

THE WELFARE OF DOGS

Animal Welfare

VOLUME 4

Series Editor

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The Welfare of Dogs

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ANIMAL WELFARE BY SPECIES: SERIES PREFACE

Animal welfare is attracting increasing interest worldwide, but particularly from those in developed countries, who now have the knowledge and resources to be able to offer the best management systems for their farm animals, as well as potentially being able to offer plentiful resources for companion, zoo and laboratory animals. The increased attention given to farm animal welfare in the West derives largely from the fact that the relentless pursuit of financial reward and efficiency has led to the development of intensive animal production systems, that challenge the conscience of many consumers in those countries. In developing countries human survival is still a daily uncertainty, so that provision for animal welfare has to be balanced against human welfare. Welfare is usually provided for only if it supports the output of the animal, be it food, work, clothing, sport or companionship. In reality, there are resources for all if they are properly husbanded in both developing and developed countries. The inequitable division of the world's riches creates physical and psychological poverty for humans and animals alike in all sectors of the world. Livestock are the world's biggest land user (FAO, 2002) and the population is increasing rapidly to meet the need of an expanding human population. Populations of farm animals managed by humans are therefore increasing worldwide, and there is the tendency to allocate fewer resources to each animal.

Increased attention to welfare issues is just as evident for companion, laboratory, wild and zoo animals. Although the economics of welfare provision may be less critical than for farm animals, the key issues of provision of adequate food, water, a suitable environment, companionship and health remain as important as they are for farm animals. Of increasing

importance is the ethical management of breeding programmes, now that genetic manipulation is more feasible, but there is less tolerance of deliberate breeding of animals with genetic abnormalities. However, the quest for producing novel genotypes has fascinated breeders for centuries, and where dog and cat breeders produced a variety of extreme forms with adverse effects on their welfare in earlier times, nowadays the quest is pursued in the laboratory, where the mouse is genetically manipulated with even more dramatic effects.

The intimate connection between animal and owner or manager that was so essential in the past is rare nowadays, having been superseded by technologically efficient production systems, where animals on farms and in laboratories are tended by fewer and fewer humans in the drive to enhance labour efficiency. In today's busy lifestyle pets too may suffer from reduced contact with humans, although their value in providing companionship, particularly for certain groups such as the elderly, is increasingly recognised. Consumers also rarely have any contact with the animals that produce their food. In this estranged, efficient world man struggles to find the moral imperatives to determine the level of welfare that he should afford to animals within his charge. Some, such as many pet owners, aim for what they believe to be the highest levels of welfare provision, while others, deliberately or through ignorance, keep animals in impoverished conditions or even dangerously close to death. Religious beliefs and directives encouraging us to care for animals have been cast aside in an act of supreme human self-confidence, stemming largely from the accelerating pace of scientific development. Instead, today's moral codes are derived as much from media reports of animal abuse and the assurances that we receive from supermarkets, that animals used for their products have not suffered in any way. The young were always exhorted to be kind to animals through exposure to fables, whose moral message was the benevolent treatment of animals. Such messages are today enlivened by the powerful images of modern technology, but essentially still alert children to the wrongs associated with animal abuse.

This series has been designed to provide academic texts discussing the provision for the welfare of the major animal species that are managed and cared for by humans. They are not detailed blueprints for the management of each species, rather they describe and consider the major welfare concerns of the species, often in relation to the wild progenitors of the managed animals. Welfare is considered in relation to the animal's needs, concentrating on nutrition, behaviour, reproduction and the physical and social environment. Economic effects of animal welfare provision are also considered where relevant, and key areas requiring further research.

With the growing pace of knowledge in this new area of research, it is hoped that this series will provide a timely and much-needed set of texts for researchers, lecturers, practitioners, and students. My thanks are particularly due to the publishers for their support, and to the authors and editors for their hard work in producing the texts on time and in good order.

Clive Phillips, Series Editor

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Reference:

Food and Agriculture Organisation (2002). http://www.fao.org/ag/aga/index_en.htm.

PREFACE

There are about 500 million dogs in the world (Macpherson *et al.*, 2000) and only a small percentage of them live as pampered pets of the relatively wealthy, the majority live free-ranging lives in Africa, Asia and Latin America. Indeed an indicator of wealth and national development may be the number of free-ranging dogs. The life of many pet dogs is long and comfortable, but they may live in socially uninteresting environments while free-ranging dogs may live short, possibly brutal but certainly complex lives. The presence of zoonoses, especially rabies, in free-ranging dogs makes their control and perhaps ultimate extinction in many countries necessary. Indeed the control of rabies may have more of an effect on the welfare of such dogs than any desire to improve their welfare *per se*.

The physical requirements of the dog are easily met. They need a warm dry place to sleep. There is a wide variety of sustaining dog foods in many grocery stores and dogs will eat what we eat or don't eat. However, the social, exercise, and activity requirements of an individual dog is more difficult to define and to meet by busy owners. The presence of animal shelters and local government dog pounds in many towns and cities in the developed world suggests that there are many problems with the welfare of dogs in these societies.

The welfare of an animal relates to its subjective experience of life. The emotional life of a dog is probably simpler than that of a human and possibly limited to a few emotions of evolutionary consequence such as fear, anger and pleasure. The strength of these emotions may be measured using physiological and behavioural parameters that appear to be common to many mammals including humans. The biological functioning of an animal, both short and long term may also reflect its welfare (Duncan *et al.*, 1993). In the short term the effort made to maintain homeostasis and the presence of stress

or distress may reflect an animal's welfare. In the longer term an animal's health, reproductive success and longevity may be influenced by its physical and mental wellbeing.

The biological functioning of dogs managed under different circumstances is difficult to assess for technical, philosophical and financial reasons and a more practical approach to discussing and assessing animal welfare is used in this book. In this approach the physical components of an animal's life such as its nutrition, health and comfort and its ability to behave 'normally' are evaluated, and its experience of suffering (pain, anxiety, fear, distress) is assessed using physiological, immunological and behavioural parameters. We can never know the subjective experience of a dog, but we can be reasonably sure of its physical condition and can use the parameters mentioned to give some indication of an animal's experience of suffering and pleasure. However, in the end this interpretation is always subjective. Choice tests and demand curve tests are used to get an idea of what is important to an animal and how hard it will work to gain access to different elements of the environment. These tests have not been used on dogs to identify their environmental needs.

The physical components of dog welfare have been intensely studied. Knowledge of canine nutrition and dietetics have increased greatly in the last 40 years and the nutrition of dogs owned by people who buy dog food is probably better now than ever (Chapter 4). The developments in veterinary medicine since 1950 mean that all the major infectious diseases and most parasite infestations of dogs can be prevented or treated (Chapter 5). Veterinary surgery now allows safe de-sexing, a major weapon in improving the welfare of dogs, and the treatment of many previously life threatening or painful conditions for companion, sport and working dog (Chapter 8). In the developed world at least there are sufficient veterinarians to tend the dog. The development of cheap and effective analgesics has been a major step towards reducing pain in dogs (Chapter 6).

The ecology of stray, free-ranging and feral dogs and their control is now well understood and if there are still many unwanted free-ranging dogs it is not due to a lack of knowledge (Chapter 2). The welfare of dogs in animal shelters (Chapter 10) and in research laboratories (Chapter 9) has been studied in some depth. The use of the dog in research has declined in some countries over the last decade, but it is a useful model for many human diseases and surgical development.

There is a paucity of research into the psychological status of companion dogs (Chapter 12). There are many problems with the management of pet dogs which will impact on their welfare. The explosion of interest in the behaviour problems of companion dogs suggests that all is not well with them (Chapter 11). The aetiology and pathophysiology of anxiety-based

behaviours is poorly understood despite excellent work by dedicated therapists such as Overall (1997). The observation that pet dog numbers are declining in some countries is almost certainly good news as it may result in a decrease in the number of unwanted and unhappy dogs.

Most of the emphasis on animal welfare research has been on quantifying and reducing the deficits in the lives of animals and few attempts made to monitor the pleasure experienced by animals (Odendaal & Meintjes, 2003). The relationship between dogs and humans is complex and depends on the attitude and behaviour of individual humans and the animal's response. Understanding the welfare of dogs is always going to be a challenge, but physically dogs have never had it so good in many parts of the world and their psychological needs are being addressed more now than ever before. Dogs are used in a wide variety of activities and it is naïve to believe that their welfare will not always be compromised to some degree regardless of the intentions of owner or handler. However at present the cup of canine welfare is really half full and filling.

Kevin Stafford
New Zealand
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Chapter 1

THE DOMESTICATION, BEHAVIOUR AND USE OF THE DOG

Abstract: The wolf was domesticated and became the dog more than 15,000 years ago. Since then dogs have been used by humans for many purposes. Initially they probably assisted humans during scavenging and hunting and acted as sentinels. Later they were used to guard and to drive livestock. More recently the dog is being used for an ever increasing range of activities and it has become a close companion for many people. The social behaviour of the dog makes it suitable as a companion but its need to live in a group may be compromised when individual dogs live with busy people in modern post-industrial societies. The welfare of working and sporting dogs may be compromised at work but for many of them work is a positive experience. Police, military, racing and hunting dogs may be injured during training or work. Gundogs may be shot by accident. Dogs used for fighting are often seriously injured and killed. This is an unacceptable use of dogs even if the breeds used to fight are game to do so. In some countries dogs are eaten and their welfare may be compromised by inadequate management particularly during marketing and slaughter. The welfare of guide dogs for the blind and other assistance dogs is generally high. Dogs used for showing may be modified surgically to meet breed standards. Tail docking, ear cropping and dew claw removal are common practices in some countries for specified breeds. There is a dearth of information on the longevity and health of working and sporting dogs and on the stress experienced by these animals during training and work.

1. INTRODUCTION

The wolf (*Canis lupus*) was the first animal to be domesticated, becoming the domestic dog (*Canis familiaris*). The dog has been a close companion of humans for at least 15,000 years (Savolainen *et al.*, 2002) but

the wolf was probably a camp follower for thousands of years before that (Clutton-Brock, 1995). The role of the dog in human development is controversial, but dogs were probably used as food, as sentinel animals and in a supportive role during scavenging and hunting. It was a support animal when other species were being domesticated and livestock farming developed. The value of the dog to humans can be seen in the rapidity with which it moved from its site of origin in East Asia (Savolainen *et al.*, 2002) to Europe and North America (Leonard *et al.*, 2002).

The dog is a member of the Canidae family of the order Carnivora. There are between 34 (Wayne, 1993) and 38 (Clutton-Brock, 1995) canid species and they have been divided using allozyme genetic differences and chromosome morphology into four groups. These are wolf-like canids including the domestic dog, South American canids, red-fox-like canids of the Old and New World and a few monotypic genera like the bat eared fox and racoon dog (Table 1) (Wayne, 1993; Clutton-Brock, 1995).

Dogs have always been working animals, but recently, especially in post-industrial western societies, their work has decreased and they have become more important as companions. However, in other societies dogs are considered unclean and are not to be touched. The contrast between the lives of a street dog in Yemen, a working sheep dog in New Zealand and a pampered pet dog in the United States illustrates the considerable difference in how dogs experience life. The welfare of the dog, more than that of any other species reflects its use, and the attitude and welfare of their human community (Podberscek, 1997). Dogs are not essential animals in post-industrial urban society and therefore their welfare is impacted by the wealth and philosophy of their owners. In these societies the physical welfare (health, nutrition, comfort) of dogs may be high but their lives may be dull as they are severely restricted in where they can go, what they can do and who they can meet (Kobelt *et al.*, 2003b). By contrast, the poor physical welfare of free-ranging dogs, owned or not-owned, may be leavened by their active but often short lives.

In this chapter, the domestication and the uses of the dog will be outlined as the background to modern dog-human relations. The behavioural characteristics of the dog and how they impact on canine welfare will be discussed as will the welfare of working and sport dogs.

Table 1. Categories of canid species and their geographical distribution.

Species	Distribution	
Wolf-like canids (12-30kg)		
<i>Canis familiaris</i>	Domestic dog	Worldwide
<i>Canis familiaris dingo</i>	Dingo	Australia, Asia
<i>Canis simensis</i>	Ethopian wolf	Ethiopia
<i>Canis lupus</i>	Grey wolf	Holarctic
<i>Canis latrans</i>	Coyote	North America
<i>Canis rufus*</i>	Red wolf	Southern US
<i>Cuon alpinus</i>	Dhole	Asia
<i>Lycan pictus</i>	African wild dog	Subsaharan Africa
Wolf-like canids (5-10 kg)		
<i>Canis aureus</i>	Golden jackal	Old World
<i>Canis adustus</i>	Side-striped jackal	Subsaharan Africa
<i>Canis mesomelas</i>	Black-backed jackal	Subsaharan Africa
South American canids		
<i>Speothos venaticus</i>	Bushdog	Northeast South America
<i>Cerdocyon thous</i>	Crab-eating fox	Northeast South America
<i>Chrysocyon brachyurus</i>	Maned wolf	Northeast South America
<i>Dusicyon australis</i>	Falkland Island Wolf	Falkland Islands
<i>Dusicyon culpaeus</i>	Culpeo	Patagonia
<i>Dusicyon culpaeolus</i>	Santa Elena zorro	Uruguay
<i>Dusicyon gymnocercus</i>	Azarra'a zorro	Patagonia
<i>Dusicyon inca</i>	Peruvian zorro	Peru
<i>Dusicyon griseus</i>	Grey zorro	Patagonia
<i>Dusicyon fulvipes</i>	Chiloe zorro	Island of Chiloe
<i>Dusicyon sechurae</i>	Sechuran zorro	Peru, Equador
<i>Dusicyon vetulus**</i>	Hoary zorro	Brazil
<i>Atelocynus microtis</i>	Small-eared zorro	Brazil
Red Fox-like canids		
<i>Vulpes velox</i>	Kit fox	Western USA
<i>Vulpes vulpes</i>	Red fox	Old and New World
<i>Vulpes chama</i>	Cape fox	Southern Africa
<i>Vulpes corsac</i>	Corsac fox	Central Asia
<i>Vulpus ferrilata</i>	Tibetan fox	Tibet
<i>Vulpus bengalaensis</i>	Bengal fox	India
<i>Vulpus cana</i>	Blandford's fox	Southwest Asia
<i>Vulpus pallida</i>	Pale fox	Sahel
<i>Vulpus rueppelli</i>	Ruppell's fox	North Africa and Southwest Asia
<i>Alopex lagopus</i>	Arctic fox	Holarctic
<i>Fennecus zerda</i>	Fennec fox	Sahara
Other canids		
<i>Otocyon megalotis</i>	Bat-eared fox	Subsaharan Africa
<i>Urocyon cinereoargenteus</i>	Grey fox	North America
<i>Urocyon littoralis</i>	Island grey fox	Californian islands
<i>Nycteruetes procyonoides</i>	Raccoon dog	Japan, China

Adopted from Wayne (1993) and Clutton-Brock (1995)

*Hybrid Grey Wolf and Coyote

** Also *Lycalopex vetulus*

2. DOMESTICATION

The details of the process of domestication whereby the wolf came to live with humans and became the dog is unknown, but Clutton-Brock (1995) suggested that wolves may have lived in association with early hominids from the Middle Pleistocene period and that early human hunters would have tamed wolf pups, which may have bred and scavenged around human settlements. Wolf skulls with minor morphological changes suggestive of domestication have been found on archaeological sites 14,000 and 10,000 years old in Europe and Alaska respectively (Musil, 1984; Olsen, 1985). The refinement in the use of bows and arrows for hunting in the Mesolithic Period may have given the dog a role in tracking wounded animals (Clutton-Brock, 1995) and accelerated the process of domestication. The early intimacy of humans and dogs is suggested in a 12,000 year old grave in the Jordan valley in which a small dog is buried with a woman (Davis & Valla, 1978). Recently Savolainen *et al.* (2002) produced genetic evidence from the mitochondrial DNA of 654 domestic dogs that the wolf was domesticated in East Asia between 40,000 and 15,000 BP. This team of researchers suggested that 15,000 BP was the likely time of domestication and the archaeological evidence from China, Southwest Asia and Europe supports this date. This date is supported by evidence of the origin of dogs in the Americas (Leonard *et al.*, 2002), but they observed that dogs were rapidly distributed throughout Europe, Asia and America within a few thousand years of domestication and that when they arrived in America they were already genetically diverse. This had led Wayne to support 40,000 BP as the time of domestication (cited by Hecht, 2002), but alternatively, dogs could have been traded widely in the years after domestication, because they were highly valued. Behaviourally, modern *Homo sapiens* may not have emerged until about 55,000 BP (Diamond, 2002) and if the earlier date is accepted then dogs have been with us for nearly three quarters of our existence! The origin of the dog in East Asia is supported by the recent finding that the most ancient breeds (Chinese Shar-pei, Shiba Inu, Chow Chow and Akita) come from that part of the world (Parker *et al.*, 2004).

The role of the dog in human development has been exaggerated by some (Newby, 1997), but the development of improved hunting technology plus the domestication of the dog allowed for more effective hunting (Eaton, 1969). Lee (1979) found that dogs were involved in up to three-quarters of the prey animals killed by the Kung San Bushmen although dingoes were of variable help to Australian Aborigine hunters (Meggitt, 1965). The human-dog hunting team probably resulted in the depletion of large mammalian prey species. This made hunting-gathering less rewarding and encouraged the development of agriculture about 10,000 BP (Diamond, 2002). Human

civilisation is based on agriculture and our use of the dog to slaughter large mammalian species was probably a significant key to our becoming farmers and subsequent urbanisation. Agricultural development and sedentary living may have accelerated the development of the dog.

The domestic dog originated from five female wolf lines but there is no evidence that the morphological variation in dog breeds resulted from wolves being domesticated in different parts of the world (Savolainen *et al.*, 2002). The process of wolf domestication remains unknown and there are two, not mutually exclusive, theories. The territorial nature of wolves may have encouraged juvenile wolves that had just left the natal pack to live on the outskirts of human encampments and to scavenge off the rubbish and faeces left by humans. Human encampments might have been unattractive to pack wolves with large territories but might have been a relatively safe haven for the young wolf. Some of these wolves would have bred successfully having not sufficiently impinged on the human existence to be killed. Wolves may have accompanied humans on scavenging and hunting trips and were found to have been of use, when competing with other carnivores at kills. Wolves would have been inadvertently selected for an ability to live close to humans.

The alternative theory is that humans tamed young wolves, found them useful, as described above, and allowed them to breed. Many hunter-gatherer peoples have pets and pet keeping might be a common behaviour of humans. However, if this was the methodology then we have to ask why other mammals were not domesticated at the same time as the wolf? The wolf has two characteristics that predispose it to domestication, namely, being a social animal and having a catholic diet. However, its territoriality may also have been an important behaviour in the process of domestication, although this is not generally considered to be a factor predisposing an animal to domestication (Price, 1984).

Domestication is a biological and a cultural process (Clutton-Brock, 1995). The biological process of wolf domestication involved wolves adapting to living in proximity to humans and the natural selection for a type of wolf that could breed when living close to humans (O'Connor, 1997). Then the cultural component engaged in selecting animals that are particularly attractive and useful. The valued wolf/dog was isolated from their wild con-specifics. The artificial selection involved in domestication was probably quite severe. When Belyaev domesticated the fox (*Vulpes vulpes*) he allowed 4 or 5% of the males and 20% of the females to breed and over 40 years produced a population in which 70-80% of the foxes were human-friendly and could be reared as affectionate pets (Trut, 1999).

The numbers of wolves killed as unsuitable during the process of domestication is unknown, but it was certainly substantial. One can imagine

the brutality expressed towards a potential predator as it moved to live alongside people. Even when the usefulness of the wolf/dog had been recognised a scarcity of food might still have caused considerable malnutrition for them. In an attempt to domesticate river otters (*Lutra lutra*) and grey rats (*Rattus norvegicus*) only 16% and 14% respectively were reproductively successful and Trut (1999) concluded that domestication must put animals under extreme stress. The dog is predisposed to live alongside humans and even when opportunities allow it to go feral, as the dingo has done, it is easily recaptured and tamed. In many countries where dogs have the opportunity to go feral they are remarkably unsuccessful as hunters (Butler *et al.*, 2004) and in a North American urban environment they do not reproduce well enough to establish a wild population and disappear unless an ongoing supply of pets are abandoned on to the street (Beck, 1973). Populations of wild dogs in many countries survive by living on garbage dumps apparently bound inextricably to human resources. Thus it appears that the dogs' natural environment is now close to human society (Douglas, 2000).

3. THE OUTCOME OF DOMESTICATION

Domestication resulted in pedomorphosis with the dog becoming physically similar to the juvenile wolf (Goodwin *et al.*, 1997). The physical changes included a decrease in body and teeth size, a shortening of the skull, a change in hair colour and tail carriage, and a decrease in the brain to body size ratio (Clutton-Brock, 1995). However, the progenitor of the dog, the Asian wolf, has a smaller brain than some other grey wolf types, so the decrease in brain size may not be substantial. A scarcity of food would limit physical size. The mandible became rounded and the eyes more forward looking. These physical changes could be a by-product of the selection for docility (Wayne, 2001) and similar physical changes were observed in the fox domestication experiments of Belyaev (Trut, 1999) and in black-footed ferrets bred in captivity (Wisely *et al.*, 2002). The dingo appears to be a reasonably defined prototype dog and many street and village dogs in Asia and Africa are middle sized, fawn or black and tan, short haired and reasonably light dogs. However in breed development some infantile physical characteristics were probably deliberately selected (Coppinger *et al.*, 1987).

Physiologically the dog reaches puberty earlier than the wolf (Price, 1984). Many female dogs can breed twice rather than once a year and dog litter sizes are greater than in the wolf (Clutton-Brock, 1995). The dingo, however, usually breeds only once each year (Thomson, 1992b). In general,

male domestic dogs do not assist bitches with the rearing of pups, but all the other canids and dingo males do (Thomson, 1992b). Dogs are more promiscuous than wolves and are not monogamous.

During domestication behavioural neoteny also occurred (Frank & Frank, 1982) and the adult dog now behaves as a juvenile wolf with reduced aggression and increased submission (Price, 1999). Thus, adult dogs retain the sociability of the young wolf, they bark more than adult wolves do and they continue to play. Neoteny is associated with an increased capacity to cope with environmental change (Price, 1984). Dogs are more skilful at reading human communicative signals than wolves, a skill which puppies can achieve without much contact with humans (Hare *et al.*, 2002). This ability appears to be the result of domestication when dogs were selected for social cognitive abilities that enabled them to understand human behaviour effectively. Thus the wolf/dogs that could read human intentions were more likely to survive and reproduce successfully than their less skilful conspecifics (Mikosi *et al.*, 2003). Wolves do not have this skill and neither do New Guinea singing dogs (Koler-Matznick *et al.*, 2003), which appear to have lost the skill when they went feral.

Dogs exhibit a range of attachment behaviours towards their owners similar to those seen in infant humans and chimpanzees towards their mothers (Topal *et al.*, 1998; Prato-Previde *et al.*, 2003) suggesting a high level of attachment. This level of attachment to humans suggests that dogs regard humans as conspecifics and is the outcome of humans favouring dogs that were social and attached to them. This closeness has led to dogs being able to change from being leader to follower and vice versa, depending on the role they have with humans, as seen in guide dogs for the blind (Nadri *et al.*, 2001) and hunting dogs. Dogs that were stroked, scratched, talked to and gently played with by their owners had increased plasma dopamine levels, which indicates that they were experiencing pleasure in this intimate contact (Odendaal & Meintjes, 2003).

The dog has been a remarkably successful species. There are about 500 million dogs (Matter & Daniels, 2000) and they have inhabited all the continents, even Antarctica where they were used as sled dogs. This success is in marked contrast to their Canidae relatives, many of which including the Ethiopian Wolf (*Canis simensis*) are endangered. Moreover, even the progenitor of the dog, the wolf, is extinct in much of its former range and endangered in much of the rest. The ability of the dog to be useful to humans has made it one of the mammalian success stories and even when its welfare is compromised it still exists in large numbers. Local populations of dogs depend on factors such as resource availability, climate, geography but most importantly, the human attitude towards dogs (Matter & Daniels, 2000).

4. THE BEHAVIOUR OF DOGS

The behaviour of dogs is basically similar to that of their progenitor the wolf but it has been changed during domestication. The dog is defined behaviourally as a cursorial hunter, promiscuous, a scavenger, a social animal, territorial with a propensity for barking and one that uses urine and faeces in communication and uses its teeth in aggression. The social, reproductive and foraging behaviour of free-ranging, feral and wild dogs has been reviewed recently by Matter & Daniels (2000) who identified six classes of dogs based on the closeness of the relationships with humans (Table 2).

Table 2. Classification of dogs according to their origin, behaviour and relationship with people.

Wild	Wild for thousands of years (e.g. dingo)
Feral	wild for a few generations
Free-ranging (un-owned)	not owned (abandoned or born from free-ranging female)
Free-ranging village (neighbourhood owned)	owned by villager rather than individual household and not restrained
Free-ranging family hold owned)	owned by individual household but not restrained
Restrained	owned and with restricted movement

Adapted from Matter & Daniels, 2000

The social behaviour of these different classes of dogs is influenced by the level of restriction imposed on them by their human owners, by the resources available to them (food, shelter) and by pressure of predation by humans and other species. Thus, restrained dogs live in the social group owned and determined by their owner.

Free-ranging but owned dogs often live solitary lives and rarely group up with dogs other than those with which they are familiar from their home. In several studies of North American urban and rural owned free-ranging dogs the tendency was to live solitarily and to avoid others (Beck, 1973; Daniels, 1983b). When groups formed they were transitory collections of owned and un-owned dogs (Rubin & Beck, 1982) which formed and split apart regularly (Daniels, 1983a). Group formation of owned but free-ranging dogs is strongly influenced by the behaviour and practices of the dogs' owners (Daniels & Beckoff, 1989a). As most free-ranging dogs, owned or not, live on garbage there may be few advantages to be gained from foraging in a pack. However, village dogs (free-ranging and un-owned) in one Italian study (Macdonald & Carr, 1995) lived most of the time alone but belonged to social groups as indicated by amicable interaction. These groups appeared to defend territory and there were aggressive interactions between different groups. Groups of free-ranging dogs occur in many countries.

Feral dogs tend to have larger social groups than owned free-ranging dogs. On the Galapagos Islands feral packs of up to 8 animals were found by Kruuk & Snell (1981) and in Alabama, USA, packs of from two to six animals were identified by Causey & Cude (1980). In Italy, feral dogs were generally seen in groups (Macdonald & Carr, 1995) and these groups were aggressive towards each other. Pack hunting by feral dogs is generally unsuccessful and thus they tend to live off garbage which does not require pack cooperation. Feral dogs may sometimes attack people usually children or old people and in some circumstances, pack living may protect individual dogs from larger predators and perhaps humans. The pack structure of feral dogs may lack the social cohesion seen in dingo packs, but this may improve over generations if the pack is successful in rearing puppies. The pack behaviour of feral dogs suggests that given time, and without human control, dogs will return to a pack social life. In one Italian study, a pack of feral dogs was maintained by immigrants and remained physically close together even when the den site of a female was far from the usual resting area (Boitani *et al.*, 1995). The poor reproductive success of feral dogs is explained by the poor integrity of the pack when it comes to supporting a bitch rearing puppies. Reproductive success may be better in dingo packs that hunt, rear young and protect territory together.

Unlike free-ranging and feral dogs, dingoes live in packs that exist long-term although all members may not be together all the time (Thomson, 1992c). The pack consists of a pair and their offspring from different years. Pack size varies and many dingoes remain solitary either permanently or split from their pack temporarily. Dingoes are successful because they cooperate while rearing young (Corbett & Newsome, 1975). The social organisation of dingoes varies depending on the prey species, climate, habitat and interaction with humans (Corbett, 1995). Dingoes hunt together when targeting larger prey species such as kangaroos, but the maximum pack size appears to be six (Thomson, 1992d). Hunting packs are more successful than individuals, but when large prey become scarce then packs will split up and individual animals will target smaller species. Dingoes occur in Australia, and in many East Asian countries such as Thailand, Malaysia, the Phillipines, Laos, Indonesia and India, but, the pure dingo is in decline in all these countries as they interbreed with free-ranging dogs (Corbett, 1995).

Thus the further dogs are removed from direct human control the more likely they are to form groups and these may eventually evolve into cohesive packs. Individual free-ranging animals once released from human control can migrate into feral groups (Boitani *et al.*, 1995) which may become self-sustaining depending on available resources and the impact of human control efforts.

Dingo puppies can be captured and tamed easily as can un-owned free-ranging dogs. However, there is little to indicate a voluntary movement of dogs born from free-ranging females back towards close contact with humans. This may be due to the danger involved, as many such animals are killed, but may also reflect the suitability of the free-ranging life living off human refuse for the domestic dog. The tendency of free-ranging un-owned dogs to form groups reflects the innate social behaviour of these animals, which has implications for the welfare of the isolated indoor dog that lives with a busy person or any dog that spends a large proportion of its time alone.

Many of their behavioural characteristics have made the dog an ideal assistant in human endeavours. The territoriality and tendency to bark have allowed us to use dogs as sentinels and guardians of property and livestock. Their scavenging has allowed us to use them for garbage disposal. Their hunting has been adjusted to suit a range of hunting conditions and livestock driving. Their chronic sociability has allowed dogs to be exchanged regardless of age and to be introduced to new environments without difficulty. This sociability allows dogs to fit easily into human families. The playfulness of dogs makes it easier for them to interact with humans who are also playful. In addition their catholic diet and promiscuity have allowed them to survive in urban and rural environments even when they are not owned and sustained directly by humans.

However, some of these behaviours have made the dog's existence on the street unacceptable for social and welfare reasons (Serpell, 1995). Its promiscuity and the production of surplus and unwanted pups has made reproductive control necessary for many modern urban human communities. Barking is unacceptable to urban and suburban communities as is the random depositon of faeces on streets and in parks. The tendency of some dogs to hunt other companion animals and livestock is unacceptable as is its disposition to chase after bicycles, joggers and cars.

In the English language when 'Dog' is added to any word it signifies worthlessness; as in dog rose. This indicates that humans are ambivalent about dogs, thinking of them as mean and low whilst also praising their values at hunting and other activities. Bringing dogs indoors has certainly reduced the social problems caused by dogs in public places but this practice may have resulted in problems most appreciated by dog owners and their neighbours. Its intense social nature makes living in isolation difficult and being alone for long periods of time may predispose a dog to anxiety-based behavioural problems.

In post-industrial wealthy urban societies legislation regarding dog control and ownership is making the ownership of dogs more difficult. In such societies, dogs cannot roam the streets, owners must clean up after their

dogs in public places, dogs must be exercised on a leash or in specific exercise areas, dogs of specific breeds must be muzzled in public and dog breeding may be controlled. Thus many of the characteristics which made the dog such a useful companion in the past have made it a pariah in a modern urban context. The legislation restricting dog ownership and management has occurred largely because of the constant public pressure that dogs should be controlled and owners should be responsible for that control, and that dog ownership is earned and not a right *per se*. This emphasis combined with the growing concern about dog attacks has forced legislators to restrict the lives of dogs and their owners.

Legislation and social pressure to move dogs indoors to live alone for most of the time in socially uninteresting and physically dull environments has made the disparity between the nature of the dog and its everyday environment more obvious. That the dog is inherently unsuited to this isolated existence because of its behavioural requirements is probably being recognised by society and may have encouraged the decline or stabilization of dog populations in some European countries including Germany, the Netherlands and the United Kingdom. In the United Kingdom the dog population has declined from about 7.2 million in 1987 to 6.1 million in 2002 (Anonymous, 2003e). This decrease is to be welcomed as it may signify that people have recognised the unsuitability of dogs to the modern urban environment and to modern lifestyles.

In many countries, however, dog numbers are stable or increasing. The apparent increase in the dog population in China, Indonesia, or Malaysia may represent a change in the dog-human relationship as these countries become wealthy and may represent an increase in ownership rather than dog numbers *per se*. This may be accompanied by a decrease in un-owned dogs. Databases of dog populations may be quite inaccurate depending on the methodology used to estimate the population (Patronek & Rowan, 1995). It is difficult to obtain accurate data on the population of dogs in most developing countries. The World Health Organisation (WHO) databases provides figures for the numbers of dogs vaccinated against rabies worldwide and estimates of the national dog populations but these figures appear to be rough estimates.

Where there is human conflict and the rule of law breaks down or where serious human poverty exists then many owned dogs live free-ranging lives on the street and there may be many ownerless and feral animals also. Pictures of scavenging, often diseased, dogs upset many people living in countries where dogs have been moved off the streets but these dogs are living as dogs have lived for thousands of years and by definition, therefore, more normal lives, than those confined in an apartment.

5. THE WELFARE OF WORKING AND SPORT DOGS

The majority of dogs living in Europe, North America and Oceania are pet animals although unusually in New Zealand, with its large sheep to human ratio, working dogs outnumber pet dogs 2:1. During and following domestication and human settlement dogs were used for a limited number of purposes. However, their uses increased in the subsequent millennia and continue to increase so that today the domestic dog is used for a wide range of work and sporting activities. The traditional jobs like guarding, hunting, sledding and herding continue, but nowadays dogs work with the disabled, in conservation (Engeman *et al.*, 2002), with the military, police and customs, in search and rescue, even controlling wildlife at airports (Carter, 2003) and in the media. Dogs are involved in a great number of sports including racing, hunting of many sorts, sheepdog gundog and guard dog trials, sled racing, obedience tests of all sorts, agility, showing and newer dog sports like frisbie. Recently interest has developed in using dogs as diagnostic tools in human and veterinary medicine.

The welfare of fighting and baiting dogs is obviously seriously compromised. In addition, the welfare of other working dogs may be compromised in a number of ways which relate to their specific activity. Some jobs such as landmine detection are obviously dangerous but police dogs may become stressed and jobs like sledding are obviously hard work. Working and sporting dogs are usually bred for their particular activity and are predisposed to engage in that particular activity.

The welfare of dogs used for the different purposes varies considerably and it is difficult to discuss the degree, if any, of welfare compromise due to a lack of information and detailed research into the activity. Many dogs work under difficult physical conditions and their working life may be short which might indicate poor welfare. There is limited published information on the percentage of dogs entering training that succeed as working or sport dogs, their subsequent health and longevity and the stress caused by training and the work or sport *per se*. There is some data on the incidence of work-related injuries and diseases. However a brief description of the activity and the obvious dangers gives some indication of the welfare compromise, either physical or psychological. Many dogs have been bred for specific functions and engaging in these is a powerful positive reinforcement and therefore, by definition, pleasant. Also many dogs are trained to engage in specific activities by positive reinforcement and the activity is often, apparently, a pleasure. Physical dangers and injury have to be valued against the obvious enjoyment some dogs get in doing specific work.

The stress or distress experienced during training for, or engagement in, a particular activity has been poorly determined in the dog. There is a need for more knowledge about the physiological status of dogs during training and work. There are techniques available to monitor blood pressure (Vincent *et al.*, 1993) and heart rate remotely (Vincent & Leahy, 1997). Saliva (Kobelt *et al.*, 2003a), plasma, and faecal corticosteroid and plasma catecholamines levels are easily measured (Beerda *et al.*, 1996). However, it may be difficult to differentiate, using physiological parameters, between the stress of the excitement of work, as seen in working sheep dogs and the distress caused by overwork. There is a need for longer term studies to examine chronic stress in working dogs by monitoring the effect of training and work on immunological status (Beerda *et al.*, 1997) and health (Davis *et al.*, 2003b).

Overt behaviours have been identified which occur during stress. These include paw lifting, yawning, snout licking, lowering body profile, and vocalising while more severe stress may induce dogs to pant and increase salivation (Beerda *et al.*, 1997). Other behaviours such as stereotypic activities may indicate chronic stress but so do increased paw lifting, yawning, increased activity, nosing and urinating (Beerda *et al.*, 2000).

In the following section the welfare issues identified with the different uses of dogs will be considered.

5.1 Guard dogs

Dogs have always been used as sentinel and guard animals and many are used to protect property and individuals from humans or other animals, and as such their work may be dangerous. Dogs have three sleep-wake cycles per hour during the night and these make them useful as guard dogs (Adams & Johnson, 1994a, b). Guard dogs may patrol inside fences or buildings or may be tied up to act as sentinels. Guard dogs may be poisoned and many are trained not to eat except what the handler gives them. Guard dogs are trained using an attack sleeve to bite and hold. Side to side movement of the sleeve by the handler places undue stress on the teeth which may fracture (Jennings & Freeman, 1998). Some breeds such as the Belgian Malinois may be prone to tooth damage. Root canal treatment which leaves the dog with a broken tooth, and placing metal crowns on broken teeth are effective therapies for broken teeth (van Foreest & Roeters, 1997). Damage caused by choke chain misuse is sometimes seen in guard dogs. The damage may involve loss of hair, skin abrasions and serious musculoskeletal damage to the neck (Jennings & Freeman, 1998).

Patrol dogs are often released to guard a property alone at night. They may have little interaction with any other dog and minimal time with the handler. Many are tied up by a chain on the property during the day and may

become agitated and injure themselves. However, there is little evidence to show that penning a dog is better than having it tethered (Yeon *et al.*, 2001). There are concerns about the techniques used to train guard dogs (Chapter 7).

5.2 Dogs as food

The eating of dogs is common in China (Cui & Wang, 2001), North and South Korea and the Philippines and less frequently in Vietnam, India, Thailand, parts of West Africa (Eze & Eze, 2002) and elsewhere. In the past the eating of dogs was widespread in Central America (Tykot *et al.*, 1996) and Europe. Some dog breeds such as the Chow Chow may have been developed as meat dogs and apparently St. Bernard Dogs are being cross bred with local Chinese dog breeds to produce a fast-growing meat dog. It is believed that millions of dogs are eaten annually but data are scarce and in Korea and parts of China dog meat is considered a health food. In South Korea 28% of people eat dog. Taiwan and the Philippines have banned the eating of dog (World Society for the Protection of Animals, 2004). Dog meat was eaten by the poor in Cambodia but recently it has become more popular and apparently paws and kidneys are particularly sought after (Prasso, 1993).

The management of dogs bred and reared for meat and their transport and management pre-slaughter and subsequent slaughter may have serious implications for their welfare. In China there are dog farms which specialise in producing dogs for the meat market. Dogs, along with many other animals and birds, are often transported to market in small cages and held in them while awaiting purchase. Slaughter may be by clubbing followed by ensanguination. This is probably no different from how many other species of animals and poultry are managed in these countries. If dogs reared in groups for meat production are healthy, fed well and given sufficient space, exercise and attention and provided they are transported and slaughtered in a humane manner then their welfare requirements are taken care of and may be no more compromised than any other meat animal.

Among the Sioux Indians of North America and in pre-colonial Hawaii, dogs that were for eating were treated well and killed quickly and with respect (Serpell, 1995). Australian Aborigines ate dog only when other food was scarce because they considered it unpalatable (Meggitt, 1965). Those who keep dogs as companions may think that the eating of dog meat is an unethical and immoral activity. However, although the use of dogs as meat is repugnant to many people this use *per se* has little welfare significance if the animals are managed correctly throughout the process.

5.3 Hunting dogs

There are many different kinds of hunting dogs; hounds that hunt in packs or pairs, gazehounds that course, terriers and daschunds that hunt above or below ground, bird dogs that point set retrieve or drive, and dogs that bail up or kill animals. Hunting dogs are an important tool in conservation being used for the detection of endangered birds, such as Kiwi in New Zealand, and for the selective detection and often destruction of unwanted and destructive pest species such as goats on the Galapagos Islands. Most types of hunting may be physically taxing but not dangerous. Hunting dogs are usually bred, trained and exercised to engage in their specific hunting activity. Injuries sustained during hunting may occur because of the enthusiasm of individual dogs.

Some specific injuries are more likely to occur in hunting dogs than others. Injuries caused by seeds, such as wild barley seeds, which may lodge in the nose and cause epistaxis, in the ears and cause otitis externa, or under the axilla or between the toes and cause ulceration, are not uncommon in hunting dogs. The aspiration of plant material was implicated in chronic suppurative and pyogranulomatous lesions in hunting dogs (Frendin, 1998). Injuries may be caused by barbed wire or thorns. Hunting dogs may also be exposed to the carcasses of poisoned pest animals. Dogs hunting underground may get stuck and starve to death unless dug out. Farm terriers sometimes disappear for days or even weeks and then reappear having eventually escaped from some burrow. Some types of prey are dangerous to the hunting dogs. Pigs, deer and all the large cats can defend themselves and inflict severe injuries on hunting dogs.

A condition known as limber tail caused by damage to the coccygeal muscles has been identified in English Pointers after being worked hard in cold conditions, or held in a small cage for a long period (Steiss *et al.*, 1999), and in Labrador Retrievers after hunting (Wilkins, 1997), swimming (Jeffels, 1997) or being showered in cold water (Hewison, 1997; Stockman, 1997). Hunting dogs, hounds and working dogs are more likely to suffer from leptospirosis than other dogs (Ward *et al.*, 2002).

Dogs used for shotgun hunting of birds, ground game or vermin may be shot accidentally (Keep, 1970). Many injuries caused by shotgun pellets go unnoticed especially if caused by small shot (Keep, 1970) and are often first noticed when the dog is radiographed for other reasons. Lead pellets are rapidly encapsulated in fibrous connective tissue and surgical removal is not necessary unless the pellet is lodged in a joint when the synovial fluid dissolves the lead and causes toxicosis (Grogan & Buchholz, 1981). There is a shift away from lead to steel shot in wildfowl hunting. In future dogs may be peppered with steel rather than lead shot. Steel shot corrodes in tissues

and caused severe inflammation (Bartels *et al.*, 1991). If bacterial infection occurs then draining tracts could develop and the condition would be more serious than that caused by lead.

5.4 Draft dog

In a few countries dogs are still used as traction animals. The use of dogs for pulling carts was one of the reasons why welfare organisation became interested in the welfare of dogs in the 19th century and in the UK the use of dogs for transport was banned in 1854 (Hubrecht, 1995). The use of animals for traction is always associated with specific issues such as overloading, long hours of work, too little and too poor food, and physical abuse. These were certainly associated with the use of dogs as draught animals but the practice is now rare and more of a novelty than an economically significant activity.

5.5 Service dogs

Dogs are used by police and military forces around the world for tracking, guarding and identification work. In addition many dogs owned by individuals are involved in search and rescue work. Police dogs have to be physically capable and of a temperament suited to the type of work they do. Up to 70% of dogs bred at the South African Police Breeding Centre were not suited for use as police dogs as they did not meet the standard required for advanced training (Slabbert & Odendaal, 1999). In New Zealand about 40% of dogs bred for police work are successful, but a much smaller percentage of donated dogs become active police dogs (Kyono, 2002). In this study of 74 police dog handlers, many thought that dog and handlers were not well matched (Kyono, 2002). In one sample of 40 police dogs, 24 dogs had had one handler, 13 had 2, 3 had 3 and 1 dog had 4 handlers. This suggests that up to 40% of dogs were mismatched initially (Stafford *et al.*, 2003)

Police dogs working crowd control can be injured by glass and more rarely by petrol bombs, flying bricks or stones. Police dogs can be injured when tracking criminals. In some countries police dogs can only bail up criminals, but with particularly vicious individuals it may be better if the dog is allowed to bite and hold. Police dogs are stabbed, beaten and killed by criminals. Dogs trained to bail up rather than bite and hold are particularly susceptible to attack from criminals. The New Zealand police have had 20 dogs killed on active service since 1956.

Tracking from the scene of a crime is a common practice for police dogs. This can be stressful, particularly at night, when both dog and handler may