3, 4, and 13 respectively. The total number of dogs was 144 males and 187 females. The dogs below one year were 47 and those above one year were 284.



**Figure 4.3 Pie chart showing reasons for dog keeping by the clients.**

## 4.2 Discussions

Parasitic infestation for example, hard ticks, are of veterinary importance in all countries where the level of care for small animals is suboptimal and where these animals are allowed to roam freely (Ettinger, 1989)

They cause diseases on the dogs that are of economic importance for the clients incur costs during treatment and the dog might die in the process of treatment. The primary means of prevention is the control of the vector tick (Ettinger et al, 1995).

The dogs need to be regularly checked for the presence of ticks. The ticks may be removed manually by grasping the capitulum as near to the skin as possible using mosquito forceps. Subsequently, the dog should be treated with a suitable parasitocidal shampoo or spray to kill any other ticks overlooked on the coat (Chandler et al,1991) .

20% of the clients in the small animal clinic did not check for the presence of ticks on the dogs.

The survival of the ticks is facilitated by the presence of large numbers of scavenging dogs and by the presence of ticks in human dwellings and dog kennels (Ettinger, 1989) .Kennels should be sprayed with the acaricide to control ticks.

The tick control method should be regularly changed to prevent resistance by the ticks.

According to the study carried out in the small animal clinic, all the clients who were interviewed knew that ticks infest dogs and knew how to control the ticks. 95% knew the causes of tick borne diseases. However, eleven out of the twenty sprayed the kennels and only eight of them changed the tick control method. For effective control of the ticks, regular change of the tick control method and spraying of the kennels should be done.

The number of clients whom their dogs were diagnosed of tick borne diseases were seven.

(Simon Tappin, 2010), looks at the tick borne diseases increasing in the UK dog population and the contributing factors to the rise.

He says that tick borne diseases are uncommon but their incidence and consequently public awareness is increasing. Many factors are involved e.g. changes of tick population and distribution, pets travelling etc.

The concern regarding tick borne diseases is not limited to exotic diseases in UK, Lyme disease has been documented with increasing frequency in humans, with cases of suspected diseases in dogs also increasing. In part, this is due to increased awareness, better diagnostic tests and statutory reporting of cases in people.

The warmer climates has led to ticks moving into new areas e.g. *Dermacentor reticulatus* (the European meadow tick) – a tick usually found in southern Europe is now established in Poland, Belgium and Germany with increased number being found in the UK.

It is also thought milder winters are reducing tick mortality, leading to increasing tick numbers (Wall, 2012). A study found 15 % of the dogs were carrying ticks without owners being aware, documenting infestation and therefore the potential opportunity for the transfer of the infection (Smith et al, 2011).

This study have almost the same results gotten in the small animal clinic for 20% of the clients did not check for the presence of ticks on their dogs.

The awareness of the tick borne diseases in Kenya is likely to increase due to the value of the dogs such as security and pets.

## **CHAPTER 5**

### **5.0 Conclusions and Recommendations**

#### **5.1 Conclusions**

1. Most of the clients in the small animal clinic were aware of the causes of tick borne diseases i.e. tick causes diseases to the dogs.
2. All clients in the small animal clinic knew how to control tick borne diseases.
3. The dogs of a few clients in the small animal clinic were diagnosed of the tick borne diseases.
4. A few number of the clients changed the tick control method and sprayed the kennels.
5. The occurrence of tick borne diseases is related to; frequency of washing the dog(s), spraying of the kennels and change of the tick control method.

#### **5.2 Recommendations**

1. Clinicians should explain to the clients whose their dogs are diagnosed of the tick borne diseases what causes the diseases and how to prevent them.
2. The clients should be advised to change the tick control method and spray the kennels to increase the awareness.

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**Wall** (2012) as cited by [www.vetsonline.com/publications](http://www.vetsonline.com/publications)

## APPENDIX 1: INTERVIEW GUIDE

### UNIVERSITY OF NAIROBI

#### COLLEGE OF AGRICULTURE AND VETERINARY SCIENCES

#### ASSESSING THE AWARENESS OF TICK BORNE DISEASES AMONG THE DOG OWNERS

The purpose of this survey is to determine whether the clients are aware of the tick borne diseases. The diseases are of economic importance for the clients incur costs during treatment of the diseases and may lead to death. Your response is highly appreciated; Please put a tick in the boxes appropriately;

1) Name of the owner

.....  
.....

2) Why do you keep dog(s)? Pet  Security  Both

3) How many dogs do you own? No. of males  No. of female

4) Age of the dogs; No. of dogs below one year.....

No. of dogs above one year.....

5) Are you aware that dog(s) can be infested by ticks? Yes  No

6) Do you know that ticks cause diseases in your dog(s)? Yes  No

7) Has your dog(s) ever been diagnosed/treated for tick borne diseases? Yes  No

8) How often do you check for the presence of ticks on your dog(s)?

Daily

Weekly

Monthly

Never

Others (specify).....

9) How often do you wash your dog (s)?

Weekly

Monthly

Never

Others

(specify).....

10) What do you use to wash your dog(s)?

Shampoo

Soap

Water alone

N/A

11) Do you use ticks/flea treatment on your dog(s)? Yes  No

12) If yes, what do you commonly use?

Dudukrin

Steladone

Tixfix (Amitraz)

Advantix

Others (specify).....

13) After how long do you change the acaricide used?

Never

Monthly

After three months

Anually

Others (specify).....

14) Do you sometimes find ticks after washing the dog(s)? Yes  No  N/A

15) Do you spray acaricide in the kennel(s)? Yes  No

16) If the answer above is yes, how often do you spray?

Weekly

Monthly

Others

(specify).....

NB; This information will only be used for the purpose of the research. Thank you for your cooperation.