ANALYSIS OF MANAGEMENT SYSTEMS OF PURE-BRED AND CROSS-BRED DOGS IN CENTRAL KERALA

By

P. VIJAYA KUMAR

THESIS

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DECLARATION

I hereby declare that the thesis entitled **"ANALYSIS OF MANAGEMENT SYSTEMS OF PURE-BRED AND CROSS-BRED DOGS IN CENTRAL KERALA"** is a bonafide record of research work done by me during the course of research and that the thesis has not previously formed the basis for the award to me of any degree, diploma, associateship, fellowship or other similar title, of any other University or Society.

P. Vijaya Kumar

Mannuthy
17.09.2001

P. VIJAYA KUMAR

CERTIFICATE

Certified that the thesis entitled "**ANALYSIS OF MANAGEMENT SYSTEMS OF PURE-BRED AND CROSS-BRED DOGS IN CENTRAL KERALA**" is a record of research work done independently by **Shri. P. Vijaya Kumar,** under my guidance and supervision and that it has not previously formed the basis for the award of any degree, fellowship or associateship to him.

Mannuthy
17.09.2001

Dr. Francis Xavier,
Associate Professor,
Department of Livestock Production Management,
College of Veterinary and Animal Sciences, Mannuthy

CERTIFICATE

We, the undersigned members of the advisory Committee of **Shri. P. Vijaya Kumar,** a candidate for the degree of Master of Veterinary Science in Livestock Production Management, agree that the thesis entitled **"ANALYSIS OF MANAGEMENT SYSTEMS OF PURE-BRED AND CROSS-BRED DOGS IN CENTRAL KERALA"** may be submitted by **Shri. P. Vijaya Kumar,** in partial fulfilment of the requirement for the degree.

17/9/01

Dr. Francis Xavier
(Chairman, Advisory Committee)
Associate Professor
Department of Livestock Production Management

17/09/01

Dr. P. C. Saseendran,
Associate Professor and Head,
Department of Livestock
Production Management
(Member)

17/9/01

Dr. K. S. Sebastian,
Associate Professor,
Department of Livestock,
Production Management,
(Member)

17/9/01

Dr. K. Rajankutty
Associate Professor
Department of Surgery and Radiology
(Member)

9/11/2001

External Examiner
(Sreekumar.S)
Associate Professor & Head,
Rajiv Gandhi College of Veterinary
& Animal Sciences, Pondicherry.

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CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF PLATES

DEDICATED TO MY PARENTS,
BROTHER AND FAMILY MEMBERS

Introduction

1. INTRODUCTION

Innovations in veterinary care and a better understanding of canine nutrition, breeding, health care and management have helped to contribute to welfare and a longer life expectancy for dogs. The average lifespan of companion animals in developed countries had increased over the years because of the improved scientific feeding and management practices. But, most of our dog owners resort to management practices that were often based on traditional knowledge and practices, which were convenient to them. The life expectancy of roaming pets is usually less, than a pet housed indoors, which may be related to the more stressful lifestyle of the former. This clearly states the need for proper management to keep the dog hale and healthy.

Canine well-being depends to a great extent on the place where they are housed. Housing is a problem in India especially with regard to exotic breeds, as they are less tolerant to extremes of environmental conditions. Hence, dog owners should have sufficient knowledge regarding kennel measurements, ventilation, lighting etc. They should also have sufficient

knowledge to help their dog cope up with extremes of climate. Dogs are kept as companions or pets and have become integral part of the family. People reared them in open space without a kennel. Although a kennel is built primarily for the comfort, health and convenience of dogs, it should be designed for easy cleaning and labour efficiency. Adequate knowledge and preliminary planning is necessary to determine the right location and size of the kennel building, drainage, ventilation and lighting.

Food and nutrition plays a major role for the proportional growth and development of dogs. To be healthy, they must be fed properly. They should eat a balanced diet containing all essential nutrients to maintain good health. Well-being, through each phase of their life cycle such as growth, maintenance, reproduction, lactation and senility, are also the result of scientific feeding. Nowadays feeding dogs with commercially available balanced 'dog food' has become a common practice in foreign countries and incidentally these commercial foods have also come to the Indian market. Lot of commercial dog foods and health care products are being introduced into the country by foreign companies, which indicate the fast and drastic changes in dog feeding practices.

Scientific breeding management has gained momentum in recent times because of emergence of lot of hereditary defects in pedigreed animals. People started realizing the importance of correct time of breeding. Scientific breeding is confined to few areas and some of our prized native possessions such as *Mudhol Hound* and *Rajapalayam* are on the verge of extinction. Moreover, greater emphasis is made in recent years for commercial dog production in India.

Responsible pet ownership that results in a rewarding life for the pets and its human family not only requires total commitment to maintain optimal health of the dog but also a commitment for selecting the most appropriate companion dog and raising it in a fashion that reduces the probability of undesirable aggressive responses (Hart and Hart, 1997). In recent times people's knowledge in this aspect has gained importance and they have become more selective in choosing their pet, which fits according to their needs.

Dog owners should possess sufficient knowledge regarding the health care aspects like de-worming, vaccination, grooming, bathing, exercise etc., not only to keep their pets healthy, but also to prevent the zoonotic diseases. Any sudden

change in a pet's life should be kept minimum. Exercise is a must in order to keep them in shape both physically and behaviourally. Regular attention to the dog's coat, ears, eyes, teeth and feet is very important.

For a dog to be healthy, it must be correctly fed and adequately groomed, and its medical needs must be met. For a dog to be well mannered, it must be properly trained. Knowledge regarding the training, among dog lovers of India is limited. Training the dog not only helps to control the dog but also keeps the surrounding environment clean and safe. Training is a vital part of dog ownership and will ensure that the dog lives its life with a greater degree of safety, apart from increasing the owner's bond with their pets.

Changes in human society have made more and more people, particularly the aged, to seek a dog as a friend or companion and even consider them as a member of their family. Practices that may once have been accepted are now being reassessed and modified according to new knowledge and changing attitudes of dog owners. Good dog management depends upon the owners and handlers being competent as well

as providing basic necessities of life for their dogs. Owners should attempt to provide them with a reasonable quality of life.

Even though dog population is increasing in India, not much work has been done on the scientific management of dogs. Research in the management aspects of dogs lag behind than that of other domestic animals and the more frequently used laboratory animals. Still, knowledge regarding canine nutrition, breeding, housing, health care and training is not adequate. The information regarding the management practices followed at the household level is meagre.

Under these circumstances, the present study has been designed with the following objectives:

1. To gather and analyse the information regarding the existing management practices of purebred and crossbred dogs in Central Kerala.
2. To develop a ' need index' for dogs based on the study.

Review of Literature

2. REVIEW OF LITERATURE

Pet management has a profound effect on the society in terms of noise, smell, pollution of public areas and at times as a threat to others. How pet owners manage their pets in relation to treatment, nutrition and proper training is imperative (Chamala and Crouch, 1981).

Robertson *et al.* (1991) reported that 80 per cent of dog owners sought veterinary advice from professionals; six per cent from friends or neighbours; three per cent from dog breeders; two per cent asked pet shop owners while nine per cent did not seek any advice at all.

Serpell (1995) reported that despite a growing body of research into farm or zoo animal welfare, the welfare of domestic dog has been largely ignored as a topic of scientific inquiry. Although dogs are well known pets, little research, apart from studies on physical health exists on the welfare requirements of dogs.

Increased owner interest and level of sophistication about the nutrition of their pets has added to the importance of including data regarding diet and nutritional state in the assessment of each dog examined by a veterinarian (Slater *et al.*, 1995).

Before purchasing a dog, it is important to consider the amount of time one has, not only to train the dog but also to attend to its basic grooming and health care needs (Warren, 1995).

Hoskins (1999) stated that successful raising of puppies require a suitable environment, correct quantity and quality of nutrients for growth, a regular schedule of feeding, sleeping, grooming, exercise and the stimulus that provides micturition and defecation. Scientific management recommendations were reported by several authors (Alderton, 1987, Earle, 1993 and Simpson *et al.*, 1993).

2.1 Socio-economic characteristics

Franti and Kraus (1974) surveyed that the proportion of households owning pets was higher in rural areas of California.

Almost 41 per cent of the dogs were less than three years of age and only about five per cent of the dogs were 12 years old or older. Male were more than females. About two-third (63.4 per cent) of the dogs were categorized as purebred. Among the purebred, Poodles (13.8 per cent) was the most popular breed followed by German Shepherd (5.25 per cent), Dachshund and Labrador Retriever (3.4 per cent).

Griffiths and Brenner (1977) conducted a survey in Illinois and classified people who own dogs based on their occupation. Female owners (67 per cent) were more than male owners (33 per cent). The age of the heads of households between 18 and 29 years was maximum with 27.9 per cent followed by age groups between 30 to 39 years (19 per cent) and 40 to 49 years (17.8 per cent). The mean income was about $ 10,000. The mean number of persons and dogs per household was 3.04 and 0.467 respectively. The mean age of the dog was 4.6 years.

Bunting (1980) noted that people who have originally kept just one dog as a pet are within a few years, deeply involved with dog showing and breeding. Some have joined training classes to teach their pet simple obedience training.

Chamala and Crouch (1981) reported that a large number (42.7 per cent) of households had two adults members (over 18 years), however, there were three adults in 21 per cent, four adults in 19 per cent and one adult in 8.6 per cent of the households owning dogs. Companionship (32 per cent) seem to be the most popular motivation for dog keeping followed by companionship and relaxation (15.7 per cent) and safety and companionship (13.9 per cent).

A survey conducted by Selby and Rhoades (1981) revealed that 40.7 per cent of the respondent's age was between 18 to 29 years followed by 30 to 39 years (26.3 per cent) and 40 to 49 years (6.5 per cent). Male dog owners accounted for 45.5 per cent as against female dog owners (54.5 per cent).

Nassar and Mosier (1982) reported that the average number of dogs per household in Kansas was 0.43 and the percentage of households with dogs was 43 with an average of 1.36 dogs per household.

A study conducted by Wise (1984) showed that 70 per cent of the dog owning households had one dog, 20 per cent owned two dogs, and almost 10 per cent owned three or more

dogs. The average was 1.5. With regard to age of dogs owned, 19 per cent of all dogs were less than two years old, 37 per cent were two to five years old, 27 per cent were six to 10 years old and 12 per cent were over 10 years old. The study also revealed that 68 per cent of dog owning households had income greater than $ 15,000. The study also showed that dog ownership was more common in larger families. Specifically 58 per cent of dog owning families had three or more people.

A survey conducted by Nassar *et al.* (1984) revealed that the average age in the dog population was 5.32 years. For households with dogs, there was an average of 1.49 dogs per household. The ratio of people to dogs was 3.92:1. Forty five per cent of the dogs were male. At the pound, 24 per cent of dogs were small breeds, 24 per cent medium sized and 52 per cent large breeds.

Wise and Kushman (1984) conducted a survey in US and reported that ownership was highest for the 'family formation and growth group' (69 per cent) and lowest for the 'older singles group' (31 per cent). Family-growth households have 1.3 children under 18 years of age and at least two persons

over 18 years. Income and education were related negatively to the probability of being a dog owner.

Wise (1987) reported that more probability of children (less than five years) in a household was associated with lower probabilities of all categories of dog ownership.

Brooks (1990) reported that the ratio of 'adult male to female dogs' was '0.56' to 0.44', with 20 per cent of the dog population being less than three months old. The average age of the dog was 2.3 years with female dogs having an average age of two years and male dogs an average age of 2.5 years.

Robertson *et al.* (1990) reported that majority of the households (79.1 per cent) kept a single dog. The average number of dogs per household was found to be 1.24. The highest proportion of dogs was found in middle-class households followed by lower, lower-middle, upper-middle and upper class households.

A survey conducted by Slater *et al.* (1992) in Texas, revealed that 42 per cent of the dogs were mixed breed and 58 per cent were purebred. The age of the dogs at the time of survey

was an average of 15 months (range seven to 37 months). Males accounted for 33 per cent and females 67 per cent.

Margawani and Robertson (1995) in Bali, Indonesia; reported that the average number of dogs kept by each household was 1.3 and the average age of the dogs, was 2.06 years (range two months to 12 years). Forty two per cent of dogs lived in households with more than one dog. More male dogs (83 per cent) were kept than females. Seventy per cent of the animals were looked after by the whole family, 17 per cent by the children and 12 per cent by adult member of the family.

Leslie *et al.* (1994) opined that interest in pet populations, including their welfare and relationship with human population has increased in recent years. Dogs ranged in age from two months to 17 years with a mean of 6.12 ± 4.06. In Ontario, Canada, the most commonly reported purebred dog was Collie followed by Poodle, German Shepherd, Shih Tzu and Golden Retriever.

Paxton (1994) reported that the ratio of 'dogs: household' was '0.38: 1'. The survey also suggested that about

half of the dog owners are either unaware of, or ignore requirements to register their dogs.

Slater *et al.* (1995) noted that most dogs were kept as pets in an urban or suburban environment. Slightly more than half were females. People owned their dogs for a mean time of 18 months. Purebred dogs accounted for about 65 per cent, while mixed breed accounted for 35 per cent. Labrador retriever was found to be the most common breed owned in Texas. The per cent of dogs in the age groups of less than 12 months, 12 to18 months and more than 18 months were 27,32 and 41 respectively.

Patronek *et al.* (1997) surveyed that 72 per cent dog owning households had one dog, 21.7 per cent has two dogs, 4.3 per cent had three dogs and two per cent had four or more dogs. Average age of dogs was five years. More than half (57.2 per cent) of the dogs were purebreds. The per cent of male dogs was 48.3 per cent.

Seksel (1997) suggested, educating owners on a few aspects of pet care such as nutrition, dentistry, bathing, grooming

and micro chipping that may not be adequately covered in an average consultation.

Hoskins (1999) opined that by offering consultative advice and providing owners with educational pamphlets, the veterinary practice can not only assist owners who are seeking medical treatment for their puppies but can also take up a vital role in educating people in the community.

2.2 Selection of pup/ dog

Griffiths and Brenner (1977) reported that the major source of dogs was from private owners. The most important factors to be considered while choosing a breed are temperament and size, how much time needed for exercising, grooming etc., and whether children and the dog are compatible. It is ideal to purchase the dog from breeders, pet shops, commercial kennels, dog dealers and humane societies. Emphasis should be given to the temperament and health of pets (Bunting, 1980).

Nassar *et al.* (1984) reported that among the dogs acquired by the owners, 84 per cent were less than one year of age. Breeders and pet shops supplied about 17 per cent of dogs,

whereas 10 per cent of dogs were acquired at the pound and 6.4 per cent were adopted from the stray stock.

Pets act as companions for the whole family. They also do guarding for families, with six per cent of dog owners stating that this was a major function of their pets. Protection was a secondary function of 29 per cent of pets. The main reasons for dog ownership were companionship, protection, strengthening of the family group and as acceptable substitutes for human relationships (Blackshaw, 1985).

According to Alderton (1987), taking care of any dog is relatively expensive and time consuming, but breeds vary so widely in size, appearance and temperament that it is possible to select one, which will fit the owner's circumstances. Puppies settle easily and female dogs are more manageable. The basic factors to be considered while selecting pups or dogs are age, breed, size, gender and source.

A survey conducted by Brooks (1990) revealed that 70 per cent of the respondents gave 'guarding' as their dogs' main function and herding, companionship and hunting were described by approximately 10 per cent of the respondents as the main

reason for keeping their dogs. Robertson *et al.* (1990) reported that only 10.5 per cent of dog owning households had either purchased or been given a dog in the 12 months prior to the survey.

Edney (1992) concluded that a great majority of people chooses to share their lives with dogs, cats or other species. The reward for such activities were companionship, support, protection and a focus of interest outside themselves.

Leslie *et al.* (1994) reported that the dogs were acquired from a variety of sources. A friend or member of one's family accounted for 44 per cent of rural dogs. Forty per cent of urban dogs were obtained from breeders. The highest scoring reason for ownership was "companionship" followed by "love and affection" and "for the benefit of children". The two lowest ranked reasons were "sporting" and "show ".

Pedigree or the ancestry of an animal is very important in selection for show or hunting. When selecting animals, most people prefer puppies because they are more adorable, usually are easier to train, and haven't been subjected to long periods of abuse, and usually will adapt easier to a family

(Warren, 1995). Responsible pet ownership results in a rewarding life for the companion animal and its human family (Hart and Hart, 1997).

Patronek *et al.* (1997) reported that 84 per cent of dogs were acquired from amateur breeders and from show or hobby breeders was 15.4 per cent and 4.4 per cent respectively. It was not possible to classify (14.3 per cent) dogs that were obtained from private owners or breeders, because their purchase price was unknown, 21.3 per cent of the dogs were obtained free of cost. Seksel (1997) reported that some people keep the dogs solely for companionship, others for sports, and others for security reasons.

2.3 Housing

Fox (1964) reported that most sheepdogs were provided with straw or sawdust bedding on earth, stone, or cement flooring, a few were housed on boards or slats. Many farmers owned three or more dogs, some being housed in yard kennels and rest in a barn. Thirty one per cent of the dogs were chained in outdoor kennels, 62 per cent were kept in barn or shed, two per cent in farm house, five per cent in kennel plus

open air exercise enclosures and 14 per cent were let loose when not at work.

In India, kennel floors are usually made of concrete. Wooden floor remains warm and thus it can be used in cold areas. Minimum sleeping space recommended for small, medium and large breeds are not less than 10 sq. ft, 20 sq. ft and 22 sq. ft area, respectively. The floor should be kept clean, dry, neat and tidy (Chakrabarti, 1986).

Robertson *et al.* (1991) conducted a survey on health management practices by dog owners in Perth and reported that 45 per cent of dogs slept mainly inside the house, 12 per cent slept approximately equal time inside and outside and 43 per cent slept predominantly outside.

Slater *et al.* (1992) found that 17 per cent of the dogs were kept in kennels, 55 per cent in large yards, 21 per cent were tied outside and seven per cent owners never kept their dogs outside. Patronek *et al.* (1997) reported that greater than 70 per cent of the dogs were confined to a fenced yard. The per cent of dogs kept in kennel, yard and let loose were 15,71 and 10 respectively.

Serpell (1995) suggested that dogs should be normally housed on solid floor rather than grid floors, that compatible dogs may be housed together in pairs, that dogs need to have regular human contact, and that dogs should be able to exercise with other dogs. The minimum dimensions of the kneel should be the square of the dog's length plus six inches, and cage height must be six inches taller than the height of the dog. These dimensions clearly represent the minimum space to allow a dog to turn around. According to 'UK home Office Code of Practices', minimum floor space area required for a dog weighing up to 25 kg is 4.5 m^2 if housed singly, 6.5 m^2 for dogs weighing between 25 to 35 kg and 8.0 m^2 for dogs weighing more than 35 kg.

Jackson (1996) opined to pay attention to breed choice, management and training by the owner, and other positive features of pet's environment while deciding the housing type for their dog. He also suggests that ideally a dog should have access to as much open space on the property as possible, which will improve their quality of life as well as enhances opportunities for shade and shelter.

2.4 Feeding

Fox (1964) reported that most of the adult sheep dogs (97.5 per cent) were fed in the evening, but too few consider to feed the pregnant female dog, or young dog, at more frequent intervals with a more concentrated diet high in protein and low in fibre content. The ingredients used in the meals were flaked maize (96 per cent), scraps (98 per cent), bones (29 per cent), commercial meal (six per cent), bread (38 per cent), milk (92 per cent), fish meal (74 per cent), meat (21 per cent) and carcasses (88 per cent) depending upon the individual preferences or availability. It is a common practice to include sodium chloride in the feed mainly to improve palatability.

According to Ingmand (1971) excellent results have been obtained by starting feeding of solids as soon as the pup's eyes were open. By the time the growing dog is six months old, one feeding a day is usually sufficient. There is no harm in feeding a small quantity in the morning, but the major portion of the diet should be fed in late afternoon or early evening.

Bunting (1980) suggested that meat can be fed either raw or cooked, but if fed raw the source of supply must be a clean and if in doubt should always be cooked. Cooked bones or frozen

bones should not be given. Plain simple food is not only tolerated by a dog, but also better for its health.

Mugford and Thorne (1980) stated that dogs, kept as pets readily adapt to feeding regimens supplying one, two or more meals per day. It is known that the dog can adapt to enormous variations in diet and husbandry. A survey conducted in UK showed that 77 per cent provided only one meal per day, a minority (19 per cent) two meals, very few (three per cent) three meals per day and only one per cent gave four meals per day. Although occasional tit-bits are probably given to many pet dogs between meals, it would seem that most are encouraged to conform to an occasional gorge-feeding pattern rather than three to four meals per day of a British family households, or the nibbling pattern which have been demonstrated with *ad libitum* feeding in kennels.

Until the solid food is first offered at three to four weeks of age, milk supplies all the nutrients required for the growth. Artificially supplementing calcium and phosphorous, does enable increasing calcification of the bones to occur in suckling animals (Baines, 1981).

The daily intake of solid foods in growing pup would be approximately seven per cent of its body weight. By the sixth week, they are weaned from their mother. For pups up to three weeks of age should be fed six times a day then up to five times a day until the pup starts eating solids. By 10 to 12 weeks of age, pups should be provided with solid foods in the form of meats, bones etc. Pups should be fed four to six times a day prior to weaning. On weaning they should be given three to four meals. Subsequently one half of their adult food, they should be provided with two meals. Adult dogs may be fed once or twice a day. The principal meals should contain milk and biscuits. Meat may be replaced by fish or egg. Small amount of homemade curd may also be fed to dogs. Cooked meat is safe and less likely to cause digestive upset. Raw egg should not be provided. Whole fish along with bones after cooking is considered to be a better balanced nutrient to dogs over meat. The dog should have water supply at all times or at least three times a day. The water intake including watery food is about 80 ml per kg body weight (Chakrabarti, 1986).

Alderton (1987) suggested that meat should be cooked for about 20 minutes before serving. Fresh food must be mixed with a biscuit meal supplemented by vitamins and minerals.

Most dogs are fed once a day, or in half-ration morning and evening. Bones are not essential from a nutritional point of view but dogs undoubtedly appreciate being able to gnaw it. The number of meals can be decreased to two meals per day if sufficiently concentrated foods are given (Rainbird, 1988).

Brooks (1990) surveyed that all but one of the households feed their dogs everyday and 23 per cent said that dogs other than their own occasionally fed at their households.

Earle (1990) stated that prepared pet foods contain the complete nutrients profile necessary for the health of the dog and therefore need no additional supplements as against 'home-prepared' diets. Dogs can be influenced by their owners to adapt to alternative feeding routines, now commonly two meals per day. Some owners prepare specially formulated home-cooked for their pets and spend a great deal of time and effort in preparation.

Slater *et al.* (1992) reported that more information is needed on the usual feeding pattern of dogs of all age groups to elucidate the relationship between dietary components and other diseases, including cancer, renal diseases and obesity. Data from

survey revealed that 57 per cent of the owners provided dry food for their dogs followed by canned food (29 per cent), semi moist food (six per cent) and combination of both (five per cent). Meat was provided by 44 per cent of the dog owners followed by chicken (37 per cent) and trimmings (37 per cent). Food was provided twice daily by 50 per cent of the owners followed by once a day (21 per cent) and *ad libitum* (20 per cent). Supplement; usually multi vitamin products were provided by 18 per cent of the owners. Bones were provided by 40 per cent of the owners whereas; 33 and 34 per cent of dog owners fed bread and egg respectively.

Earle (1993) stated that defining a practical feeding guide to encompass all breeds across a wide range of body weights is a difficult task because dogs of different breeds achieve their mature body weights at different times.

Simpson *et al.* (1993) reported that many dog owners, particularly those with puppies of the large and giant breeds, like to supplement the diets of their pets with either calcium, or a combination of calcium and phosphorous. If the diet already contains adequate levels of these minerals it is not only unnecessary, but also potentially dangerous to add them.

Burger (1994) reported that the dog owner expects reliable feeding guide that are applicable to their individual animal and advice on special aspects such as activity, different life stages and environmental conditions.

Dogs apparently select nutritionally complete and balanced diets but with domestication generally a single food is presented which eliminates the choice, animals previously exercised (Morris and Rogers, 1994).

Supplementation with calcium or any other mineral during pregnancy is not necessary for healthy fetal development, as long as the dam is consuming a well-balanced, high quality commercial ration. It is also stated that excessive supplementation with calcium or vitamin D during pregnancy may cause soft tissue calcification and physical deformities in the developing fetuses. Contrary to popular belief, diets containing excessively high amounts of calcium and phosphorous should not be fed to growing dogs. More than 90 per cent of pet owners in the US, feed commercially prepared pet foods as the primary component of their pet's diet. Although one meal per day can be sufficient for feeding adult pets during maintenance, providing two meals per day is healthier and more satisfying. Feeding two

times per day reduces hunger between meals and minimizes food associated behaviour problems such as begging and stealing food (Case *et al.*, 1995).

A flavour preference test for dogs, showed that majority of the dogs studied, preferred canned and semi moist pet food to dry food. Beef appears to be the most preferred type of meat and cooked meat is overwhelmingly preferred to uncooked meat. Dogs become conditional to receiving their meals at a particular time of day. Puppies that had access to food throughout the day gained weight more rapidly and were heavier than were puppies than were puppies that were fed using the portion-controlled regimen. The best method of ensuring adequate water intake is to provide, clean water at all times, regardless of the animal's physiological state, caloric needs or dry matter intake (Case *et al.*, 1995).

Slater *et al.* (1995) reported that 51 per cent of the dogs were fed dry food followed by 45 per cent special food and 16 per cent canned food. Beef was the meat (27 per cent) fed to the dog by most owners followed by meat trimmings and chicken (19 per cent each). Most (50 per cent) dog owners fed their dog twice a day, followed by once (26 per cent) and more than four times a

day (21 per cent). Thirty per cent owners fed bones to their pets as 22 per cent fed bread. Supplements were fed to their pets by 12 per cent of the owners. About 60 per cent were fed dog biscuits or some other dog treat or snacks.

Warren (1995) stated that puppies would begin to lap solid food at about three weeks of age. Usually a puppy should be fed three or four meals a day. Eggs should be hard boiled or cooked serving to a dog. Pregnant females should be fed three or four evenly spaced meals to avoid discomfort that one large meal may cause. Modern commercial food provides an adequate and balanced ration during pregnancy and supplementary feeding shouldn't be needed. Commercial foods not only save time, but also are very convenient to use. Following whelping, the female will need food two or three times as much as before which should be given in three or four meals per day.

Beaeley (1996) stated that the puppy could be fed entirely on home-prepared fresh foods and other food items that are intended for human consumption. It was also stated that, prepared and fresh foods are the best options for feeding a dog and the meat and fish should be cooked before feeding and suggested not to feed them raw. Vegetables make a very good

training reward for those who like the taste, as they are low in calories. Mineral and vitamin supplementation is a must if the dogs are fed homemade diet. Fresh, clean water is the only kind of drink that puppy needs.

A survey conducted by Robertson (1996) on the diets offered to dogs revealed that more dogs were offered dried pet food every day than ' other foods', meat or canned foods. Over half (55 per cent) of the dogs were fed both canned and dried pet food during the week, whereas only 9.6 per cent were fed neither dried nor canned food. Of these, 95 per cent were fed meat every day, while five per cent were fed meat on some days and 'other foods' on the remaining days. It was also reported that 43 per cent of the owners fed bones to their dogs in the week preceding to the survey. About 72.5 per cent of the dogs were fed meat during the week. Beef was fed more frequently (53 per cent) than chicken (43 per cent), mutton (37 per cent), kangaroo meat (8.5 per cent) or other species (fish, goat and camel). Sixty nine per cent of owners always cooked the meat before feeding, while 12 per cent sometimes cooked and 19 per cent never cooked. Only 7.1 per cent of dogs were fed 'offal' during the week preceding the survey, and only 1.8 per cent dogs were fed with offal on every day of the week. Table scraps or leftovers were fed

most frequently, followed by vegetables and bones. Some owners fed a range of other types of food including chocolate, popcorn, yoghurt and ice cream. Fourteen per cent received dietary supplements; calcium-phosphorus preparations were the most frequently used supplements.

Beri (1997) stated that Western countries generally depend upon well-balanced commercial dog foods and it is difficult for an average dog owner to provide a diet as balanced and nourishing as that sold by manufacturers.

Hoskins (1999) mentioned that the puppy should be encouraged to begin eating solid food at three to four weeks of age. From the time of weaning to four to six months of age, puppies are best fed at least three times a day at regular intervals. Thereafter, puppies should be fed twice a day on a regular schedule.

There is no need to supplement vitamins or minerals to pups, unless a veterinarian recommends. There is no need to feed pups, food items like baby formula, cereals, eggs etc., as long as they are eating a complete and balanced food (Deshmukh, 2000).

The daily food requirements of puppies should be split into five or six meals. At the age of 10 weeks, the meal size may be increased and the number of meals may be reduced to three. Adult dogs may be fed just once or twice a day. The pregnant and lactating female dog may not be able to eat their daily food requirements in one or two meals. In such cases, daily requirements may be split into three meals and fed three times a day (Krishnamurthy, 2000).

Pasupathi *et al.* (2000) stated that exorbitant increase in the price of commercial dog foods draws attention to formulate economical and nutritionally balanced complete food for dogs under Indian conditions. Among various feed preparations, dry food (biscuit, meals and flakes) seems to be the cheapest, having long storage life and these can be easily transported after packaging. He also concluded that the complete diet is quite palatable and also have potential to sustain normal growth in Mongrel pups.

A study conducted by Rahman and Yathiraj (2000) revealed that the mortality pattern of pups till weaning indicated that the per cent survival of pups in groups fed on commercial

dog food, was higher (94.4 per cent) as compared to the pups receiving homemade food (87 per cent).

2.5 Breeding

Ingmand (1971) suggested that dog weaning can be easily done at five weeks and usually no setback is experienced. Franti and Kraus (1974) reported that about one-third of female dogs, but less than 10 per cent of male dogs were neutered. Paxton (1994) is of the opinion that 69.27 per cent of the dogs owned in Canberra were de-sexed.

Griffiths and Brenner (1977) reported that the per cent of neutered dogs was 32.0 as to intact animals of 67.8 per cent; only 1.4 per cent of the male dogs were used as studs. Only 10.5 per cent of the owners raised a litter 12 months prior to the survey. Mean litter size was found to be 4.7 (range one to eight). Litter size of four and eight was found to be maximum (20 per cent each).

Bunting (1980) stated that the age at which a female dog has her first season, can vary from five months to two years depending on the size of the breed and recur every five to twelve

months. The best time to do spaying is three months after her first season. Stud fees vary considerably from as low as £ 10 up to £100 in a few cases depending upon the breed. The average age of the start of weaning is about three weeks when they will easily lap a rather thick mixture of baby food.

A survey conducted by Nassar *et al.* (1984) revealed that about 77 per cent of the female dogs were spayed and 26.5 per cent of males were castrated. Approximately 17 per cent of un-spayed female dogs reproduced.

Alderton (1987) reported that in female dogs, oestrus cycle occurs every seven or eight months on an average, but intervals vary between two and 18 months are unknown. The heat may be noticed from the age of six months onwards to 18 months. The right time for mating is usually about 10 days after the start of pro-oestrus. Mating will probably take place twice, under controlled conditions, over the four days period from the 10^{th} day onwards. Gestation period lasts about 63 days, but breed variations of a week more or less are not uncommon. After whelping, three or four meals may be necessary, with the actual amount of food depending on the size and breed.

Brooks (1990) reported that only one female dog out of 50 female dogs, less than one year old; gave birth and only five female dogs (two per cent) had been spayed. The survey found that each female dog had whelped on an average of 1.4 times and that 40 per cent of female dogs had not whelped, the largest number of parturition reported being eight. As much as 51.9 per cent of puppies were reported to have died, there was a maximum of 2.3 puppies per litter surviving.

Robertson *et al.* (1990) reported that 52.6 per cent of the dogs were neutered. More female dogs were de-sexed (69.4 per cent) than males (33.8 per cent). Only 19.2 per cent of the entire female dogs whelped and only 3.9 per cent of pups were produced in the 12 months prior to the survey.

Leslie *et al.* (1994) reported that 66 per cent of dogs were neutered. Among the dogs surveyed, 14 per cent of dogs had reproduced, with rural pets more likely to have reproduced than urban ones.

Margawani and Robertson (1995) reported that only 11 per cent of the female dogs were spayed and 44 per cent of male dogs were castrated. This low level of neutering accounted

for the findings that 69 per cent of the entire female dogs had had litters in 12 months preceding to the survey.

American Veterinary Medical Association approved a resolution that supported the concept of early (eight to 16 weeks of age) gonodectomies in dogs and cats, and promoted further research to look for short and long term detrimental effects of the surgery (Root, 1995). Serpell (1995) reported that careful breeding has produced good results in reducing the prevalence of some of the genetic defects. Warren (1995) stated that weaning of puppies should be completed when the puppies are about six weeks of age.

A survey conducted by Patronek *et al.* (1997) revealed that 62.9 per cent of males were castrated and 72.7 per cent of females were spayed. Among households that owned a dog, owners with the lowest annual income (34 per cent) had a sexually intact dog (≥six months old) when compared to 27.2 per cent households with medium to high income. Among the female dog owning households, 3.4 per cent reported that their dog had whelped during the previous 12 months and 11.3 per cent female dogs had had one or more litters since they were owned.

Sindhwani (1997) suggested that the age at first mating of the female dog is important and it is better to wait for the second or third season. The female's heat period usually occurs twice a year, but it can vary. Large and giant breeds may cycle only once every nine to 12 months.

Hoskins (1999) stated that most puppies are completely weaned at seven to eight weeks of age depending somewhat on dog's size and breed. Early weaning and separation of littermates prior to six weeks of age, however, can cause malnutrition or numerous behavioural problems later in life.

2.6 Health care

Fox (1964) reported that vaccinated sheep dogs have contacted the canine distemper disease, and in an outbreak several older dogs, although vaccinated when young, have died. It is important to perform second vaccination, 12 to18 months after the initial dose. No single vaccination can give life long immunity. De-worming was done as a routine in 19 per cent of the dogs whereas; it was done when required in 81 per cent of sheep dogs. Sarcoptic mange mites were the commonest skin mites noticed in sheep dog. Common ailments were distemper

(26.5 per cent), followed by skin disorders (26 per cent) and leptospirosis (seven per cent).

A combined vaccine against distemper, hepatitis and parvovirus was used in 50.4 per cent of vaccinated dogs. However, 31 per cent of owners did not know the diseases their dogs had been vaccinated against. Eighty three per cent of dogs had been treated for intestinal parasites in the 12 months period prior to the survey. Flea control had been used on dogs by 85.6 per cent of owners in the 12 months preceding the survey. Rinses and shampoos was the most popular method of flea control (44.7 per cent) followed by powders (18 per cent) and collars (15.6 per cent). The common reasons for consultations were ill health or injuries (44.17 per cent), vaccination (33.7 per cent), routine checkups (10.2 per cent), de-sexing (4.3 per cent), heartworm testing (3.1 per cent) and other reasons such as grooming (0.8 per cent) or boarding problems (0.4 per cent). Owners of dogs belonging to the lower socio-economic group were least likely to have visited a veterinarian in the previous 12 months, were more likely to have an unvaccinated dog which were less likely to have wormed their dogs (Ingmand, 1971).

Anvik *et al.* (1974) reported that 9.3 per cent of the dogs were positive for *Toxocara leonina* and 1.92 per cent for *T. canis* from the Animal Resources Centre records that were examined. An average of 31.8 per cent of samples collected and examined yielded ova of some kind in their faeces.

Franti and Kraus (1974) reported that the use of veterinary services was higher among owners of purebred dogs than among mixed breed owners. In urban/suburban areas, 87 per cent of dog owners were reported using veterinary services for their pets.

Nielsen *et al.* (1979) suggested that a one year vaccination schedule did not protect an area better against dog rabies than did a program based on a vaccination schedule every two or three years keeping in mind many social, economic and educational factors which influence whether a rabies control program would work in a particular area or not.

Bunting (1980) opined that grooming should be part of daily care, and if daily grooming is impossible, brushing and combing at least twice a week is essential. Grooming, cleaning and feeding must be done regularly to pups and massage of the

anal region with damp cotton wool; to substitute for the dam's licking is required to stimulate elimination (Baines, 1981).

Chamala and Crouch (1981) noted that 46.3 per cent of dog owners took the sick pet immediately to a veterinarian, a substantial number of owners (41.8 per cent) reported that they treated sick pets at home first and took the dog to a veterinarian if treatment does not work out. Another 5.3 per cent indicated that they treated their pets at home using family experience only. About 76.5 per cent of the owners indicated that the pets required treatment for health problems in the year preceding the survey. Only 22.6 per cent reported having no health problem with their pets.

Wise (1984) reported that 26 per cent of households owning dogs do not take their pets to veterinarian during the past one year, while 74 per cent dogs were taken to a veterinarian at least once. Fifty per cent of dogs were taken to a veterinarian one to two times followed by 23 per cent who took their dogs three or more times in the past 12 months prior to survey.

Blackshaw (1985) reported that almost 40 per cent of pet owners spent between two and three hours daily feeding, playing with, grooming or exercising their pets.

The amount of exercise required depends partly on the breed. The small breeds are often quite content with a walk of about one kilometre daily whereas, larger dogs need up to around 13 km. Frequent short periods of grooming are preferable if carried out regularly. Young dogs may need their nails clipped. Pets will need to be bathed only if their coats become soiled, but otherwise a bath every two to three months should be adequate (Alderton, 1987).

Brooks (1990) stated that in Zimbabwe, dogs had to be vaccinated against Rabies at three to four months of age, at 12 to 15 months of age and every three years thereafter.

Robertson *et al.* (1991) reported that most dogs (90.8 per cent) had been vaccinated at some stage of life, only 67 per cent had been vaccinated in the preceding 12 months and 4.1 per cent of owners being unsure of their dog's vaccination history. Sixty one per cent of the dogs were first vaccinated when they were less than four months of age, 12 per cent between four to 12 months and seven per cent after the age of one year. Twenty per cent of owners did not know the age of first vaccination.

Slater *et al.* (1992) reported that most dog owners (51 per cent) considered their dog to be very active, followed by moderately active (34 per cent) and sedate (15 per cent).

Savini *et al.* (1993) reported that sarcocystis (31.1 per cent) was found more frequently than any other parasites in the faeces of all three groups (Stray dogs kept in kennels, urban dogs and working dogs in farm) of dogs. *Sarcocystis* species occurred more frequently in dogs fed raw meat than in those fed only processed food. All kennel dogs, 71.1 per cent of rural dogs and 45.3 per cent of urban dogs received raw meat in their diet. In those dogs that had been fed raw meat, mutton was fed more commonly (79.2 per cent) than beef (43.7 per cent) or kangaroo meat (18.7 per cent).

Leslie *et al.* (1994) reported that only two per cent of urban and three per cent or rural dogs had never been vaccinated as against 12 per cent of urban dogs. Eighty eight per cent of rural dogs had visited veterinarian within the past 12 months as compared to 82 per cent of urban ones.

Serpell (1995) reported that castration, spaying, tattooing, de-clawing, ear cropping, tail-nicking, docking, teeth

cutting and ear implants etc., as 'mutilations' and therefore morally unacceptable.

Slater *et al.* (1995) reported that many dog owners (62 per cent) reported playing and retrieving games with their dog, including playing with a flying disk. About two-third of the owners (67 per cent) took their dogs for a walk. Fifty seven per cent owners took the dog for a walk three to seven times a week whereas, 20 per cent took one to two times per week. Twenty per cent of the dogs did not exercise with other dogs. Thirty eight per cent owners were reported to be playing with their dogs more than seven times a week followed by one to three times a week (20 per cent).

Warren (1995) suggested that even small apartment dogs should be allowed some freedom to move around and exercise. Daily brushing is recommended to remove dead hair and distribute the skin's oil. Longhaired breeds, in addition to regular combing and brushing, need to be checked for matted hair. During routine grooming, ears should be checked and cleaned once a month. Cotton swab or soft cloth soaked in mineral oil or alcohol can be used. Dogs should be bathed only when they become extremely dirty. When bathing becomes

necessary, a mild human soap, baby shampoo or coconut oil shampoo can be used.

Gehrke (1997) reported that nearly nine-tenth of dog owning households used veterinary medical services at least once during the past two years. Primary pet care responsibilities were almost equally divided between females and males for caretaker 18 years old or less. However, between the ages of 19 and 29 years, the primary caretaker was much more likely to be female (ratio 3:1).

Hoskins (1999) stated that the initial vaccination series consisted of one injection of a multivalent vaccine given at six weeks of age and two boosters at nine and 12 weeks of age. The rabies vaccination is usually given at 12 weeks of age or older. Some veterinarians do recommend vaccinations for canine corona virus infection, giardiasis and leptospirosis.

2.7 Training

Fox (1964) conducted a survey on the management of working sheep dog and reported that training session usually

starts when the animal is above six months and their average retirement age is about eight to nine years.

A successful training routine depends on repetition of words and action over a period of time, and on praise. Simple commands such as 'COME' and 'STAY' used together with clear gestures will gradually be understood, subsequently, more complex lessons can be taught. It will take about three months to train a puppy to ask to go out when it needs to and slightly longer before it performs on demand (Alderton, 1987).

Warren (1995) stated that the amount and type of training a dog receives depends on what the dog is going to be used for. Almost all dogs should learn five basic commands namely 'HEEL', 'SIT', 'DOWN', 'STAY' and 'COME'. Never hit or threaten to hit the puppy with hand or an object while training. House training can be accomplished by allowing the new puppy outside shortly after eating or several times during the day as well as by 'paper training'. At about six months of age, the puppy is ready to start the more serious stage of training. Training period should be held once or twice a day, be short in the beginning, and gradually increase to 15 to 30 minutes at a time.

Beri (1997) stated those basic commands like 'NO', 'SIT', 'DOWN', 'STAY' and 'COME' can be started at the young age of three to four months. Training should be best accomplished by rewards, which can be verbal (praise), physical (petting or play) or material (treat).

Early socialization, training and habituation to handling should be started when a puppy is eight to 12 weeks old should be strongly encouraged (Hunthausen, 1997).

Seksel (1997) suggested that a combination of socialization chances with puppy training helps puppies learn good manners and builds a strong bond among the owners, the puppy and the veterinary clinic. While training puppies, the focus should be on positive reinforcement or reward. Food is used as the reward because most dogs find this very desirable, but it always should be paired with a pat or verbal reward such as "good dog".

2.8 Welfare

Broom (1986) suggested that one approach to the improvement of welfare lies in the design of housing systems on

the basis of either what animals choose to do in semi natural environments or their choice as to their preferred conditions in experimental situations. Surveys of disease incidence in housing systems can provide considerable information about welfare if interpreted with care.

Slater *et al.* (1992) reported that 43 per cent of the dogs spent less than 25 per cent of time outside followed by 25 to 75 per cent time spent outside (42 per cent) and more than 75 per cent time outside (15 per cent).

Serpell (1995) stated that welfare clearly relates to an animal's ability to or cope successfully with, the prevailing conditions in which it finds itself. To satisfy basic welfare criteria, animals need to be kept in conditions providing adequate food, water, and ventilation and protected from the risk of injury or ill health. He also stated that the dogs spent on an average 35 per cent of their time inside the kennel.

Jackson (1996) reported that dogs might be better able to cope with confinement and loneliness during the day if they have a view of outside. Restraining a dog to a backyard with no view, companion or toys for long periods increases isolation,

which has been linked to aggression and boredom, which has been linked to excessive barking and other nuisance behaviour.

An "Animal Needs Index"(ANI) was developed to be used primarily at farm level as an instrument for assessing and grading livestock housing with respect to the well-being of the animals. ANI considered five husbandry conditions: (1) possibility of mobility, (2) social contact, (3) condition of flooring, (4) stable climate (ventilation, light, noise etc.) and (5) the intensity of human care. Scoring leads to a sum of points. The ANI values have been divided up into different grades of good or poor animal welfare (Bartussek, 1999).

2.9 Constraints

A survey conducted by Selby *et al.* (1980) revealed that the limitation in dog keeping were housing limitations (32.5 per cent), including either lack of space or the need for monetary deposit, emotional dissatisfaction (20.5 per cent) with the animals, destructive habits of pets (13.7 per cent), and a transient household status ranked first, second, third and fourth respectively. Other constraints were inconvenience (10.8 per cent); have not found type of pet wanted (4.9 per cent),

allergy to pets (2.6 per cent) and others (3.6 per cent – like selection of pet in progress, economics, and feed inadequate to provide care etc.).

A survey conducted by Selby and Rhoades (1981) revealed that the negative characteristics of dogs reported by dog owners were shedding of hair, annoyance to neighbours, smell and spread of diseases.

Leslie *et al.* (1994) reported that the highest scoring reason for non-ownership was "Pets are a problem when I go away", followed by " I don't have enough time to devote to a pet", and "poor housing for a pet".

Materials and Methods

3. MATERIALS AND METHODS

3.1 Sampling design

A total of 150 dog owners who maintain dogs, were surveyed. It comprised of 50 households each from the selected three districts *viz.*, Ernakulam, Palakkad and Thrissur (Central Kerala). A stratified random sampling procedure was employed. Two *'taluks'* were selected from each district. From each of the *taluks*, five veterinary hospitals/dispensaries were selected randomly. With the help of the veterinarian of the selected hospital/ dispensary, five dog-owning households were identified and surveyed to collect the data.

3.2 Data collection

3.2.1 Questionnaire preparation

A detailed questionnaire was prepared incorporating details regarding the socio-economic profile of the dog owners and the management details such as selection of the pup/dog, housing, feeding, breeding, health care, training, welfare and major constraints in dog keeping. A pilot study was carried out to test

the efficiency of the questionnaire and a model of the modified questionnaire is appended (Annexure - I).

3.2.2 Data collection

The data regarding dog owners and the dogs were collected from the dog owner's households by personal interviews during the period, November 2000 to April 2001. Direct observation of canine management at owner's premises was also made and the data were entered in the pre-tested questionnaire.

3.2.3 Observation

The following observations were made:

3.2.3.1 Kennel characteristics

Mainly the housing details were recorded. The location of the kennel was observed and noted. Kennel dimensions *viz.*, height, length and width were measured using a measuring tape and recorded. The constructional details like the type of floor, wall and roof were also recorded. The parameters such as, the space availability for the dog to move around with

respect to the breed and size, kennel's lighting and sanitation were also noted.

3.2.3.2 Feeding

Type of food served was divided into two categories and labeled as vegetarian and non-vegetarian and the meals made available at the dog owner's premises were recorded. Similarly, the preparation was labeled as 'homemade' and 'commercial dog food'. An examination of the food components fed to the dog was done. Quantity of food given to the dog was also recorded.

3.2.3.3 Health

The general health condition of the dog was observed and recorded. The growth parameters *viz.*, weight, height at withers, length (from withers to the base of the tail) and chest girth (circumference just behind the point of shoulders) were recorded. The weight of the dog was estimated using a weighing balance. The height, length and chest girth were measured using a measuring tape.

List of Veterinary Hospital/ Dispensaries visited:

Sl. No	District	Taluk	Veterinary Dispensary/Hospital	No. of samples	Total
1	Ernakulam	Kanayanoor	DVC, Ernakulam	5	50
			VD, Edapilly	5	
			VH, Thirupunithura	5	
			VD, Vennala	5	
			VPC, Mattanchery	5	
		Cochin	VD, Thrikakara	5	
			VH, Palluruthy	5	
			VD, Elankunnapuzha	5	
			VD, Njarakkal	5	
			VD, Nayarambalam	5	
2	Palakkad	Palakkad	DVC, Palakkad	5	50
			VD, Kanjikode	5	
			VD, Marutha Road,	5	
			VD, Mundur	5	
			VH, Elapilly	5	
		Ottappalam	VH, Shoranur	5	
			VPC, Ottapalam	5	
			VH, Pattambi	5	
			VD, Chalissery	5	
			VD, Mezhathur	5	
3	Thrissur	Thrissur	VH, Thiruvambady	5	50
			University Veterinary Hospital, Kokkalai	5	
			College Veterinary Hospital, Mannuthy	5	
			VH, Ollur	5	
			VD, Ayanthole	5	
		Mukunthapuram	VPC, Irinjalakuda	5	
			VH, Chalakudy	5	
			VH, Kodakara	5	
			VPC, Mala	5	
			VH, Vellangallur	5	

DVC- District veterinary centre VH- Veterinary hospital

VD- Veterinary dispensary VPC- Veterinary polyclinic

3.2.3.4 Temperament

The reactions of dogs to strangers and towards family members were observed for a period of half an hour. Response of the dogs towards the owner's verbal commands and behavioural peculiarities were also noted.

3.2.3.5 Faecal examination

Rectal swabs were collected randomly (seven each in each district) from among the dogs surveyed and preserved it in 10 per cent formalin and a thorough examination of the sample for the parasitism was conducted.

3.2.3.6 Examination of body coat

A detailed examination of the dog's body coat was made to detect any ecto-parasites and also to assess the accuracy of the dog owner's knowledge on this subject.

3.2.3.7 Record keeping

Observations were made regarding the maintenance of de-worming and vaccination records by the owner to assess the efficiency of dog owner's response.

3.2.3.8 Need index

Using an evaluation sheet (Appendix-I), the need index was worked out in the surveyed units.

3.3 Analysis of data

The data collected were analysed for mean and standard error using SPSS (PC plus) package and the results are tabulated under different headings.

Results

4. RESULTS

Background details of pet holdings and dog management practice adopted, in three districts of Central Kerala are presented:

4.1 Socio-economic profile of dog owners

The socio-economic profile of persons engaged in dog keeping, such as average age of dog owner; their family size, land area available; previous exposure to dog keeping and dog owner's occupation; are presented in Figures 1 and 2.

The average age of dog keeper was 46.5 ± 2.1 years in Ernakulam district whereas it was 48.1 ± 1.6 and 47.1 ± 1.8 years in Palakkad and Ernakulam districts respectively with an average age of 47.2 years.

The average family size was 4.6 numbers for both Ernakulam and Palakkad districts as against 4.3 in Thrissur district. Mainly businessmen were involved in dog keeping in all the three districts. In about 92 per cent of the households surveyed, dog owners were the male members of the family.

Figure 1. Socio-economic profile of dog owners surveyed

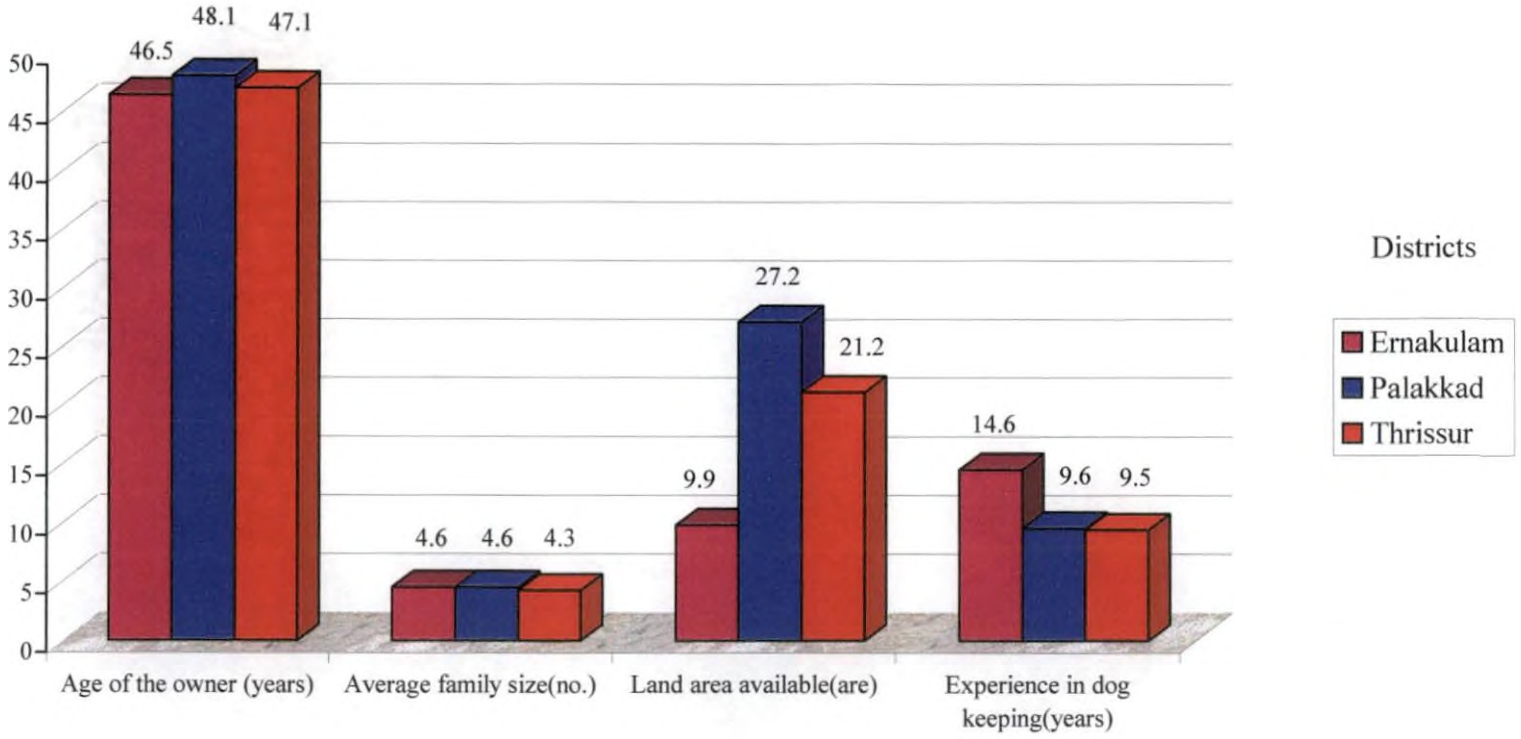
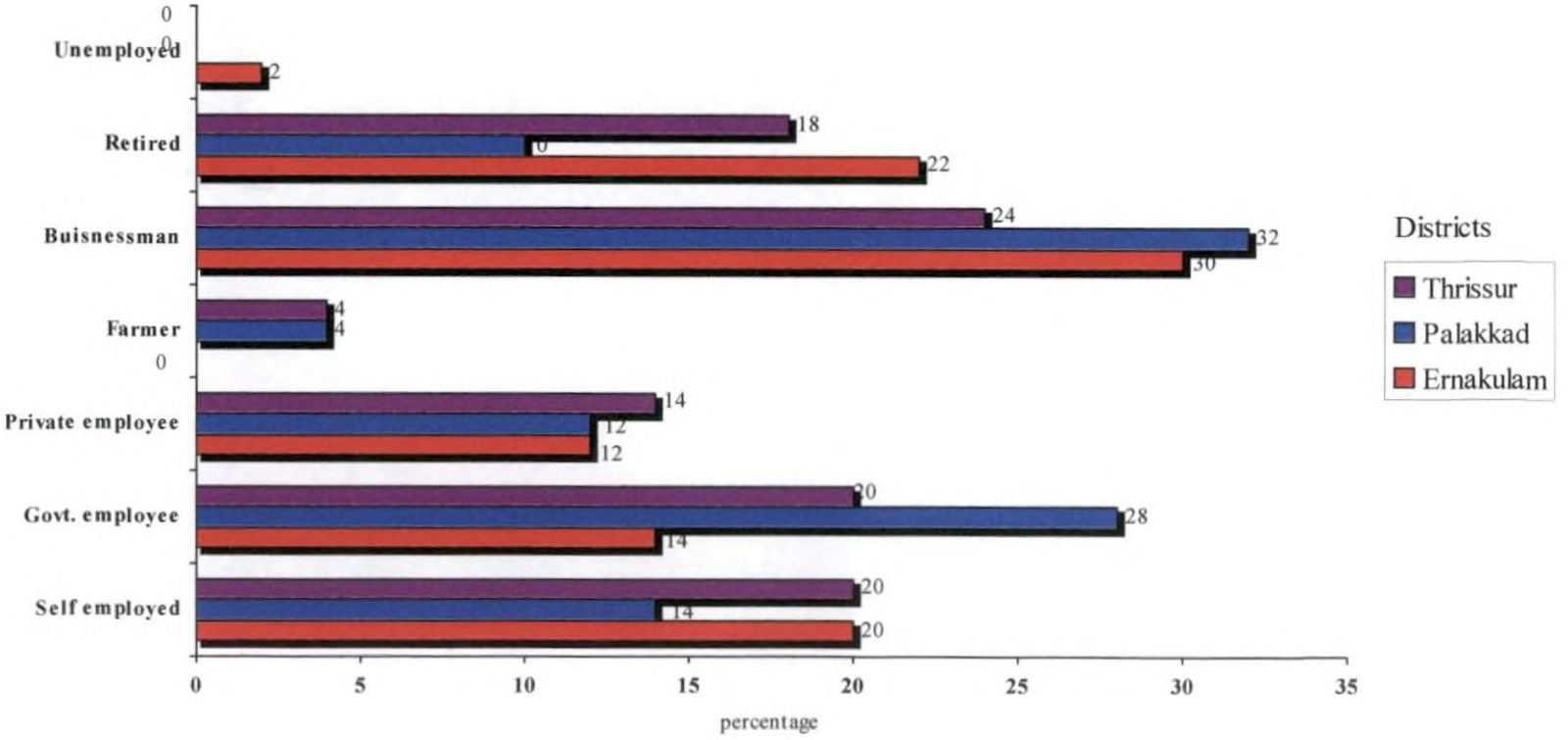


Figure 2. Occupation pattern of the dog owners in all the three disticts surveyed



The financial status of the dog owners was also surveyed. About 30 per cent of the dog owners in Ernakulam district, 20 per cent in Palakkad and 40 per cent in Thrissur district reported to have an annual income ranging between one and two lakh rupees.

The land holdings of the dog owners were highest (27.4 are) in Palakkad district followed by Thrissur district (21.2 are) and Ernakulam (9.9 are) district with an overall average of 19.4 are.

Only two per cent of the dog owners in Thrissur district had social participation whereas, it was eight per cent in Ernakulam and twelve per cent in Palakkad districts.

The dog owners of Ernakulam district had previous experience in dog keeping (14.6 years) when compared to dog owners of Palakkad (9.6 years) and Thrissur districts (9.5 years) with an average of 11.2 years. None of the dog owners in all the three districts had attended any training programme in dog keeping.

4.2 Details of dogs maintained as pets

The details pertaining to dogs surveyed are presented in the Table 1.

The number of dogs surveyed in Ernakulam, Palakkad and Thrissur districts were 76, 73 and 108 respectively. The average number of the dog per owner per household was 1.5 each in Ernakulam and Palakkad districts whereas; it was more (2.2) in Thrissur district with an overall average of 1.7. Large sized breeds were preferred more in all the three districts that accounted for 51.3, 65.8 and 57.4 per cent in Ernakulam, Palakkad and Thrissur districts respectively, followed by small sized breeds. The most preferred breed, among the large breeds was German Shepherd and Dachshund in the case of small sized breeds. Some popular breeds of dogs are presented in Plate 1.

Male dogs accounted for half of the dogs maintained in survey areas of Ernakulam district. Fifty three per cent of the dogs in Palakkad district were also males. Almost 55 per cent the dog owners in Thrissur district selected female dogs as pets.

Table 1. Details of pet dogs

Sl. No.	Variables		Districts			
			Ernakulam	Palakkad	Thrissur	Average
1.	Average number of dogs owned per household		1.5 ± 0.2	1.5 ± 0.1	2.2 ± 0.3	1.7
2.	Breeds owned	Large	51.3	65.8	57.4	58.2
	(%)	Medium	9.2	16.4	11.1	12.2
		Small	39.5	17.8	31.5	29.6
3.	Sex of the dog (%)	Male	50.0	53.4	45.4	49.6
		Female	50.0	46.6	54.6	50.4
4.	Average age of the dog	(in months)	28.1	32.3	30.0	30.1

Table 2. Selection of pup/dog

Sl. No.	Variables		Districts			
			Ernakulam	Palakkad	Thrissur	Average
1	Procurement of the pup/dog	Purchased	48.7	57.5	62.0	56.1
	(%)	Gift	51.3	42.5	38.0	43.9
2	Reason for keeping the dog	Pet	24.0	24.0	24.0	24.0
	(%)	Watch dog	54.0	58.0	56.0	56.0
		Both	22.0	18.0	20.0	20.0
3	Do you seek veterinarian's	Yes	5.4	11.9	7.5	8.3
	advice while selecting a pup (%)	No	94.6	88.1	92.5	91.7
4	Age at the time of purchase	< 2 months	32.4	57.1	59.7	49.7
	(%)	2-6 months	64.9	23.8	17.9	35.5
		> 6 months	2.7	19.1	22.4	14.8

Plate 1. Some popular breeds of dogs

Plate 2. Breeding management of dogs

The overall average age of the dog at the time of study was 30.1 months and more than three-fourth of the dogs studied were non-pedigreed in all the three districts.

About 22 per cent of the dogs owned were registered in kennel club of Thrissur district as compared to 12 per cent in Ernakulam and 10 per cent in Palakkad district.

4.3 Selection of the pup/dog

Existing selection criteria by pet dog owners are given in Table 2. About 62 per cent of the dogs owned in Thrissur district were purchased whereas it was only 57.5 and 48.7 per cent in Palakkad and Ernakulam districts respectively.

About 56 per cent of the dog owners kept their dogs for guarding purpose. Adult members of the family selected majority of the pup, which accounted for more than 80 per cent in all the three districts.

One-third of the dogs were purchased from outside the state in Palakkad district as against only 10.8 and 7.5 per cent in Ernakulam and Thrissur districts respectively.

Only about 12 per cent of the dog owners who purchased their dog in Palakkad district took a veterinarian's help while selecting their pup, whereas it was much lower in Thrissur (7.5 per cent) and Ernakulam (5.4 per cent) districts.

About 65 per cent of the dog owners in Ernakulam district purchased their dog at the age of two to six months whereas 57.1 and 59.7 per cent dog owners procured them at less than two months of age in Palakkad and Thrissur districts respectively.

Dog owners in Ernakulam district gave equal importance (43.5 per cent) to breed and appearance whereas dog owners in Palakkad district gave more importance (61.3 per cent) to appearance and three-fourth in Thrissur district gave more importance to breed while deciding the quality of the pup/dog. Active nature and general appearance were the two major signs of health checked by majority of the dog owners of all the three districts while selecting the pup.

4.4 Housing of dogs

Housing facilities provided for pet dogs in all the three districts surveyed are given in Table 3. Different types of kennel are presented in Plate 3.

Table 3. Housing of pet dogs

Sl. No.	Variables		Districts			
			Ernakulam	Palakkad	Thrissur	Average
1	Constructed a kennel?	Yes	80.0	86.0	72.0	79.3
	(%)	No	20.0	14.0	28.0	20.7
2	Time of construction	Before purchase	47.5	32.6	47.2	42.4
	(%)	After purchase	52.5	67.4	52.8	57.6
3	Consulted with	Veterinarian	2.5	2.4	2.8	2.5
		Books	5.0	2.4	2.8	3.4
	(%)	Friend/ neighbour	10.0	-	-	3.3
		Self	70.0	90.6	91.6	84.1
		Others	12.5	4.6	2.8	6.7
4	Do you clean the kennel regularly?	Yes	92.0	88.0	80.0	86.7
	(%)	No	8.0	12.0	20.0	13.3
5	If yes, how frequently?	Daily	67.4	68.1	67.5	67.7
	(%)	Weekly	17.4	20.4	20.0	19.3
		Thrice weekly	2.2	4.6	7.5	4.8
		Others	13.0	6.9	5.0	8.2
6	Have you employed labourer for	Yes	8.0	28.0	4.0	13.3
	cleaning the dog and kennel (%)	No	92.0	72.0	96.0	86.7
7	Whether existing housing facilities	Yes	92.0	88.0	94.0	91.3
	are adequate? (%)	No	8.0	12.0	6.0	8.7
8	Do you chain the dog?	Yes	46.0	32.0	24.0	34.0
	(%)	No	54.0	68.0	76.0	66.0
9	If yes, where?	Outside the house	78.3	87.5	91.7	87.3
	(%)	Inside the house	21.7	12.5	8.3	12.7

Plate 3. Types of kennel

In Palakkad district (86 per cent) kennels were exclusively designed and set up for their dogs. This was 80 and 72 per cent in Thrissur and Ernakulam districts respectively. More than half of the dog owners in all the three districts have constructed the kennel after procuring their dogs. Two per cent of the dog owners in Ernakulam district had constructed the kennel inside the house. Location of the kennel in Palakkad and Thrissur districts was outside the owner's house. Common sense and logic of the owners, supplemented to the constructional design of these kennels.

Concrete formed the stratum for floor. Concrete was preferred by 80 per cent of dog owners and 61.1 per cent owners in Ernakulam and Thrissur districts respectively. Dog owners of Palakkad district gave equal preference (41.9 per cent) to concrete and wood as strata.

Concrete walls with iron rails were common in Ernakulam district (72.5 per cent) and it accounted for only 46.5 and 47.2 per cent in Palakkad and Thrissur district respectively.

Concrete roofing for kennel was predominant (72.5 per cent) in Ernakulam district. About 35 per cent had concrete

roof in Palakkad district and 44.4 per cent in Thrissur district. Most of the kennels had raised platform. The approximate cost of construction of kennel was highest in Thrissur district followed by Palakkad and Ernakulam district.

Regular cleaning of the kennel was practiced by majority of the dog owners and had not employed any labourers to clean the dog and kennel, in all the three districts. Daily cleaning of the kennel was reported by two-third of the owners.

Ninety six per cent of the dog owners in Thrissur district reported that the existing housing facilities were adequate for the dog whereas it was 92 per cent in Ernakulam district and 88 per cent in Palakkad district. Tying of the dog was practiced by about 46 per cent of dog owners in Ernakulam district followed by Palakkad (32 per cent) and Thrissur district (24 per cent). Majority of them tied the dog outside the house in all the three districts.

4.5 Feeding of dogs

The feeding practices followed by dog owners are presented in Table 4.

Table 4. Feeding management of dogs

Sl. No.	Variables		Districts			
			Ernakulam	Palakkad	Thrissur	Average
1.	Average feeding frequency	< 2months of age	6.0	-	4.0	5.0
		2-3 months of age	3.0	3.5	4.3	3.6
	(times/day)	4-6 months of age	3.0	3.0	2.0	2.7
		7-12 months of age	2.7	3.5	2.2	2.8
		> 12 months of age	2.2	2.3	2.2	2.2
2.	Frequency of feeding (adult dogs)	One meal	20.3	19.7	30.0	23.4
		Two meals	45.3	39.4	41.1	41.9
	(%)	Three meals	31.3	39.4	28.9	33.2
		Four meals	3.1	1.5	-	1.5
3.	Advice on feeding	From a veterinarian	18.0	2.0	16.0	12.0
		From others	2.0	4.0	2.0	2.6
	(%)	From books	8.0	4.0	2.0	4.7
		Experienced neighbour	10.0	2.0	-	4.0
		Self	62.0	88.0	80.0	76.7
4.	Do you feed as per recommendations	Yes	24.0	12.0	10.0	15.3
	of veterinarian/package of practices (%)	No	76.0	88.0	90.0	84.7
5.	Type of food	Vegetarian	6.0	10.0	6.0	7.3
	(%)	Non-vegetarian	94.0	90.0	94.0	92.7
6.	Rice/cereals fed	< 1 month of age	4.0	-	-	1.4
	for the first time	1-2 months of age	14.0	25.0	19.0	19.3
		3-6 months of age	70.0	58.0	78.0	68.6
	(%)	> 6 months of age	12.0	17.0	3.0	10.7
7.	Meat fed for the first time	< 1 month of age	4.3	26.7	-	10.3
		1-2 months of age	14.9	55.5	10.6	27.0
	(%)	3-6 months of age	70.2	8.9	89.4	56.2
		> 6 months of age	10.6	8.9	-	6.5
8.	Non-vegetarian type	Meat only	40.4	73.3	63.8	59.1
		Meat or Fish	29.8	20.0	17.0	22.3
	(%)	Meat & Fish	23.4	4.5	14.9	14.3
		Only Fish	6.4	2.2	4.3	4.3
9.	Do you provide mineral and	Yes	26.0	24.0	42.0	30.7
	vitamin supplements? (%)	No	74.0	76.0	58.0	69.3

Two-third of the dogs in all the three districts were fed by the female members of the owner's family. Average frequency of feeding of adult dogs in all the three districts were found to be almost same, whereas there were variations in the frequency of feeding of dogs of other age groups.

Eighteen per cent of dog owners in Ernakulam district and 16 per cent in Thrissur district took advice from a veterinarian about feeding their dog. Among the owners who took advice regarding feeding, only 24 per cent in Ernakulam, 12 per cent in Palakkad and 10 per cent in Thrissur districts fed their dogs as per the recommendations of veterinarian/ package of practices.

More than 90 per cent of dog owners in all the three districts fed their dogs with non-vegetarian food that too homemade. Eighty per cent of owners in Thrissur district cooked food separately for their dogs when compared to 76 and 58 per cent in Palakkad and Ernakulam districts respectively.

Majority of the dog owners reported that milk and meat are essential for an adult dog that too daily. The dogs in all the three districts were fed with rice daily and more than

three-fourth of the dogs with meat and milk. Medium sized breeds received more food (1020.4 g) when compared to small (534.2 g) and large breeds (887.6 g).

Rice (68.7 per cent) and meat (56.2 per cent) formed the major component of dog's food for the first time between three and six months of age. A high proportion of dog owners provided only meat (59.1 per cent) to their dogs in all the three districts followed by meat or fish (22.3 per cent).

About one-fourth of the dog owners in Palakkad and Ernakulam districts provided mineral and vitamin supplements to their dogs whereas it was much higher (42 per cent) in Thrissur district. About 65 per cent of dog owners in Ernakulam district and 54 per cent in Thrissur district provided bones for their dog to chew whereas it was much lower (48 per cent) in Palakkad district. Majority of the dog owners in all the three districts provided *ad libitum* drinking water to their dogs.

A higher proportion (52 per cent) of dog owners in Ernakulam and Thrissur districts added salt to their dog's food whereas it was lower (42 per cent) in Palakkad district. More

than three-fourth of the owners added spices to the dog's food in all the three districts amongst which turmeric powder was the most common one.

4.6 Breeding of dogs

The breeding data collected in the survey are detailed in Table 5.

It was noted that about 45 per cent of the female dog owners used them for breeding purpose whereas it was only 34.2 and 32.4 per cent in Ernakulam and Palakkad districts respectively. Almost 60 per cent of the dogs showed signs of 'heat' for the first time between eight to 12 months in Thrissur district as compared to 47.1 per cent and 26.3 per cent in Ernakulam and Palakkad districts respectively.

Female dogs came to heat twice a year with prominent heat signs. Duration of vaginal bleeding noticed during the heat period was on an average 10.1 days in Ernakulam district and it was 9.0 and 9.6 days in Palakkad and Thrissur districts respectively with an overall average of 9.6 days.

Table 5. Breeding management of dog

Sl. No.	Variables		Districts			
			Ernakulam	Palakkad	Thrissur	Average
	Female:					
1.	Bred the female dog?	Yes	34.2	32.4	44.1	36.9
	(%)	No	65.8	67.6	55.9	63.1
2.	Age at first heat	6-8 months	2.6	2.9	6.8	4.1
		8-12 months	26.3	47.1	59.3	44.2
	(%)	> 12 months	21.1	8.8	8.5	12.8
		Not yet	13.2	8.8	8.5	10.2
		No idea	36.8	32.4	16.9	28.7
3.	Occurrence of heat	Once in 4 months	6.7	5.9	-	4.2
	(%)	Yearly	-	-	7.0	2.3
		Twice a year	80.0	94.1	93.0	89.0
		Irregular	13.3	-	-	4.5
4.	Duration of vaginal bleeding	(in days)	10.1 ± 0.7	9.0 ± 0.6	9.6 ± 0.2	9.6
5.	Number of mating (s) in an estrum	One	53.8	35.0	34.6	35.0
	(%)	Two	38.5	39.3	46.2	39.3
		No idea	7.7	25.7	19.2	25.7
6.	Interval between two mating(s)	One day	80.0	50.0	66.7	65.6
	(%)	Two days	20.0	50.0	25.0	31.7
		Three days	-	-	8.3	2.7
7.	Age at first mating	(in months)	17.9 ± 2.1	16.6 ± 1.8	17.2 ± 0.9	17.2
8.	Age of first whelping	(in months)	19.5 ± 3.2	31.4 ± 3.5	19.2 ± 0.9	23.4
9.	Number of whelping/s so far	Mean	1.1 ± 0.1	2.7 ± 0.6	1.7 ± 0.2	1.8
10.	Average interval between two whelpings	Mean	7.0 ± 2.0	6.7 ± 0.7	8.8 ± 1.0	7.5
11.	Charges paid per successful service	Free	90.9	33.3	38.5	54.2
	(%)	One pup or its cost	9.1	66.7	61.5	45.8
12.	Problems encountered during	Abortion	11.1	-	-	3.7
	breeding and whelping (%)	Irregular Heat	11.1	-	-	3.7
		Nil	77.8	100.0	100.0	92.6

Sl. No.	Variables		Districts			
			Ernakulam	Palakkad	Thrissur	Average
	Male:					
1.	Maintain breeding male?	Yes	34.4	35.1	26.5	32.0
	(%)	No	65.6	64.9	73.5	68.0
2.	Stud fee	Free	54.5	38.5	33.3	42.1
	(%)	One pup or its cost	27.2	38.5	44.5	36.7
		Male- female together	18.3	23.0	22.2	21.2
3.	Number of stud services so far	Mean	2.6 ± 0.6	2.5 ± 0.5	2.1 ± 0.6	2.4
4.	Age of first service of male	(in months)	37.1 ± 6.1	25.0 ±3.7	19.3 ± 3.1	27.1

Sl. No.	Variables		Districts			
			Ernakulam	Palakkad	Thrissur	Average
	Pup:					
1.	Number of pups born in last whelping	Mean	5.3 ± 0.6	4.7 ± 0.9	5.4 ± 0.5	5.1
2.	Mortality of pup(s) (%)	Yes	33.3	11.1	27.3	23.9
		No	66.7	88.9	72.7	76.1
3.	Average age at weaning	(in days)	57.8 ± 7.4	48.7 ± 3.1	49.3 ± 4.3	51.9

Sixty per cent of dog owners in Ernakulam and Thrissur districts bred their dog on 10^{th} and 12^{th} day after the onset of vaginal bleeding whereas 75 per cent of owners bred on eight and 10^{th} days after the onset of bleeding. About 53.8 per cent of dogs in Ernakulam district were used for mating only once as compared to 35 per cent and 34.6 per cent in Palakkad and Thrissur districts respectively.

All the non-stud owning, female dog owners got the stud animals for breeding from a local breeder or owner. The two major aspects considered while selecting a male dog for stud in Ernakulam district, were appearance and ownership (36.4 per cent each) when compared to ownership and veterinarian's help (33.3 per cent each) and ownership (50 per cent) in Palakkad and Thrissur districts respectively. Most of the female dogs in Palakkad (67 per cent) and Thrissur (61.5 per cent) districts paid one pup or its cost as stud fee per successful service to male owners whereas it was much lower (9.1 per cent) in Ernakulam district.

More than 90 per cent of female dog owners in all the three districts took their dog to male dogs for breeding. The average age at first mating of female dogs in Ernakulam,

Palakkad and Thrissur districts were 17.9, 16.6 and 17.2 months respectively with an overall average of 17.2 months. The overall age at first whelping was 23.4 months. The overall mean number of whelping till the time of survey was 1.8. Only one whelping was highest (77.8 per cent) in Ernakulam district. The average interval between two whelping was 7.5 months. Abortion and irregular heat (11.1 per cent) were the common problem encountered by the female dogs during breeding and whelping only in Ernakulam districts.

Nearly two-third of the male dog owners in Thrissur district used them for mating only once so far whereas it was 46.2 and 45.5 per cent in Palakkad and Ernakulam districts respectively. The average age at first service of male animals was 27.1 months. About 35 per cent of the dog owners maintained breeding males in both Ernakulam and Palakkad districts as compared to 26.5 per cent in Thrissur district. One pup or its cost was charged as stud fee per successful service by about 45 per cent of the stud owners in Thrissur district in comparison to 38.5 and 27.2 per cent in Palakkad and Ernakulam districts respectively. Plate 2 represents the breeding management of dogs.

The overall average litter size in last whelping was 5.3. Mortality of pups was highest (33.3 per cent) in Ernakulam district followed by 27.3 per cent in Thrissur and 11.1 per cent in Palakkad district. The death of the pup reported in Palakkad district was due to lack of milk secretion from dam whereas it was infectious cause in Thrissur district. Sales price of the male pup was highest in Ernakulam and Palakkad districts whereas it was the female dogs which were costlier than male pups in Thrissur district. The overall average age at weaning was 51.9 days.

None of the dog owners in all the three districts neutered their dogs except 2.6 per cent of owners in Ernakulam district who had spayed their dog. None of the dog owners in Ernakulam district reported incidence of pseudo-pregnancy in contrast to 2.9 per cent and 1.7 per cent dog owners in Palakkad and Thrissur districts. Modern techniques in dog breeding like artificial insemination was known to only six per cent of the dog owners in Thrissur district and four per cent each in Palakkad and Ernakulam districts

4.7 Health management

The health management practices followed by the dog owners of all the three districts are furnished in Table 6 and depicted in Figure 3.

All the dogs surveyed were apparently healthy and active without any deformities at the time of survey in all the three districts.

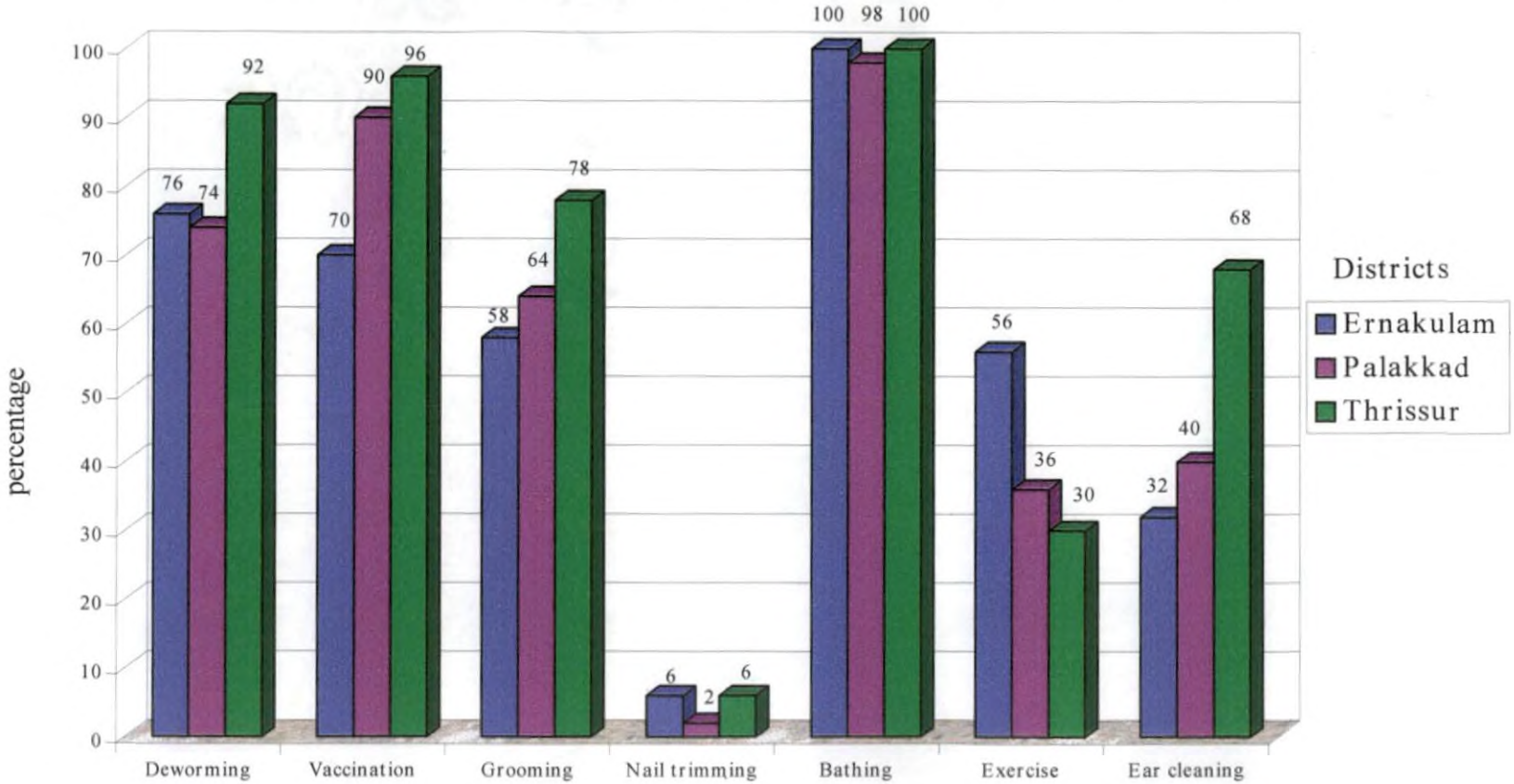
Ninety-two percent of the dogs in Thrissur district were de-wormed as compared to 76 and 74 per cent in Ernakulam and Palakkad districts respectively. One-third of dog owners in Ernakulam district and two-third of dog owners in both Palakkad and Thrissur districts are practicing monthly de-worming.

Ninety six per cent of dog owners in Thrissur district had vaccinated their dogs at least once whereas it was lower (90 per cent) in Palakkad and least (70 per cent) in Ernakulam district. Vaccination was not a regular practice in 51.4 per cent of dog owners in Ernakulam and 100 per cent in both Palakkad and Thrissur districts.

Table 6. Health management

Sl. No.	Variables			Districts			
				Ernakulam	Palakkad	Thrissur	Average
1	De-worming interval	(%)	Monthly	31.6	62.2	69.6	54.5
			Bimonthly	23.7	13.5	6.5	14.6
			Every 3 months	23.7	10.8	8.7	14.4
			Others	21.0	13.5	15.2	16.5
2	Diseases against which the dog had been vaccinated		Rabies	74.0	90.0	92.0	85.3
			Canine distemper	28.0	46.0	50.0	41.3
			Infectious hepatitis	30.0	46.0	50.0	41.3
		(%)	Leptospirosis	28.0	46.0	50.0	41.3
			Parvovirus	24.0	44.0	50.0	39.3
			Parainfluenza	-	8.0	10.0	6.0
3	Grooming frequency		Daily	37.9	28.1	35.9	34.0
			Weekly	37.9	34.4	30.8	34.4
		(%)	Fortnightly	10.3	6.3	7.7	8.1
			Others	13.9	31.2	25.6	23.5
4	Bathing frequency		Weekly	42.0	48.9	50.0	47.0
		(%)	Fortnightly	20.0	10.2	16.0	15.4
			Others	38.0	40.9	34.0	37.6
5	Frequency of ear cleaning		Daily	6.3	-	8.8	5.0
			Weekly	56.3	60.0	26.5	47.6
		(%)	Others	37.4	40.0	64.7	47.4
6	Do you take the dog to the veterinarian for health check up?	(%)	Yes	14.0	6.0	4.0	8.0
			No	86.0	94.0	96.0	92.0
7	Previous history of any disease		Yes	30.0	14.0	28.0	24.0
		(%)	No	70.0	86.0	72.0	76.0
8	If yes, specify		Skin infection	66.7	57.1	64.3	62.7
			Worm infestation	33.3	-	7.1	13.5
		(%)	Canine distemper	-	14.3	14.3	9.5
			Parvo infection	-	14.3	7.1	7.1
			Infectious Hepatitis	-	-	7.2	2.4
			Leptospirosis	-	14.3	-	4.8

Figure 3. Canine health management practiced by the dog owners



A high proportion (96 per cent) of dog owners in Thrissur district were aware of disease rabies followed by 94 per cent in Ernakulam and 78 per cent in Palakkad district. Distemper was the second most known diseases of dogs in all three districts. Rabies was the most common disease against which majority (85.3 per cent) of the dog owners in all the three districts had vaccinated their dogs followed by canine distemper, infectious canine hepatitis and leptospirosis (41.3 per cent each).

Fourteen per cent of the dog owners in both Ernakulam and Palakkad districts maintained de-worming and vaccination records whereas it was on 12 per cent in Thrissur district.

About two-third of the dog owners groomed their dogs. Once a week grooming was the most commonly reported frequency of grooming followed by daily grooming. Dog brush was the grooming instrument most commonly used by dog owners of all the three districts.

Nail trimming was performed by six per cent of dog owners in both Ernakulam and Thrissur districts whereas it was

much lower (two per cent) in Palakkad district. All the dog owners in Palakkad district practiced yearly nail trimming whereas two-third and one-third of the dog owners in Thrissur and Palakkad districts performed it once in six months.

Bathing was practiced by all the dog owners in all the three districts except two per cent of dog owners in Palakkad district. Weekly bathing using ordinary soap was reported by almost 50 per cent of the dog owners in all the three districts.

Exercise was given to about 56 per cent of the dogs in Ernakulam district as against 36 and 30 per cent in Palakkad and Thrissur districts respectively. More than 60 per cent of the dog owners in all the three districts gave exercise to their dogs by playing with them.

Pet dog's ear cleaning was done by 68 per cent of the dog owners in Thrissur district as compared to 32 and 40 per cent in Ernakulam and Palakkad districts respectively. Fifty six per cent and 60 per cent of dog owners in Ernakulam and Palakkad districts performed weekly ear cleaning respectively whereas dog owners of Thrissur district equally practiced weekly and monthly ear cleaning.

About eight per cent of the dog owners took their dog to a veterinarian for health check up of which majority in Ernakulam and Palakkad districts did it every six months whereas all the dog owners in Thrissur district did a monthly health check up for their dog. Annual veterinary expenditure was highest in Palakkad district followed by Thrissur and Ernakulam district.

Previous history of any disease was maximum in Ernakulam district (30 per cent) followed by Palakkad (14 per cent) and Thrissur districts (28 per cent). Skin infections were the most common disease reported by majority of the dog owners in all the three districts. Dog owners in all the three districts sought veterinary help during illness.

It was observed that brown colour and solid consistency were the predominant faecal colour and consistency. On microscopic examination of randomly collected rectal swabs, it was found that about 15 per cent of the dogs surveyed in Thrissur district were positive for *Toxocara* sp. whereas, almost all the rectal swabs collected from Ernakulam and Palakkad districts were negative for any parasitic ova.

On examination of dog's body coat, it was found that majority of dogs in all the three districts were free from ecto-parasitic infestation. Tick was the most predominant ecto-parasite among the infested dogs in Ernakulam (12 per cent) and Thrissur districts (eight per cent) whereas, lice and flea were equally prevalent (two per cent) in Palakkad district.

Only six percent of dogs were kept for show purposes in Thrissur district compared to four per cent in Palakkad district.

Eighty per cent of dogs were never left alone in the house while all the members of the family were away whereas it was much lower in Ernakulam district (58 per cent) and Palakkad district (34 per cent).

Cosmetic surgery was performed to a high proportion (26 per cent) of dogs in Thrissur district and it was much lower (16 per cent) in Ernakulam district and least (eight per cent) in Palakkad district. Docking was the common cosmetic surgery performed.

4.8 Training of dogs

Forty per cent of dogs in Palakkad district were exposed to house breaking as compared to 34 per cent and 26 per cent in Thrissur and Ernakulam districts respectively.

Professional trainer's help was sought in 25 per cent of dogs in Palakkad district and it was only 15.4 and 5.9 per cent in Ernakulam and Thrissur districts respectively.

The overall average training period duration was 75.8 days. Majority of the dogs in all the three districts responded to owner's verbal commands. All the dogs, which were trained in Thrissur and Palakkad districts and 96 per cent of dogs in Ernakulam district were trained by giving reward/ appraisal as compared.

When approached by a stranger, ninety eight per cent of the dogs in Thrissur district reacted by barking at the stranger, whereas, it was only 94 per cent and 88 per cent in Ernakulam and Palakkad districts. The dogs were friendly to all the family members in all the three districts except two per cent in Ernakulam district, which were non-cooperative. Majority of

the dogs in all the three districts responded quickly to their owner's verbal commands.

Majority of the dogs in all the three districts obeyed all the members of the family and most of the dogs had liking towards their master/owners. More than two-third of the dogs in all the three districts were aware of "COME" command followed by "SIT" and "GET IN" commands.

4.9 Constraints

About 62 per cent of the dog owners in Ernakulam district experienced constraints in dog keeping in comparison to 28 and 22 per cent in Palakkad and Thrissur districts respectively.

Difficulty in looking after the dogs while the family members are away controlling difficulties and hair shedding were the major constraints (12.9 per cent each) faced by Ernakulam dog owners.

In Palakkad district, the major constraint the dog owners are facing in dog keeping; was training difficulties

(21.4 per cent) followed by inadequate space, lack of man power, difficulty in looking after the dog while family members are away and restraining difficulties (14.3 per cent each).

Inadequate space was the major (45 per cent) constraint faced by dog owners of Thrissur district followed by training and breeding problem (18.9 per cent each).

4.10 Body and kennel measurements

The details pertaining to the body measurements of the dog *viz.*, weight, chest girth (just behind forelimbs), length of the dog (from withers to base of the tail) and height at withers are furnished in Table 7. The kennel measurements *viz.*, kennel height, length and breadth of the kennel are given in Table 8.

Table 7. Body measurements of the dogs

Sl. No.	Type of breed	Weight (in kg)	Body measurements of dog (in cm)		
			Chest girth	Length	Height at withers
1	Small sized breeds	12.7	55.0	44.9	36.8
2	Medium sized breeds	37.0	79.0	59.0	58.0
3	Large sized breeds	42.5	82.6	67.1	68.3

Table 8. Kennel measurements

Sl. No.	District	Breed Type	Height (in cm.)	Length (in cm.)	Breadth (in cm.)
1	Ernakulam	Small Breed	118.4	146.4	134.5
		Medium Breed	142.5	128.1	146.9
		Large Breed	128.8	178.5	142.4
2	Palakkad	Small Breed	124.8	142.3	134.5
		Medium Breed	126.0	156.5	134.2
		Large Breed	129.6	149.6	155.6
3	Thrissur	Small Breed	120.5	163.3	125.8
		Medium Breed	139.2	136.7	133.3
		Large Breed	141.3	149.4	149.1

4.12 Need index

The results of the need index are furnished in Table 9.

Table 9. Need Index

Sl. No.	Scores	Districts (in per cent)			
		Ernakulam	Palakkad	Thrissur	Overall
1	Low	14.5 (11)	12.3 (9)	1.9 (2)	9.6 (22)
2	Optimum	78.9 (60)	78.1 (57)	72.2 (78)	76.4 (195)
3	High	6.6 (5)	9.6 (7)	25.9 (40)	14.0 (40)

Low – Scores less than or equal to 10

Optimum – Scores 11 to 15

High – Scores more than 15

Number in parenthesis indicate the sample size

Discussion

5. DISCUSSION

5.1 Socio-economic profile of dog owners

The average age of the dog owner in the three districts surveyed, showed that there is not much difference between three districts. The overall average age of the owner was 47.2 years that is contrary to the reports of Griffiths and Brenner (1977) and Selby and Rhoades (1981) in US. The age of the dog owner reported by them were between 18 and 29 years.

In the present study 92 per cent of the dog owners were males as against females. Griffiths and Brenner (1977) reported that nearly two-third of the dog owners in US were females, which is in contrast to the present finding. The male dominated family structure existing in Kerala and the socio-cultural difference may be the reasons for such a result.

The average family size of the dog owners (4.5 persons per household) was almost similar in all the three districts. This is in agreement with the reports of Wise (1984), Nassar *et al.* (1984) and Wise and Kushman (1984) in US.

When the professions of the dog owners were explored, businessmen were found to be more involved in dog keeping than others. Griffiths and Brenner (1977) conducted a study in Illinois, which revealed that unemployed persons were more (33.5 per cent) involved in dog keeping. Differences in socio-economic status can be attributed to this difference (Government of Kerala, 1998).

The average land holding per owner was highest (27.4 are) in Palakkad district followed by Thrissur (21.2 are) and Ernakulam districts (9.9 are). The overall average land holding per owner was 19.4 are. This may be due to the fact that the former district is more agriculture oriented when compared to the later two districts (Government of Kerala, 1998).

Dog owners of Ernakulam district were more experienced in dog keeping than dog owners of Palakkad and Thrissur district. This may be due to the developed socio-economic status prevailing among the dog owners of Ernakulam district. Dog owners in the present study had not undergone any training programme in dog keeping. Factors like lack of time for such activities, non-availability of such facilities and lack of interest may be the reasons for this.

5.2 Details pertaining to pet dogs

The average number of dogs owned per household was highest in Thrissur district followed by Ernakulam and Palakkad districts with an overall average of 1.7 dogs per household. This is in agreement with the reports of Nassar and Mosier (1982), Wise (1984), Nassar *et al.* (1984) in US, Robertson *et al.* (1990) in Australia and Margawani and Robertson (1995) in Indonesia.

Large breeds were preferred to small and medium sized breeds in all the three districts. This is in close agreement with the report of Nassar *et al.* (1984). Larger area and land holdings and use of pet dogs as watchdogs may influence the selection of large breeds. German Shepherds were the most commonly opted breed among the large breeds whereas it was Dachshund in small breed category. Franti and Kraus (1974) and Slater *et al.* (1995) reported that, the most commonly kept breeds in US were Poodles and Labrador retrievers. Preference to breed may be influenced by the popularity of breeds in those places, utility and availability of the breeds.

Male dogs were preferred to female dogs, in Palakkad district whereas it was exactly the opposite in Thrissur district. Male and female dogs were equal in number in Ernakulam

district. In general, female dogs were slightly more preferred than the male dogs. This is akin to the reports of Nassar *et al.* (1984), Slater *et al.* (1995) and Patronek *et al.* (1997). Whereas, Franti and Kraus (1974) in US, Brooks (1990) in Zimbabwe and Margawani and Robertson (1995) in Indonesia, reported that male dogs were preferred to female dogs. Docile temperament and easy adaptability of female dogs may be the reasons for selecting the female dogs.

The overall average age of the dogs, 30.1 months at the time of study agree with that of Brooks (1990) and Margawani and Robertson (1995).

Less than one-fourth of the dog owners in all the three districts had pedigree dogs and only 15 per cent of the dogs had been registered in the nearby kennel club. This reveals that the dog owners took less interest in dog breeding or dog shows and may also be due to their inability to set apart lot of time for pet caring.

5.3 Selection of pup

Most of the pups in Palakkad and Thrissur districts were purchased whereas gift formed the major source of the pup

in Ernakulam district. This coincides with the report made by Griffiths and Brenner (1977). It could be assumed that in Ernakulam district, being an industrial centre of Kerala, people had chances of social contacts than Thrissur and Palakkad districts (Government of Kerala, 1998).

Owing to the report made by Brooks (1990) in Zimbabwe, majority of the respondents maintained dogs for guarding their premises. On the other hand, Blackshaw (1985) and Leslie *et al.* (1994) reported that companionship was the objective of pet dog selection in Australia and Canada respectively. This utility may also be linked with the large agricultural land holdings the dog owners have.

In Ernakulam district, about 65 per cent of the dogs were purchased when they were between two and six months of age. In general, nearly 50 per cent of the dog owners purchased their pup at less than two months of age. This finding is similar to the report of Nassar *et al.* (1984). Package of practices recommendations (1994) suggests eight weeks, as the optimum age to wean puppies. This age difference in surveyed stock may be due to the differences in weaning practices adopted by dog

owners, easy training and adaptability of the pups to a new environment by different breeds utilised here.

Alderton (1987) has reported that the two most important criteria to be considered while deciding the quality of the pup are breed and appearance. The present study also revealed a similar finding. Only active outlook and general appearance of the pup were the two common signs of health checked by most of the dog owners while selecting the pup. Package of practices recommendations (1994) has also suggested these qualities for selection.

5.4 Housing of dogs

Slater *et al.* (1992) and Patronek *et al.* (1997) had reported that in USA, majority of the dogs were kept in large open yards. In the present study, majority of the dogs (79.3 per cent) were housed in permanent buildings constructed exclusively for them. This difference may be due to social and cultural practices existing in India.

Concrete formed the stratum in majority of the kennels in Ernakulam and Thrissur districts. This finding is in

line with the report of Chakrabarti (1986). Equal preference was given to both concrete and wood as strata in Palakkad district, which is in accordance with the package of practices recommendations (1994). Concrete with iron rails were the most common type of wall found in the kennel, in all three districts surveyed. Package of practices recommendations (1994) suggested that walls made up of wood are best suited for hot and humid Kerala conditions. Majority of the dog owners in all the three districts preferred concrete roofing for their dog's kennel.

5.5 Feeding of dogs

The female members of the dog owner's family were bestowed with the duty of feeding their dogs in all the three districts. This may be due to the social factor that women look after the cooking related house chores in Kerala and majority of them are found unemployed, in the present study.

The average feeding frequency was five times a day for pups less than two months of age. Reports by Rainbird (1988), Package of practices recommendations (1994) and Krishnamurthy (2000) also suggested the same. The average feeding frequency of dogs between two and three months of age

was 3.6 times a day, which is in accordance with the report of Rainbird (1988).

Majority of the adult dogs were fed two meals a day. This is akin to the reports of Chakrabarti (1986), Earle (1990), Slater *et al.* (1992), Case *et al.* (1995), package of practices recommendations (1994), Slater *et al.* (1995) and Krishnamurthy (2000). Majority of dog owners studied, strictly followed the feeding schedule they opted for. Case *et al.* (1995) had also reported similar habitual feeding plans for dogs.

Earle (1990) and Beaeley (1996) reported that the dogs should be fed with non-vegetarian food. Similar findings were reported in the present study also.

Earle (1990) suggested that specially formulated homemade food should be fed to the dogs. This coincides with the results of the present study. The major reason reported by the dog owners is the different type of food they prepare for the dog which according to them does not require that much of care as that of human food preparation.

Majority of the dog owners in all the three districts surveyed reported that, it is essential to provide milk and meat to

an adult dog daily. This coincides with the reports made by Chakrabarti (1986) and package of practices recommendations (1994).

It was found that rice, milk and meat formed the major constituents of the dog's food, which coincides with the reports for Indian conditions (Chakrabarti, 1986 and package of practices recommendations, 1994). In the present survey, medium sized breeds received more quantity of food when compared to small and large breeds.

Fully cooked milk, meat, egg, rice and vegetables were mostly fed to the dogs. Many similar reports are there (Bunting, 1980; Chakrabarti, 1986; Alderton, 1987; Case *et al.*, 1995; Warren, 1995; Beaeley, 1996 and Robertson, 1996).

Rice and meat formed the major components of the dog's food when they are between three and six months of age, which coincides with that of Chakrabarti (1986). Contrary to this finding, Baines (1981), Warren (1995) and Hoskins (1999) reported that the puppies should be encouraged to take solid food for the first time by three to four weeks of age.

The reports by Slater *et al.* (1992), Simpson *et al.* (1993), package of practices recommendations (1994) and Beaeley (1996) states that dogs were fed with food supplements, which mainly included minerals and vitamin products. This is true in the present observation also.

Dogs were provided with bones to chew by majority of the dog owners. This is akin to the reports by Fox (1964), Slater *et al.* (1992, 1995) and Robertson (1996). Bones for chewing cleans the teeth and prevents accumulation of tartar in dogs (Chakrabarti, 1986).

Chakrabarti (1986) and Case *et al.* (1995) reported that the dogs should be provided with *ad libitum* clean drinking water. The present study also revealed similar finding.

Nearly 50 per cent of the dog owners added salt to their dog's food to improve palatability of the diet. This is in accordance with the report by Fox (1964).

Addition of spices to their dog's diet was practiced in all the three districts, the most common spice used being *turmeric* powder *(Curcuma longa)*. General food habits of the state and a

concept prevailing among the dog owners that *turmeric* powder is having medicinal properties may be attributed to this (Chopra *et al.*, 1958).

5.6 Breeding of dogs

The dog's age at puberty, between eight and 12 months reported in the present survey coincides with the reports by Bunting (1980), Alderton (1987), and package of practices recommendations (1994).

Bunting(1980), package of practices recommendations (1994) and Sindhwani (1997) stated that the heat signs reoccur usually after every six months in dogs. This holds true in the present study also.

Dogs were left for mating twice during an estrum. Most of the dogs were bred one day apart and the most commonly reported time of mating was on 10^{th} and 12^{th} days after the onset of vaginal bleeding. Reports by Alderton (1987) and package of practices recommendations (1994) also agree with this.

The average number of whelping was 2.7 in Palakkad district whereas it was only 1.1 in Ernakulam and 1.7 in Thrissur

districts respectively with an overall average of 1.8 whelpings. This is in agreement with the report of Brooks (1990).

Griffiths and Brenner (1977) reported that the average litter size was 4.7 pups per litter in US. Similar results were obtained in the present study also.

Mortality of pups was highest in Ernakulam district followed by Thrissur and Palakkad districts. The most common reasons reported were lack of milk secretion from the dam and infectious diseases. Scientific preventive measures and scientific caring of pups, if taken up may reduce mortality in these places.

The overall average age at weaning was 51.9 days. This finding is in close agreement with the report of Hoskins (1999) who opined that the optimum age for weaning was seven to eight weeks. On the other hand, Ingmand (1971), Bunting (1980), Alderton (1987) and Warren (1995) reported that the exact time of weaning was between three and five weeks of age. This weaning age difference may be due to the breed differences in the above reports.

Majority of the dogs in all the three districts were sexually intact at the time of study. Similar findings are there in studies of Paxton (1994), Nassar *et al.* (1984), Robertson *et al.* (1990), Leslie *et al.* (1994), Margawani and Robertson (1995) and Patronek *et al.* (1997). Only four per cent each in Palakkad and Ernakulam districts and six per cent in Thrissur district knew about artificial insemination and other modern techniques in dog breeding.

5.7 Health Management

Fox (1964), Ingmand (1971) and Robertson *et al.* (1991) conducted studies on the health management practices adopted by the dog owners and reported that de-worming were followed by nearly 83 per cent of the dog owners. Present study also revealed similar results. Most of the dogs were de-wormed once in a month.

About 80 per cent of the dogs were vaccinated at least once, which coincides with the report of Robertson *et al.* (1991) who opined that around 91 per cent of the dogs in US were vaccinated. Nearly 43 per cent of the dogs were revaccinated every year in Ernakulam district whereas all the dogs in Thrissur

and Palakkad districts were not regularly revaccinated with a booster. This result is in line with the report by Fox (1964). This may be due to high cost of the vaccines and the misconception among the dog owners that it in not necessary to vaccinate dogs housed indoors. The disease against which majority of the dogs were vaccinated was Rabies. This is akin to the report by Brooks (1990). Lack of knowledge about other important diseases affecting dogs may be a reason for this.

On an average, 13.3 per cent of the dog owners maintained complete de-worming and vaccination records for their dogs. This may be due to lack of awareness regarding scientific management among dog owners.

A high proportion of the dog owners in Thrissur district groomed their dog compared to dog owners of Ernakulam and Palakkad district. The propensity to keep longhaired breeds may be a reason for this difference. Daily and weekly grooming was done. This finding is not in tune with the reports of Bunting (1980) and Warren (1995) who suggested that the dogs should be groomed daily.

Nail trimming was practiced by less than five per cent of the dog owners. The hard floor of the kennel helps in regular

wear of the nails when the foot comes in contact with the hard, rough surface of the floor and the outdoor exercise, the dog owners give may supplement to wear of nails.

Weekly bathing was reported by most of the dog owners. Contrary to this finding, Bunting (1980), Alderton (1987) and Warren (1995) suggested that the dogs should be bathed once in two or three months or whenever required. This may be due to the lack of scientific knowledge among dog owners here and also the climatic difference existing in those places.

Exercising their dogs was practiced by most of the dog owners especially in Ernakulam district. This can be attributed to lack of sufficient space for the dog to move around. About two-third of the dog owners exercised their dogs by playing with the dog. This is similar to the report of Slater *et al.* (1995) who opined that 62 per cent of the dogs were exercised by the owner playing with them.

Regular cleaning of the dog's ear was practiced by majority of the dog owners in all the three districts. This is in accordance with the recommendations of package of practices (1994).

The dogs surveyed were healthy and active without any deformities. Majority of the dog owners were aware of the disease rabies followed by canine distemper. Previous history of any disease was reported by one-fourth of the dog owners. The above observation is in contrast to the report of Chamala and Crouch (1981) who opined that only 22.6 per cent of the dogs in US were apparently healthy. Skin ailments were the predominant ill health in the present observation. This is akin to the report of Fox (1964). The harsh environmental conditions such as high temperature and humidity prevailing in the study area may be a precursor to skin ailments.

Microscopic examination of rectal swabs revealed ova of *Toxocara* sp. Only about five per cent of the samples were positive for ova of intestinal parasites. In contrast, Anvik *et al.* (1974) reported that 9.3 per cent of the dogs were positive for *Toxocara leonina* and 1.92 per cent for *Toxocara canis* whereas, 31.8 per cent of the samples collected and examined yielded ova of some kind. Soulsby (1974) reported that prevalence of *Toxocara canis* in dogs varied from 12 to 83 per cent (mean 20 per cent) on a global basis. Direct infection may occur by the ingestion of eggs in the soil, or indirectly, by eating paratenic hosts bearing second stage larvae.

Dog's body coat examination revealed that 9.3 per cent of the dogs had ecto-parasites, among which, ticks (6.7 per cent) was predominant. Good housing and health management existing here may be a reason for this.

When the dog became sick; respondents of Thrissur district consulted a veterinarian whereas it was much lower in Palakkad and Ernakulam district. This coincides with the report by Franti and Kraus (1974), Wise (1984) and Leslie *et al.* (1994). Easy availability of veterinary facilities in primary locations may be a reason for this.

Only 3.3 per cent of the dogs were kept for show purposes. High cost of the show pups and maintenance involved and less popularity of dog shows in these places could be the major reason for this low participation.

Cosmetic surgery was performed in 26 per cent of the dogs in Thrissur district whereas it was only 16 per cent and eight per cent in Ernakulam district and Palakkad districts respectively. Easy accessibility of surgical facilities, breed variations and easily availability of veterinary facilities at

primary locations in the former district may be the reasons for this difference.

5.8 Training

About 40 per cent of the dogs in Palakkad district were given housebreaking whereas; it was much less in Ernakulam and Thrissur districts. Professional trainer's help was sought by one-fourth of the dog owners in Palakkad district. Easy availability of professional trainers in and around the district and awareness created in the area may be the reason for this.

The average duration of training was 75.8 days. This finding is in close agreement with the report by Hunthausen (1997) who opined that the training classes should be started by eight to 12 weeks of age.

Majority of the dogs in all the three districts were trained by giving reward or verbal praise. This is in agreement with the report of Alderton (1987), Beri (1997) and Seksel (1997). Training may be made easier, faster and best accomplished by giving reward or verbal praise in all animals.

Majority of the dogs reacted to strangers by barking at them when approached, but were friendly to the family members and responded quickly to owner's verbal commands. "COME" and "SIT" were the two commands, majority of the dogs in all the three districts were aware of. Use of verbal commands are stressed in the observations by Alderton (1987) and Beri (1997).

5.9 Constraints

The dog owners in Ernakulam district experienced difficulties in controlling the dog, alopecia, and difficulty in looking after the dog while all the members of the house are away.

Training difficulties, inadequate space, lack of man power, difficulty in looking after the dog while all the members of the house were away and restraining difficulties were the major constraints faced by dog owners of Palakkad district.

Lack of sufficient space was the major constraint experienced by dog owners of Thrissur district followed by training difficulties and problems in getting breeding males. All these differences in constraints may be due to the different socio-

cultural differences between the surveyed districts (Government of Kerala, 1998).

Similar constraints were reported by Selby *et al.* (1980) Selby and Rhoades (1981) and Leslie *et al.* (1994) in US.

5.10 Body measurements and kennel dimensions

When compared to the package of practices recommendation (1994), respondents having small breeds in Ernakulam and Thrissur districts provided adequate kennel length whereas in the case of the large breeds, only Ernakulam dog owners provided sufficient kennel length to their dogs.

In all the three districts surveyed, adequate kennel height was not provided by the dog owners of all the three categories. This is not in agreement with the recommendations in the package of practices recommendations (1994).

5.11 Need Index

Need index reports are meagre in India for dogs. Similar index was developed for pigs in Austria by Bartussek (1999).

Summary

6. SUMMARY

A study on the existing management practices followed by the dog owners was taken up in three districts of Central Kerala, *viz.,* Ernakulam, Palakkad and Thrissur. Data were collected from dog owners in their own premises by personnel interview using a pre-tested questionnaire.

The average age of the dog owner was 47.2 years. Male members of the household were reported to be the owners of the dog in majority of the households and on an average, a family constituted 4.5 members. Majority of the dog owners earned between one lakh and two lakh rupees per annum. Average land holdings available with the owner was 19.4 are. Their experience in dog keeping was 11.2 years on an average. Dog owners had not undergone any training program on dog keeping in the past.

The average number of dogs owned per household was 1.7. More preference was given to large breeds when compared to small and medium sized breeds. German shepherd was preferred more among the larger breeds and it was Dachshund in the case of smaller breeds. Female dogs were slightly more in number

than male dogs. The average age of the dog was 30.1 months. Only about 20.4 per cent of the dogs were pedigreed. Nearly 15 per cent of the dogs were registered in the nearby kennel club.

Pups were mostly purchased. Adult members of the family were involved in selecting a pup. Majority of the respondents reported that the major reason for keeping the dog was for security reasons. A veterinarian's help was sought by only 8.3 per cent of the dog owners while selecting the pup. Nearly 50 per cent of the respondents preferred pups less than two months of age. More emphasis was given to breed and appearance while deciding the quality of the pup. The pup's activity and general appearance were the two most important signs of health looked into while selecting the pup.

Most of the dogs were housed in permanent buildings specially built for them of which majority of the kennels were located outside the house and constructed after the purchase of the pup. Only seven per cent of the dog owners consulted the veterinarian and relevant books, before designing and constructing the kennel. Cement concrete was the favoured flooring. The predominant wall type was concrete with iron rails. Cement concrete roofing was preferred over asbestos and

galvanized iron sheet. Most of the dogs were housed in the kennel with raised platform. Cleaning the kennel was a mandatory practice followed by majority of the dog owners. Only 13 per cent of the dog owners had employed labourers to take care of the dog. About one-third of the dog owners chained their dogs. Majority of the respondents felt that they are fully satisfied with the existing housing facilities they have provided for their dog. Only in Ernakulam district dog owners of small and large breeds provided a standard kennel length.

Female members of the household were mostly involved in feeding the dog. Two meals a day feeding was practised by most of the dog owners. Only 12 per cent of the respondents got advice from a veterinarian regarding the feeding practices to be followed for their dogs. The dogs were mostly fed with homemade non-vegetarian diet. About 70 per cent of the dogs were fed with specially cooked food. The preferred age at which rice and meat were fed for the first time was between three and six months. The dogs were fed mostly with meat only. Yet others were given meat or fish. Well-cooked rice, meat, milk, eggs and vegetables were fed to the dogs. Only about one-third of the respondents fed their pets with vitamins and mineral supplements. Slightly more than half of the respondents offered

their dogs, bones for chewing. Nearly 50 per cent of the respondents added common salt to the diet of their dogs. In majority of the cases, pet food had one or more spices added in it. Majority of the dog owners opined that it is essential to feed milk and meat daily to an adult dog.

About one-third of the male and female dogs were bred at least once in their lifetime. The dog's age at puberty reported by majority of the respondents, was between eight and 12 months. The most commonly reported occurrence of heat was twice a year. The average duration of vaginal bleeding was 9.6 days. Most of the dog owners opted for two matings in an estrum for their dog with a day apart between matings. Tenth and 12^{th} day mating after the onset of estrum was practiced by most of the dog owners. All the female dog owners who are not maintaining breeding males got the stud animal's service from a local breeder or stud owner. Slightly less than half of the dog owners gave one pup or its cost as the stud fee. Ownership was the most important criteria considered by dog owners while selecting a male dog for stud service for their female dog. Average age of the female dogs at the time of first mating was 17.2 months and first whelping was 23.4 months. The average number of whelpings so far was 1.8 and average interval between two whelpings, was 7.5

months. The average age at first service of the male dog was 27.1 months. The average number of instances a male dog was used for service was 2.4 times. Only about one-third of the stud owners charged one pup or its cost as stud fee. The average litter size in last whelping was 5.1 and the average age at weaning was 51.9 days. Only about 24 per cent pup mortality was noted. The sale price of male pup was slightly higher than the female pup. Majority of the dogs in all the three districts were sexually intact. Incidence of pseudo-pregnancy was reported by only about 1.5 per cent of the dog owners. Only about five per cent of the dog owners were aware of modern techniques in dog breeding like artificial insemination.

The health management practices such as de-worming, vaccination, ear cleaning, bathing and exercise were practiced by majority whereas, nail trimming was practiced by only five per cent of the respondents. Weekly bathing, and monthly de-worming was done by them. Booster vaccination was not a regular practice. Rabies was the disease against which majority of the dogs were immunized and naturally rabies was the disease that most of the dog owners were aware of.

Pet dogs got exercise by playing. Only eight per cent of the dogs were taken to a veterinarian for regular health check

up. One-fourth of the respondents reported that their dog had suffered from any disease previously. Skin ailment was common. Cosmetic surgery was performed on 17 per cent of the dogs surveyed of which docking was the most commonly adopted cosmetic surgery. A high proportion of the dog owners reported that they never left their dogs alone in the house.

Only one-third of the dogs studied were given basic training and a professional trainer's service was sought only by 16 per cent. The average duration of training was 75.8 days. Reward or tit bits were given during training by majority of the dog owners. Nearly one half of the dogs obeyed, all the members of the family whereas most of the dogs showed more liking towards their owner/master. 'COME', 'SIT' and 'GET IN' were the commands most commonly used.

The most common constraint reported was inadequate space. The other constraints were difficulties in training and alopecia in hairy breeds. From the results of need index it is clearly evident that majority of dog owners in all the three districts had fulfilled most of their dog's need.

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ANALYSIS OF MANAGEMENT SYSTEMS OF PURE-BRED AND CROSS-BRED DOGS IN CENTRAL KERALA

By

P. VIJAYA KUMAR

ABSTRACT OF A THESIS

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KERALA

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ABSTRACT

Canine management practices existing in Central Kerala were investigated. Mostly the owners of the dogs were male members of the family. Businessmen were more interested in dog keeping. Average number of dogs owned per household was 1.7. Large breeds were preferred to small and medium sized breeds and among large breeds German Shepherds. Female dogs were slightly more in number than male dogs in the surveyed area.

The dogs were mostly kept for watching or guarding purpose than companionship. Dogs were purchased at less than two months of age. The quality of the pup was mostly decided based on the breed and appearance. Active nature and general appearance formed the basis for puppy selection.

A high proportion of the dog owners kept their dogs in a kennel, which was located outside the house and constructed after the arrival of the pup. Only few respondents constructed the kennel after consulting a veterinarian or scientific books. Most of the kennels were of cement concrete floor, concrete with

iron rails wall, concrete roof and had raised platform. Daily cleaning of the kennel was also practiced.

The dogs were mostly fed with two meals a day, with specially cooked, homemade, non-vegetarian diet. Mostly rice and meat were fed for the first time between three and six months of age. Fully cooked milk, meat, fish, egg, rice and vegetables were fed to the dogs. Most of the dogs were fed with meat. Only one-third of the dogs were fed with supplements. About 55 per cent of the dog owners provided their dogs with bones, for chewing.

About one-third of the male and female dogs were used for breeding. The dog's age at puberty reported by most of the dog owners was between eight and 12 months of age. The signs of heat occurred every six months. Dogs were mated twice in an estrum with 24 hours interval. One pup or its cost was charged as stud fee by one-third of the dog owners. Ownership was the most important criterion considered while selecting a stud male for female dogs. Majority of the dogs were sexually intact.

Except nail trimming, the other health management practices such as de-worming, vaccination, grooming, bathing,

exercise and ear cleaning were practiced by majority of the dog owners. Weekly grooming, bathing and ear cleaning were practiced by majority of the dog owners. Slightly more than one half of the dogs were de-wormed monthly. The dogs were mostly immunized against rabies and majority of the dogs were not regularly immunized with the booster vaccine. About two-third of the dog owners exercised their dogs by playing with them. Only eight per cent of the dogs were taken to a veterinarian for a regular health check-up. Previous history of any disease was reported by one-fourth of the dog owners. Majority of dog owners never left their dog alone in the house when all the members were away.

Only one-third of the dog owners gave basic training to their dogs. Reward was given to the dogs, which responded to their commands while training. 'COME' and 'SIT' were the two most common commands which majority of the dogs were aware of. Inadequate space was the predominant constraint faced by dog owners followed by difficulties in training and shedding hairs. Majority of the dog owners surveyed cared to provide the optimum needs of their dogs.

Annexure

ANNEXURE - I

QUESTIONNAIRE

Respondent No.:
Date :

PART-I

1. Name of the owner / Household member responsible for the dog:
2. Address :

   Phone No. (if any) : e-mail address:
   District :
   Taluk :
   Veterinary Hospital :
3. Age :
4. Gender :
5. Educational Status : No formal education/primary/middle/high/higher-Secondary/diploma/undergraduate/postgraduate/others
6. Family size :

Age groups (in years)	No. of males	No. of females
Above 50		
25-50		
15-25		
Less than 15		

7. Occupation : Self-employed/government employee/ private-employee/farmer/businessman/retired/unemployed
8. Annual income (in Rs.) : <50,000/ 50,000-1,00,000/1,00,000-2,00,000/>2,00,000
9. Area available with the owner :
10. Number of dogs owned :

Breed(s)	Sex		Age	Status
	M	F	(in months)	(Pedigree/Non-pedigree)

11. Whether the dog(s) is/are registered with Kennel Club? YES/NO
12. Social participation:
    Are you a member / office bearer of any organization? YES/NO
    (If yes, details)
    Do you attend the meeting of these organizations? Always/ Sometimes/ Never
13. Experience in dog keeping (in years):
14. Whether you have undergone any training programme on dog keeping? YES/NO
    If yes, specify the nature and duration

PART-II

A. SELECTION:

1. Selection of pup is by:

	Always	Often	Sometimes
Children			
Adults			
Joint			
Others (specify)			

2. Whether you seek advice from a veterinarian while selecting a pup? YES/NO
3. Where from did you purchase the pups? From local breeder / outside the state/ others
4. What was the age of pup/s at the time of purchase? <2 months/2-6 months/>6 months
5. What are the criteria on which you decide the quality of the pup/s and reason there of?

Criterion/ Criteria	Reason(s)
Breed	-
Sex	-
Colour	-
Pedigree	-
Body weight	-
Appearance	-
Source	-
Health condition	-
Others (specify)	-

6. While selecting a pup, whether you have looked into the following?

Eyes	-
Nose	-
Ears	-
Coat	-
Bones & Joints	-
Weight	-
Look	-
Activeness	-
Behaviour	-

7. Procurement of the pup : Purchased / Gift / Adopted / Others (specify)

B. HOUSING:

1. Whether you have constructed a kennel for your dog? YES/NO

If no, reason(s) for not constructing a kennel?

If yes,

a. When did you have constructed the kennel? Before purchase / After purchase

b. Location of the kennel:

c. Whom did you consult before constructing the kennel?

Veterinarian / From books / Neighbour / Kennel club/ Others (specify)

d. Construction details:

(a) Floor - Mosaic/Tiles/Cement concrete/Wood/Mud floor /Others
(b) Wall - Concrete/Iron rails/Wire mesh/Wood/Others
(c) Roof - Concrete/Asbestos/Tiles/Plastic sheet/Others
(d) Platform - Raised / Ground level

e. Where does the dog feel comfortable? a)Inside the Kennel b)Outside the kennel

f. Cost of construction of kennel (in Rs.):

C. FEEDING:

1. Who used to feed the dog(s) daily?

	Always	Often	Sometimes
Children			
Adults male member			
Adult female member			
Servant			

2. Frequency of feeding:

Age Group	Frequency/day
< 2 months	
2-4 months	
4-6 months	
6-12 months	
> 1 year	

3. When do you feed the dog? Morning / Noon / Evening / Night
4. Whether you follow the feeding schedule strictly? YES/NO
5. Whether you follow any special feeding for growing / pregnant / lactating dogs?
6. From whom do you get advice about feeding?
   Veterinarian/ Local breeder/ Kennel club/ Books/ Neighbour/ Others
7. Are you feeding as per the recommendations of veterinarian / standard books? YES/NO
   If yes, details:
8. Type of food given to the dog - Vegetarian / Non-vegetarian
9. What kind of food do you provide to the dog? Home-made food/Canned food/ Others
10. Whether you specially cook for the dog? YES/NO
    If yes, why?
11. Ingredients of the diet:

Ingredients	Quantity	Frequency (daily/weekly)
Milk		
Meat		
Egg		
Fish		
Bread / Biscuit		
Rice/cereals		
Vegetables		

Others (specify)

12. At what age you start giving rice/cereals? < 1 month/1-2 months/2-6months/>6months
13. At what age did you start feeding meat? < 1 month/1-2 months/2-6 months/>6months
14. Is milk essential for an adult dog? YES/NO
15. How do you serve milk to the dog? (a) Fully boiled (b) Half boiled (c) Raw milk
16. Is meat essential for an adult dog? YES/NO
17. Is it essential to give meat daily? YES/NO
18. How do you serve meat to the dog? (a) Fully cooked (b) Half cooked (c) Uncooked
19. What kind of meat do you provide to the dog? Chicken/Mutton/Beef/Pork/offal
20. How do you serve egg to the dog? (a) Boiled (b) Half boiled (c) Raw egg
21. Whether you are providing the dog with mineral and vitamin supplements? YES/NO
    If yes, details:
22. How do you serve vegetables? Uncooked/Half cooked/Fully cooked/No vegetables
23. Whether you provide bones for the dog to chew? YES/NO
24. How often do you provide water and specify the quantity per day?
25. Whether you add salt to the food? YES/NO
    If yes, indicate the amount
26. Whether you add spices to the food? YES/NO
    If yes, details:

D. BREEDING :

1. Whether the dog is used for breeding? YES/NO
2. Age at which first heat was noticed?
   < 6 months/6-8 months/8-12 months/>12 months/Not yet
3. Occurrence of heat - Once in 2 years/Once in a year/ Twice in a year/Irregular/Never
4. Length of oestrum (in days):
5. Duration of vaginal bleeding (in days):
6. When do you breed the dog after the onset of bleeding?
7. Number of mating in an oestrum:
8. Interval between two mating in same season:
9. Breeding season: January-March/ April-June/July-September/October-December
10. Do you maintain breeding male/s? YES/NO
    If yes, how much do you charge for each successful service?
    (In rupees or as number of pups)
11. Do you follow any special management practices for better breeding performance?
    If yes, specify- YES/NO
12. If you are not maintaining a male breeding dog, where do you get male animals for breeding? Local breeder/Local kennel/Others (specify)

13. Charge per successful service -
(In rupees or as number of pups)
14. Number of instances the male animal was used for mating -
15. Age of first service of male -
16. Which of the following aspects do you consider while selecting a male dog for breeding your female dog? By appearance/ ownership/ pedigree/ based on previous performance/ Cost per service/With the help of a veterinarian/Others (specify)
17. Do you take the female dog to the male dog's house for breeding? YES/NO
If no, why?
18. Age of first mating of the female -
19. Age of first whelping -
20. Number of whelping/s so far -
21. Average interval between two whelpings -
22. Number of pups born in the last whelping -
23. Mortality of pup(s) - YES/NO
If yes, reason?
24. Age at weaning of pups -
25. Sales price per pup - Male: Female:
26. What are the modern techniques you are aware of in dog breeding?
None/ Artificial Insemination/ ETT/ Cryopreservation of semen/ others (specify)
27. What are the management procedures to be adopted during pregnancy?
28. Problems encountered during breeding and whelping -
29. Whether you have castrated your male dog? YES/NO
If yes, Why?
30. Whether you have spayed your bitch? YES/NO
If yes, why?
31. Any incidence of pseudo-pregnancy observed till today?

E. HEALTH CARE:

1. Which of the following management practices you adopt and give reasons for non-adoption?

Management	adopt	not adopted	reason for non-adoption
De-worming			
Vaccination			
Grooming			
Nail-trimming			
Bathing			
Exercise			
Ear cleaning			
Others (specify)			

2. Details of de-worming?

Drug, Dose, age and frequency:

3. Details of vaccination?
   Diseases, Vaccine, dose route, booster.
4. Details of grooming:
5. Details of bathing:
   At what interval, whether you use any soap or shampoo
6. Details of nail clipping:
   Indicate the intervals:
7. Details of ear cleaning:
8. Details of exercise
   By playing with the dog/ by taking the dog for a walk/ others (specify)
9. What are the diseases you are aware of which affects the dogs?
10. Do you take the dog to the veterinarian for health check up? YES/NO
    If yes, how often?
11. Previous history of any disease which affected your dog? YES/NO
    If yes (specify)
12. What do you do when the dog becomes sick?
    (a) Consult a veterinarian immediately
    (b) Treat the dog with the drugs available in your house itself
    (c) Consult neighbour
    (d) Treat the dog with any paediatric drug available in the house
    (e) Treat the dog with herbal drugs
    (f) Others (specify)
13. How often you provide timely treatment when your dog is diseased?
    Often/Sometimes/Never
14. Whether you are keeping the dog for show purposes? YES/NO
    If yes, what are the special management practices you follow?
15. If all the household members are away from the house, who will take care of the dog?
    (a) Neighbour
    (b) Leave the dog in the nearby Kennel
    (c) Leave in your friend's house
    (d) Leave in your house itself with sufficient food and water
    (e) Take the dog along with you
    (f) Others (specify)
16. Annual Veterinary expenditure (in Rs.):
17. Have you done any cosmetic surgery? YES/NO
    If yes, indicate:

F. TRAINING :

1. Whether you have given basic training to the dog? YES/NO
   If yes, who has given the training? Professional / by your own / others

2. Duration of the training:
3. Whether you have trained the dog to defecate and urinate outside the house? YES/NO
4. What is the type of commands for which the training has been given?

5. Whether the dog responds to the commands? YES/NO

6. Methods by which training has been given:
   By giving any reward or appraisal/By scolding or beating the dog/Others (specify)

7. To whom does the dog obey?

8. With whom the dog is more attached?

G. WELFARE :

1. Whether you are regularly cleaning the kennel? YES/NO
   If yes, how frequently?

2. Have you employed any labourer to clean the dog and kennel? YES/NO

3. Do you consider the existing facilities are adequate for the dog? YES/NO
   If no, why?

4. Do you tie the dog? YES/NO

If yes, where and duration?	Always	Very often	Sometimes
Inside the house			
Outside the house			
Top floor			
Others (specify)			

H. CONSTRAINTS IN KEEPING DOG (S):

1. Selection -
2. Housing -
3. Feeding -
4. Breeding -
5. Health care -
6. Training -
7. Man power -
8. Lack of experience/Knowledge -
9. Others (specify)

ITEMS OF OBSERVATION

1. Kennel characteristics:

(a) Location -
(b) Height -
(c) Length -
(d) Width -
(e) Floor -
(f) Wall -
(g) Roof -
(h) Ventilation -
(i) Space -
(j) Light -
(k) Sanitation -

2. Feeding:

(a) Amount fed -
(b) Ingredients -
(c) Type of food -
(d) Type of preparation -

3. Examination of animals for:

(a) General Health condition -

(b) Deformities -

(c) Growth parameters -
- Weight (if possible) -
- Chest Girth -
- Length -
  (from withers to point of croup)

4. Temperament of the dog:

(a) Reaction towards outsiders -
(b) Towards the household members -
(c) Response to the commands -
(d) Behavioural peculiarities -

5. Faeces: (To check the efficiency of de-worming)

Colour -
Consistency -
Odour -
Sample examination for parasites -

6. Presence of ecto-parasites in the body -

7. Vaccination and de-worming records -

Appendices

APPENDIX – I

Need Index

Sl. No.	Particulars	Score	
		0	1
1.	Constructed Kennel	Yes	No
2.	Provide sufficient space to move around	No	Yes
3.	Provide sufficient ventilation	No	Yes
4.	Clean the place where the dog stays	No	Yes
5.	Take care of the dog while going out/away	No	Yes
6.	Tie the dog with chain	Yes	No
7.	Is the dog breed so far?	No	Yes
8.	Neutered the dog	Yes	No
9.	Chances of socialization	No	Yes
10.	Any cosmetic surgery	Yes	No
11.	De-worming	No	Yes
12.	Vaccination	No	Yes
13.	Grooming	No	Yes
14.	Nail-trimming	No	Yes
15.	Bathing	No	Yes
16.	Exercise	No	Yes
17.	Ear cleaning	No	Yes
18.	Health check up	No	Yes
19.	Infections so far	Yes	No
20.	Ecto-parasitism	Yes	No

APPENDIX – II

Food ingredients and its average quantity: District: **Ernakulam**

Sl. No.	Breeds	Milk (ml)	Meat (gm)	Egg (nos.)	Fish (gm)	Bread/ Biscuit (nos.)	Rice (gm)	Vegetables (gm)	Frequency
1.	German Shepherd Crossbred	264.3 (7)	185.7 (7)	0.43 (7)	64.3 (7)	1.0 (7)	435.7 (7)	-	Daily (7)
2.	Labrador	666.7 (3)	266.7 (3)	1.33 (3)	-	2.7 (3)	533.3 (3)	-	Daily (3)
3.	Dachshund	214.3 (14)	117.9 (14)	0.5 (14)	-	0.4 (14)	221.4 (14)	17.9 (14)	Daily (14)
4.	Cocker Spaniel	-	-	-	-	-	-	-	-
5.	Doberman	515.0 (10)	245.0 (10)	0.7 (10)	105.0 (10)	2.0 (10)	390.0 (10)	25.0 (10)	Daily (10)
6.	Spitz	150.0 (3)	333.3 (3)	0.3 (3)	-	2.7 (3)	166.7 (3)	-	Daily (3)
7.	German Shepherd	567.9 (14)	357.1 (14)	0.4 (14)	85.7 (14)	0.6 (14)	510.7 (14)	75.0 (14)	Daily (14)

Food ingredients fed and its average quantity: District :**Palakkad**

Sl. No.	Breeds	Milk (ml)	Meat (gm)	Egg (nos.)	Fish (gm)	Bread/ Biscuit (nos.)	Rice (gm)	Vegetables (gm)	Frequency
1.	German Shepherd Crossbred	188.9 (9)	166.7 (9)	0.3 (9)	22.2 (9)	0.89 (9)	344.4 (9)	11.1 (9)	Daily (9)
2.	Labrador	200.0 (4)	125.0 (4)	0.8 (4)	-	4.0 (4)	375.0 (4)	150.0 (4)	Daily (4)
3.	Dachshund	400.0 (4)	125.0 (4)	0.8 (4)	25.0 (4)	3.0 (4)	187.5 (4)	12.5 (4)	Daily (4)
4.	Cocker Spaniel	-	-	-	-	-	-	-	-
5.	Doberman	275.0 (4)	225.0 (4)	0.5 (4)	25.0 (4)	1.8 (4)	562.5 (4)	87.5 (4)	Daily (4)
6.	Spitz	200.0 (9)	144.4 (9)	0.3 (9)	11.1 (9)	1.4 (9)	216.7 (9)	22.2 (9)	Daily (9)
7.	German Shepherd	267.2 (29)	282.8 (29)	0.6 (29)	32.8 (29)	0.8 (29)	491.4 (29)	41.4 (29)	Daily (29)

Food ingredients and its average quantity: District: **Thrissur**

Sl. No.	Breeds	Milk (ml)	Meat (gm)	Egg (nos.)	Fish (gm)	Bread/ Biscuit (nos.)	Rice (gm)	Vegetables (gm)	Frequency
1.	German Shepherd Crossbred	220.0 (5)	14.0 (5)	0.6 (5)	80.0 (5)	1.6 (5)	430.0 (5)	-	Daily (5)
2.	Labrador	200.0 (1)	500.0 (1)	-	-	-	400.0 (1)	-	Daily (1)
3.	Dachshund	220.0 (10)	175.0 (10)	0.8 (10)	55.0 (10)	1.1 (10)	150.0 (10)	150.0 (10)	Daily (10)
4.	Cocker Spaniel	263.6 (11)	177.3 (11)	0.7 (11)	-	0.8 (11)	154.6 (11)	90.9 (11)	Daily (11)
5.	Doberman	204.2 (12)	187.5 (12)	0.8 (12)	-	1.7 (12)	395.8 (12)	108.3 (12)	Daily (12)
6.	Spitz	160.0 (5)	120.0 (5)	0.6 (5)	30.0 (5)	1.0 (5)	200.0 (5)	70.0 (5)	Daily (5)
7.	German Shepherd	198.3 (29)	320.7 (29)	0.3 (29)	15.5 (29)	1.5 (29)	437.9 (29)	-	Daily (29)

Number in the brackets indicates the sample size

APPENDIX – III

Kennel construction details:

Sl. No.	Variables			Districts		
				Ernakulam	Palakkad	Thrissur
1.	(i) Floor	(%)	Mosaic	10.0	-	2.8
			Tiles	-	9.2	5.5
			Concrete	80.0	41.9	61.1
			Wood	7.5	41.9	30.6
			Others *	2.5	7.0	-
	(ii) Wall		Concrete	5.0	9.3	2.8
			Iron rails	5.0	18.6	8.3
			Concrete & Iron rails	72.5	46.5	47.2
		(%)	Concrete & Wire-mesh	7.5	-	11.1
			Wire-mesh alone	7.5	14.0	5.6
			Wire-mesh & wood	2.5	7.0	8.3
			Others **	-	4.6	16.7
	(iii) Roof	(%)	Concrete	72.5	34.8	44.4
			Asbestos	10.0	23.3	22.2
			Plastic sheet	5.0	9.3	2.8
			Tiles	-	14.0	11.1
			GI sheet	2.5	14.0	11.1
			Others ***	10.0	4.6	8.4
	(iv) Platform	(%)	Raised	90.0	93.0	100.0
			Ground level	10.0	7.0	-
2.	Cost of construction of kennel (in Rs.)			2890.8	6097.2	6400.0

* Includes wire-mesh, mud floor and iron rails
** Includes galvanized iron (GI) sheet, wood, brick, iron rails and wood
*** Includes aluminium, wire mesh, wood

APPENDIX – IV

Special management practices followed:

Sl. No.	Variables		Districts		
			Ernakulam	Palakkad	Thrissur
1	Do you follow any special feeding practices for growing dogs? (%)	Yes	78.0	76.0	86.0
		No	22.0	24.0	14.0
2	If yes, details (%)	Milk	28.2	34.2	62.8
		Mineral vitamin	43.6	63.2	55.8
		Meat	5.1	5.3	4.7
		Cod liver oil	7.7	21.1	7.0
		Ragi	15.4	29.0	27.9
		Vitamin	25.6	7.9	4.7
		Cerelac/Farex	15.4	21.1	18.6
		Egg	12.8	23.7	25.6
		Calcium	10.3	23.7	16.3
		Others **	12.8	13.2	27.3
3	Do you follow any special management for better breeding performance? (%)	Yes	27.3	8.3	16.7
		No	72.7	91.7	83.3
4	If yes, specify (%)	Calcium	33.3	100.0	-
		Vitamin E	66.7	-	-
		Extra food	33.3	-	-
		Milk	33.3	-	100.0
		Egg	33.3	-	100.0
		Iron tonic	33.3	-	-
5	Feeding management procedures adopted during pregnancy (%)				
	(a) Calcium supplement		33.3	11.1	22.7
	(b) Vitamin E supplement		33.3	-	9.1
	(c) Beef supplement		-	11.1	-
	(d) Milk		22.2	11.1	22.7
	(e) Egg		11.1	-	-
	(f) Extra food		11.1	11.1	13.6
	(g) Others ***		-	66.7	18.2

* Includes other spices like garlic, ginger and masala powder, etc.

** Includes bone, iron tonic, soybean, biscuit, bone meal, bread, chocolate protein etc.

*** Includes health tonic, iron supplement, cod liver oil, de-wormer, carrot juice and soybean