Directorate of Distance Education
NALSAR University of Law, Hyderabad

Reading Material

Post-Graduate Diploma in Animal Protection

1.1 Animal Welfare Issues: Facts and Reality

Compiled by:

Humane Society International - India

NALSAR University of Law, Hyderabad (Print 2020)

(For private circulation only)

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Chapter 1
Introduction to Animal Welfare

Introduction to Animal Welfare

a. Introduction

This chapter covers:

- Which animals we are concerned about and why (looking at sentience, suffering, anthropomorphism, death and animal welfare)
- Why animal welfare is complex (considering different scientific definitions of animal welfare; why animal welfare science involves more than veterinary medicine; the roles of science, ethics and law).

b. Background

The formal, scientific study of animal welfare began about 60 years ago, and the discipline as a whole is known as animal welfare science. However, the question of whether animals are suffering and what to do about it has mattered to people around the world for thousands of years. A common criticism of this concern has been that animals don't have feelings as we do, and people who worry about animals may simply be attributing human feelings to animals. This attribution of human feelings to animals is called anthropomorphism.

Nonetheless, modern science suggests that we share many feelings with animals. This scientific finding supports the common intuitive sense that many people around the world have always had, i.e. that animals have similar feelings to us and therefore can and do show signs of feeling fear, pain, pleasure and other emotions. The capacity of humans and other animals to have feelings that they experience as pleasant or unpleasant is called 'sentience'.

Definitions of Sentience

Sentience is more than local sensation. "A sentient being is one that has some ability to evaluate the actions of others in relation to itself and third parties, to remember some of its own actions and their consequences, to assess risk, to have some feelings and to have some degree of awareness" (Broom, 2006). These feelings matter to the individual (Webster, 2011) and the organism is conscious of feeling something pleasant or unpleasant. Knowing that many species of animal are sentient means we know that they can suffer.

There is clear scientific evidence proving that all vertebrates and some invertebrates are sentient. Research into invertebrate sentience is continually advancing and we are learning of sentience and new capacities of invertebrate species every day. Our understanding of sentience is still developing; many species we now think are not sentient may actually be sentient, and therefore be able to suffer. For example, there is preliminary evidence that prawns may be sentient.

Sentience is the capacity to have feelings and to experience suffering and pleasure. It implies a level of conscious awareness. Animal sentience is the fact that animals can feel pain and suffer but also experience many positive emotions, such as joy and pleasure. Animal sentience is recognized in legislation around the world (e.g. the Lisbon Treaty). Studies have shown many animals can experience complex emotions which are often thought to be unique to humans, such as grief and empathy. The acceptance of animal sentience is based on decades of scientific evidence from the fields of neuroscience, behavioral sciences and cognitive ethology.

Knowing that many species of animal are sentient means we know that they can suffer. Knowing that a species can suffer helps us to ask careful ethical and scientific questions about how we can care for them in ways that prevent "one or more bad feelings continuing for more than a short period" (Broom & Fraser, 2007). There is growing evidence from neurobiology and behavioral studies that animals can also experience pleasant sensory input that produces positive emotions such as satisfaction. Knowing this will also inform how we care for animals.

As we do not yet know much about positive emotions, most of animal welfare science focuses on how to prevent animals from suffering. However, it is likely that during your professional life, there will be practical developments in how to give animals a positive experience of their lives, not simply a life that avoids suffering. Positive experiences are what make an animal's life a life worth living. An example of a positive experience could be, when training working animals, if you ask an animal to lift something or do something they are not used to doing, timing the request with a treat will mean the animal associates the task with a positive reward.

Anthropomorphism

Anthropomorphism is generally seen as a bad thing by scientists. However, some now acknowledge that we can use human needs as a starting point for considering what animals may need in order to have a good life or, at least, to avoid suffering. This is called 'critical anthropomorphism'. An example of this is pain: as humans, we find surgery very painful, especially if no anesthesia or analgesia is used. It is reasonable to expect the same to be true of many animals. Viñuela-Fernandez et al. (2007) studied the anatomical responses of farm and companion animals to drugs such as morphine; this proved that these animals can feel pain.

However, it is essential not to rely on anthropomorphism alone, without science and other information. For example, many pet cats are not friendly to humans and do not seem to enjoy interacting much with their owners; this is because of their paternal genetics and early experience (McCune, 1995). For most people, the presence of a companion is beneficial, and they assume that if they get a pet cat, the cat will enjoy the owner's companionship and want a lot of close contact, e.g. stroking. However, for many cats, this close attention from their owners is unpleasant, and those cats tend to be independent, not sleep on the owner's lap, etc. In this case, the original assumption that the cat will like social contact is incorrect.

Welfare and Death

People disagree about whether it is right for humans to kill animals. However, the state of death is not a welfare issue in its own right because welfare concerns the quality of an animal's life (suffering, etc.), and when the animal is dead, he/she can no longer have experiences.

Humans usually want to have as long a life as possible and to avoid a poor quality of life. However, with animals we are usually concerned with giving them a good quality of life, but not in keeping them alive at all costs. Much of the time we end their lives for our own purposes, and the manner in which the animal dies is an important welfare issue. For example, the method of slaughter of food animals should, ideally, cause instantaneous death. For example, in some parts of the world farmed fish are stunned and then killed instantly. However, in ocean fishing, the fish are caught *en masse* and most die relatively slowly, by suffocation.

Although being dead is not a welfare concern, a high death rate in a group of animals is a welfare concern. This is because, if many animals are dying, this may indicate poor husbandry or another problem under which many animals become diseased – and therefore experience bad welfare.

Definitions of Animal Welfare

In being concerned about animal suffering, we are concerned about what effect our treatment of animals has on their experience of their lives. Different people have different ideas about how we should treat animals, and they understand animal welfare in different ways. A common view has been that if animals are healthy, their welfare must be good. However, animals can be healthy but still not have a good life experience.

What is Animal Welfare?

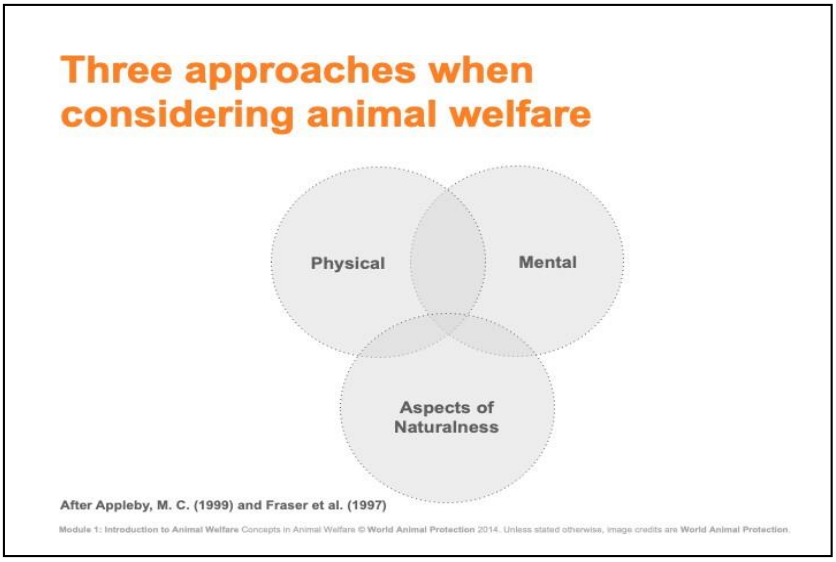
Most scientists agree that there are three areas to be considered when assessing animal welfare.

The first area is physical factors including the animal's physiology, e.g. growth rate or disease. For example, mild early tumors or infections can lead to detectable physical problems for a dog without the dog having any mental problems. This is often referred to as physical functioning – when animals are not functioning well, their owners usually ask the vet to find out why and seek to change it.

The second area overlaps heavily with the first and concerns the animal's mental state, including their preferences and their feelings. We are also familiar with an animal's feelings as they relate to health and how we can make ill animals feel better with veterinary intervention. However, other feelings in animals that an animal would choose to avoid can occur without there being any disease or production problem present, e.g. fear and anxiety during handling, but these may not necessarily be associated with any physical abnormality. Often, because owners have not noticed that their animals might have these feelings, they have not asked for advice on them, and veterinary medicine in turn has not concerned itself with them very much. There is a distinction between welfare affecting the physical or mental state of animals. However, most clinical diseases and injuries induce both physical damage to the body and some degree of mental pain or discomfort.

The third area also overlaps with the other two, especially with the mental state of the animal. It concerns an animal's species-typical behaviors (e.g. hens dust-bathing; pigs rooting; horses pair-bonding to groom; polar bears walking for many kilometers as part of their hunting behavior) and its environment – whether it is kept in the sort of natural environment in which it evolved. This 'naturalness' area of animal welfare has not been considered in our interactions with animals, because often it is not an obvious cause of ill-health. If an animal is kept in a way that does not allow them to express important behaviors, the animal can develop abnormal behaviors and may suffer from frustration and other negative emotions as a result. Furthermore, restrictions on behavior and environment may lead to physical effects, sometimes severe. It is also important to understand that just as there are aspects of naturalness that can lead to good welfare, for example, having the ability to express natural behaviors, there are also aspects of naturalness that can lead to poor welfare. For example, it can be natural for wild animals to starve, be diseased or feel extreme pain.

So we can see that these three areas of animal welfare may or may not overlap with each other.



This venn diagram illustrates these three areas of animal welfare and how they can overlap. Any significant compromise in one area tends to affect the other two, although this may not always be the case.

For example, if a single hen is housed in a wire cage on her own and has food, water, a perch, a nesting box, and an area for dustbathing, her physical functioning is likely to be good. Her mental state is likely to be good too, although she may feel frustration because of social isolation which may occur even if other birds are close by, in other cages. She will also be able to perform important behaviors like nesting before she lays. However, some people would still have concerns for her welfare because keeping a chicken in a cage is not 'natural'. The cages actually impact on other areas of welfare including the health of the animal, e.g. wired floors are likely to cause injuries; if an animal is frustrated then he or she may self-mutilate or perform stereotypical behaviors, which can cause physical damage. So, in this example, the chicken's welfare is affected in terms of all three of the

'naturalness', 'physical' and 'mental' areas of welfare.

These three areas of welfare should never be looked at in isolation and we should focus on the center of the diagram where they all overlap. It requires a holistic approach to welfare, incorporating all three and understanding the relationships between the areas.

A different example is a sheep which is farmed extensively but has a chronic infection of the foot. Some aspects of naturalness of the sheep's welfare will be very good. However, his/her welfare will be affected in terms of:

- Physical area (functioning: slower movement, weight loss because the animal is unable to access enough good grass or extra feed), and
- Mental area (feelings: pain, hunger, perhaps fear, if separated from the flock, and therefore is more vulnerable to predators)
- The overlaps between physical functioning and mental state.

These examples illustrate that animal welfare is a complex concept and that people – including scientists – may not agree on an animal's welfare because they value the three areas of welfare differently. We will now look very briefly at some of these earlier scientific definitions.

Definitions of Animal Welfare: 'Physical'

The earliest definitions concerned physical areas of animal welfare, particularly in connection with how an animal might cope with stress and how the body responds to stress physiologically. Professor Don Broom developed this view of welfare. McGlone (1993) proposed an apparently more extreme view: that welfare is only poor when survival or reproduction are impaired by a physical problem. Similarly, Moberg (1985) argued: "...the only defensible measurement of well-being in animals is to determine if the animal is suffering from stress. Furthermore, I believe that the most appropriate indicator of stress is the appearance of a pre-pathological state."

Definitions: 'Mental'

Other scientists argued for mental states, notably Professor Ian Duncan. Professor Marian Dawkins made a similar argument: "To be concerned about animal welfare is to be concerned with the subjective feelings of animals, particularly the unpleasant subjective feelings of suffering and pain" (Dawkins, 1988).

More recently, researchers as well as vets, owners and others are all acknowledging that an absence of negative feelings does not mean an animal's welfare is good. To have good welfare, it is important to have positive feelings such as happiness, safety, satisfaction, etc. (Yeates & Main, 2008; Mellor et al., 2009).

Behavioral studies and research in neurobiology using techniques such as brain imaging are beginning to indicate when animals experience positive feelings, and how much the opportunity to experience positive feelings matters to animals (Mellor et al., 2009). However, the idea is not that we have to prevent animals from ever having any negative feelings. That is unrealistic and unnatural: negative feelings have adaptive value because they motivate the animal to avoid, or escape from, harmful situations. Rather, the goal is

not to keep animals in such a way that they experience only negative feelings and cannot remove themselves from that situation or adapt to it (Keeling et al., 2011).

Natural behaviour

In the 1960s, there was widespread public concern about the effect on animals of the intensification of farming. In the UK, the government set up a committee of scientists and others to investigate the matter. The committee was named after its chair, Brambell, and they issued a report known as the Brambell Report. One of the comments in that report was: "In principle, we disapprove of a degree of confinement of an animal which necessarily frustrates most of the major activities which make up its natural behavior" (Brambell Committee, 1965).

In another example of how some authorities stress the importance of natural living, the scientists Barnard and Hurst (1996) argued that species have evolved behaviors and physiology that enable them to survive and to reproduce and that that is the basis of natural selection. They concluded that domestic animals should be kept in ways that allow them to perform the behaviors, i.e. in accordance with natural selection. The American ethicist Professor Bernie Rollin has also argued for this. He noted that animals have an inherent nature (in Greek, *telos*), or "genetic traits manifest in breed and temperament", and he argues that, to have good welfare, animals need to be able to fulfil their nature (Rollin, 1993).

'Feelings', 'Naturalness' and Needs

Related to mental states and aspects of naturalness is the idea that animals need to perform certain highly motivated behaviors that are typical of their species. Those behaviors would have developed in their wild ancestors to enable them to obtain essential resources and therefore, to survive (e.g. in calves, the act of suckling to ingest milk from the mother; in pre-parturient sows, building a secluded nest in which to give birth).

The need to show a behavior originates in the brain and therefore it is generally understood now that if animals do not live in an environment that permits these behaviors the animals are likely to experience negative emotions and therefore to suffer. This has given rise to the idea that animals have behavioral needs and that being in an environment that enables animals to express the behaviours can be a source of positive emotion (reviewed by Widowski, 2010).

> "Animal welfare means how an animal is coping with the conditions in which it lives. An animal is in a good state of welfare if (as indicated by scientific evidence) he/she is healthy, comfortable, well nourished, safe, able to express innate behaviour, and if he/she is not suffering from unpleasant states such as pain, fear and distress. Good animal welfare requires disease prevention and veterinary treatment, appropriate shelter, management, nutrition, humane handling and humane slaughter/killing."

These examples show that animal welfare is a complex concept with three important areas– physical, mental and aspects of naturalness. The best definition therefore seems to

be one that combines all three areas. That is what the World Organization for Animal Health uses. The Organization is known by its French acronym OIE (Office International des Epizooties) and is based in Paris. The OIE represents around 178 countries and territories and is taking the lead in promoting animal welfare standards around the world. Its statement regarding welfare and it stresses the importance of scientific evidence. This definition covers all three aspects of animal welfare:

- **Functioning (Physical): coping, healthy, disease prevention, nutrition**
- **Mental (Feelings): comfortable, safe, not suffering from unpleasant states, humane handling and slaughter**
- **Aspects of Naturalness: coping, able to express innate behavior.**

The Five Freedoms

The Five Freedoms are often used as a framework to assess animal welfare:

- Freedom from **hunger and thirst.**
- Freedom from **(thermal) discomfort.**
- Freedom from **pain, injury and disease.**
- Freedom to **express normal behaviour.**
- Freedom from **fear and distress.**

Another set of key statements that combines all elements of welfare are known by the term the Five Freedoms.

The Five Freedoms were based on the concerns and recommendations laid out in the Brambell Report (discussed above), published in the UK in 1965. You can see that they also relate to physical functioning, mental state/feelings and natural behaviour.

The Five Freedoms overlap with the three aspects of welfare: physical, mental and naturalness. For example, to achieve functioning we need freedom from injury and disease, freedom from hunger and thirst, freedom from thermal discomfort, freedom from fear and distress, and so on.

History

<u>India</u>

Ahimsa: do not cause injury to any living being Hinduism, Buddhism, Jainism (Taylor, 1999)

- Bishnoi tribe in Rajasthan:

Ecological Philosophy for about 500 years: Don’t eat anything animal, and give 10 per cent of harvest to wildlife. Taking India as our first example, concern for animals is part of

the ancient religions practiced here. Concern is motivated in part by a belief in reincarnation, that is, that the animal may be a reincarnated human soul, and that your own actions as a human will affect how you are reincarnated.

China

Confucianism: Due to the one-ness with all beings, the suffering of animals is a source of distress in humans (Taylor, 1999). In China, Confucianism includes concern about animal suffering.

India and China are only two examples from around the world. Today, the dominant ethical arguments about how we should treat animals are rooted in Western thought, starting with the philosophies of the Ancient Greeks, with influential additions from thinkers in Britain and other European countries in the 18th and 19th centuries.

Europe

- Ancient Greece

Fraser has pointed out that all of the present days' arguments – for example, about whether or not to eat animals, and what our duty of care is towards animals – are the same concerns that the Ancient Greeks had. Some of these are outlined here.

  - Pythagoras and others (500 to 300 BCE): we are similar to animals so we shouldn't eat them
  - Stoics: animals aren't rational, therefore we don't need to worry about whether we are treating them fairly
  - Plutarch: animals may not be rational, but we should still be kind to them
  - Porphyry (250 ACE): animals deserve moral consideration because they can feel distress

- Britain in 18th and 19th centuries

Fraser highlights that the treatment of animals in Britain had been very uncaring for many centuries. This became a concern because religious and other authorities believed humans should act virtuously (e.g. Jeremy Bentham in the 1700s; first formal animal protection law passed in 1822) c.f. earlier religious laws elsewhere e.g. Judaism forbids causing animals pain; Islam forbids cruelty to animals (Taylor, 1999).

Western thought developed following the era and in Britain in the 18th century, a philosopher called Jeremy Bentham pointed out that treating animals well was nothing to do with whether or not they could talk or think, but simply whether they could suffer. In 1822, Britain passed what was probably the first animal protection law in Western democracies. However, in non- Christian religions such as Islam and Judaism, there were already religious laws in place about treating animals well.

Modern Agriculture

Moving forward to modern-day concerns, these grew with the development of modern intensive agriculture in the 1950s and 1960s in Europe and North America in the aftermath of the Second World War. The focus was on making animals more productive (e.g. with faster growth rates, producing more milk, producing larger litters) so that people could afford to eat more nutritionally and so enjoy better health. The systems typically involve housing animals in large numbers, and veterinary medicine was and is an important part of the animals' welfare there, because such housing allows infectious diseases to spread quickly. However, the development and use of veterinary vaccines and antibiotics prevents them from suffering in this way.

As other nations develop economically today, they too want affordable, nutritious animal-based food, and national agricultural practices are drawing on and adapting the intensive approaches developed in Europe. Two examples are:

1. In sub-Saharan Africa: cross-breeding zebu and other indigenous breeds, to increase their fertility and other traits while retaining their suitability for being managed by pastoralist farmers, under the local climatic conditions (Scholtz et al., 2011).

2. In Asia: there is rapidly growing demand for a more Western diet in most Asian countries, notably China and India; that is, for a diet including more meat and fish, rather than traditional rice/carbohydrate-based meals. There is also growing demand for dairy products: by 2006, cheese dominated the growth in dairy consumption in both Malaysia and Japan, perhaps because of its use in burgers at fast-food outlets such as McDonald's and Wendy's (Pingali, 2006).

History

As intensive husbandry developed in Europe and the USA in the 1960s, there was growing public concern about its effects on animals. In the UK, a book on the subject, *Animal Machines* by Ruth Harrison, caused such concern that the British government called for a committee of scientists, vets and others to examine the question. That was the Brambell Committee, which published the Brambell Report, which was mentioned earlier. There was also public concern about other animals under human care or influence e.g. the use of wild-caught primates for research, and the need to conserve wild species.

Animal Welfare Science

In light of concern for farmed animals in particular, and the Brambell Committee's report, scientists began to formally investigate questions of animal welfare. The discipline is known as animal welfare science, and it has arisen out of specific questions that the public want answered, e.g. do hens need to dust-bathe as they would in the wild? Why do piglets bite each other's tails in intensive systems? Do dairy calves suffer if they are removed from their mothers after 24 hours?

As animal welfare science arose out of public concern, rather than from general curiosity about the world, it is a "mandated science" (Fraser, 2008a). Animal welfare science is now a well-established field. The professional group for researchers in animal welfare is the

International Society for Applied Ethology (ISAE) (which was co-founded by veterinarian Andrew Fraser). There are several peer-reviewed scientific journals that include a lot of animal welfare research, and more and more of this research is appearing in the veterinary clinical journals as well. In addition, there are two principal peer-reviewed journals that are dedicated to animal welfare science. They are *Animal Welfare* and *Applied Animal Behavior Science*, which is the ISAE's publication.

International Importance

The importance of animal welfare internationally is reflected by the OIE, which we mentioned earlier while discussing definitions of animal welfare. The OIE's member countries have authorized the organization to "take the lead internationally on animal welfare with guidelines and recommendations". The OIE has an Animal Welfare Working Group which holds international conferences every three or four years, e.g. Egypt in 2008, Kuala Lumpur in 2012. Since May 2005, the World Assembly of OIE Delegates has adopted seven animal welfare standards in the *Terrestrial Animal Health Code* and two animal welfare standards in the OIE *Aquatic Animal Health Standards Code* (*Aquatic Code*) (OIE, 2011b).

The Food and Agriculture Organization (FAO) of the United Nations (UN) now has an online resource for international and national information related to farm animal welfare, called the Gateway to Farm Animal Welfare (FAO, 2011).

Animal welfare is also an aspect of the One Health Initiative. This is an international collaboration among all professionals in **human health** (doctors, nurses, public health practitioners, epidemiologists), **animal health** (veterinarians, paraprofessionals, agricultural workers), **environment** (ecologists, communities, wildlife experts), and **other areas of expertise** (disease detectives, laboratorians, physicians, scientists, law enforcement and policy makers). It aims to expand knowledge of diseases in people and animals worldwide, especially because several diseases put both animals and people at risk. Animal welfare is involved here because disease affects feelings and functioning so much. Also, mass slaughter is sometimes used to prevent the spread of some diseases to animals and people. When this is urgent (e.g. during outbreaks of avian flu) animals can suffer at the time of slaughter because personnel are not trained to handle them humanely. The One Health Initiative is supported by the World Organization for Animal Health (OIE).

Animal Welfare Science

We now move on to how veterinary medicine and animal welfare science overlap. Veterinary medicine already concerns the functioning and feelings aspects of animal welfare, through the diagnosis, treatment and prevention of disease. Infectious diseases have been particularly important, especially in intensively farmed animals, and vets have been very important in this aspect of animal welfare.

For example, there are now at least 60 vaccines against major infectious diseases in the main domestic species (e.g. tetanus in horses; Newcastle disease in poultry; clostridial

diseases in sheep; rabies in many species; distemper in dogs). These diseases would otherwise cause widespread suffering. Vets continue to research infectious diseases and to advise governments and individual owners about the best use of these vaccines, so that many millions of animals are protected each year.

As research has revealed more about how animals can suffer for reasons other than infection or other disease, vets in different countries are including this consideration more and more. Due to the rapid expansion in knowledge of health and diseases – infectious and otherwise – veterinary medicine and animal welfare policies have not always kept up with developments in the other fields relevant to animal welfare , especially the field of applied animal behavior.

There is a lot of understanding about normal animal behavior as it relates to physical health: many clinical signs of disease are changes in normal behavior (e.g. a calf that is mouth-breathing instead of breathing quietly through his/her nose; a horse that is lame, i.e. not bearing weight evenly on all four legs). An animal's behavior can also help to assess how much pain he/she may be feeling, and to determine the appropriate mixture of analgesic drugs to give.

There is growing scientific knowledge about behavioral signs that occur because the animal's handling or housing are not appropriate. Similarly, there is more and more research arising on the importance of positive emotions in animal welfare; this research may in time tell us how to facilitate more positive experiences for animals.

In the 21st century

Today, countries worldwide agree that animal welfare is important, and animal welfare science is an established scientific discipline. Many government research departments and university faculties teach and study animal welfare, more and more vet schools also have research groups and postgraduate training in animal welfare. There are diploma programs and online courses (MOOCs) in animal welfare open to all.

The World Organization for Animal Health (OIE) recommends that animal welfare is a required Day 1 competency for all veterinary graduates (OIE, 2011c). This would enable veterinary graduates to, "…explain animal welfare and the related responsibilities of owners, handlers, veterinarians and others responsible for the care of animals; identify animal welfare problems and participate in corrective actions; and know where to find up-to-date and reliable information regarding local, national and international animal welfare regulations/standards in order to describe humane methods for:

- Animal production;
- Transport; and
- Slaughter for human consumption and killing for disease control purposes."

Many people today agree that we have an obligation towards animals. Their reasons for this may differ. For example, for some people it is because animals have inherent value. For others, it is because animals have economic value to us, i.e. are useful to us for food, etc. For others, it is because of empathy, i.e. concern that animals can suffer. For others, it

is because the species of animal is becoming rare and we have the power to prevent it from dying out. These different reasons for showing concern for animals mean that, in turn, there are different views about what our obligations to animals entail. That is the field of ethics – how we should treat animals. Other lectures will look more closely at ethics, and at how the law on animals may or may not reflect these concerns.

Conclusion

To sum up this introduction to animal welfare:

- Animal welfare is concerned with how sentient animals experience their lives, in terms of their physical functioning, mental state and natural behaviours. To understand these three aspects requires science – hence animal welfare science.
- Animal sentience is recognized in legislation around the world (e.g. the Lisbon treaty). Studies have shown many animals can experience complex emotions which are often thought to be unique to humans, such as grief and empathy. The acceptance of animal sentience is based on decades of scientific evidence from the fields of neuroscience, behavioral sciences and cognitive ethology.
- Animal welfare is affected by people's values – how they think we should treat animals, and what they think is important for animals. Science helps us to understand some of these issues. Ethics then weighs that knowledge with human desires (e.g. to earn a living by farming; to clear land and build houses), so that we can decide how we should treat animals. That is the field of animal ethics.
- Related to this, animal welfare also involves the law, i.e. society's rules about how we must treat animals. Ideally, animal welfare law should reflect the decisions that society has reached – using science and ethical reasoning –about how we ought to treat animals. However, often animal welfare law may set a low standard of care because there may not be public money available to enforce higher standards or because the public is not aware of welfare problems or is not willing to spend money on enforcing higher standards of welfare.

The rest of this course will examine these three dimensions of animal welfare – science, ethics and law – and show you how they apply in practice.

Chapter 2

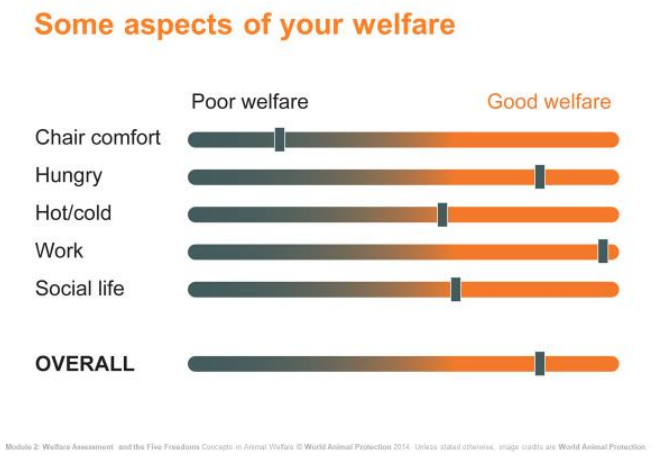
Welfare Assessment and the Five Freedoms

The Theory Behind the Five Freedoms

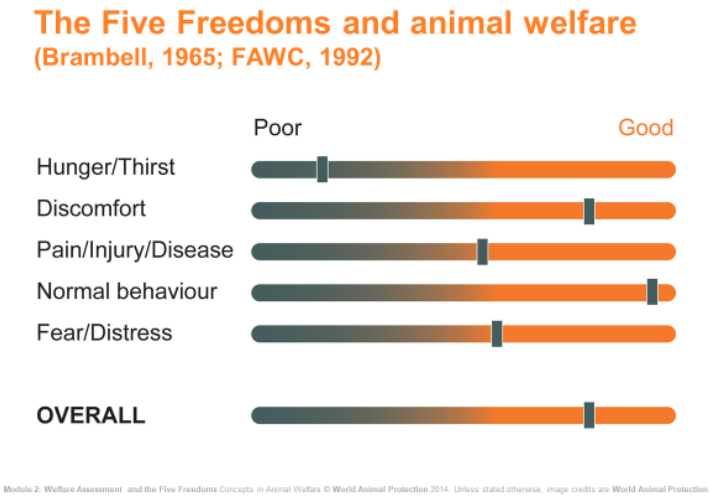
In our discussion of the definition of animal welfare in the first lecture, we mentioned the Five Freedoms. The freedoms are a very important landmark in scientific and ethical approaches to animal welfare, and many current welfare assessment tools have been developed from them. Let us have a look at it in some detail.

If you ask someone how they are, they often respond with a single phrase or concept, like "pretty good", or "OK" or "terrible". We can rank these on a continuum from 'good' to 'poor'. If you ask for further detail and try to determine the cause behind the person's answer, you will usually get a reply that incorporates different feelings about various aspects of the person's life. For example, an individual may feel that work is good, but his/her personal life is only reasonable, etc.

In other words, although we might be able to describe how we are feeling overall, this is affected by many components that may be independent of each other. For example, the comfort of your chair is not related to how hungry you feel; however, they both affect how you feel at a particular moment.



So, we can see that human welfare is a combination of independent components, some of which may be good and some of which bad. The Five Freedoms are likewise a list of components of animal welfare.



The UK's Farm Animal Welfare Council proposed the Five Freedoms in 1992, using the recommendations from an earlier government enquiry known as the Brambell Committee (1965).

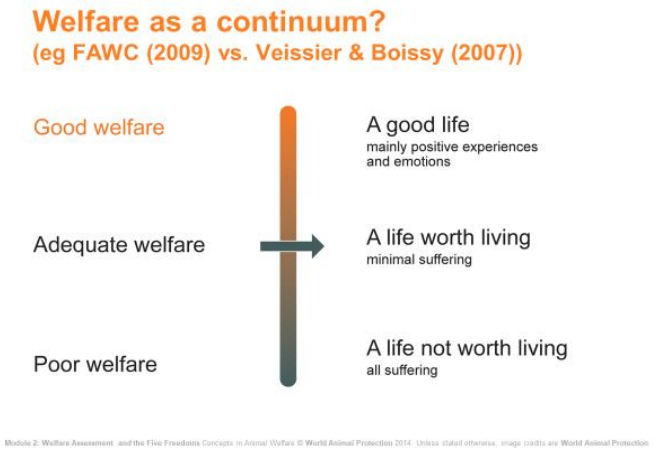
Each of the Five Freedoms can overlap with the others. For example, if an animal is hungry, he or she will seek food and eat it – this is normal behavior. If the animal cannot find food, or if the environment does not allow him/her to show normal food-seeking behavior, s/he may become distressed. Therefore, if animals are not free from hunger and are not free to express normal behavior, they may also not be free from distress.

All life ends in death; therefore, freedom from death is not something that we can provide to any organism. However, we kill most of the animals that we keep. The issue of whether or not we should kill animals is an ethical one. The avoidance of death in animals has an

ethical value for many cultures. Moreover, from the animal's point of view, animals have an interest in life and, generally, will try to avoid death.

Even though we cannot guarantee freedom from death to any animal, the manner of an animal's death does concern animal welfare. For example, if someone keeps a chameleon as a pet and does not feed the animal properly, the animal will die of malnutrition and associated diseases. In that case, the animal's death comes about because several of the Five Freedoms have been compromised (freedom from hunger, freedom from disease, freedom from distress and, possibly, freedom to express normal behaviour).

Here you see each of the freedoms on a scale from poor welfare to good welfare. The 'Poor' side of the spectrum signifies that the particular need has not been met. Moving towards the 'Good' end, we see that the need (or freedom) has been fulfilled. As you see, an animal may have different levels of each of the Five Freedoms – some of the aspects may be good, while others may be poor. This diagram suggests that we can assess each area and then come up with an overall welfare score. However, this is not as simple as it sounds.



This approach relies on the underlying assumption that welfare lies on a continuum. Under that assumption, welfare ranges from 'Poor' to 'Adequate' to 'Good'. At the 'Poor' end, the animal's environment is such that the animal has largely negative experiences and constant suffering so that his/her life is not worth living. With better care and a better environment, animal welfare may be 'Adequate': the animal may have few negative experiences, but no positive ones either. That is thought be a life worth living. At the other end of the continuum, welfare is 'Good', i.e. the animal has mainly positive experiences and not just the absence of negative ones (FAWC, 2009).

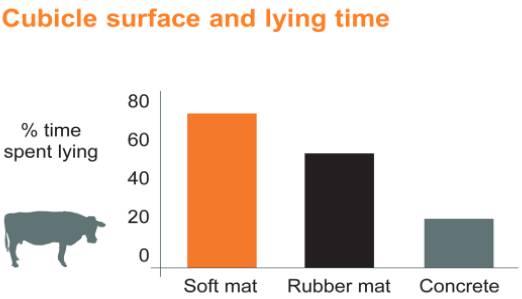
There is ongoing research into this, and some scholars argue that this view of welfare is too simplistic. However, for you, it should remain a matter of assessing specific aspects of welfare and then making your best judgment of how relatively good or bad they are in comparison with similar situations, or the situation as it was previously.

Most Farming Systems Restrict Normal Behaviour

Here we see dairy cows who are housed. Housing makes it easier to safeguard cows' health and production in climates where cold, wet weather makes it impossible to manage the cows on pasture. However, housing restricts cows' normal ranging behaviour. Therefore, housing keeps cows free from some diseases, but it reduces their freedom to express normal behaviours. That is, it can also predispose them to diseases such as mastitis and foot disorders, both of which can be very painful, and which can be present at levels of 20 per cent or higher in dairy farms in many parts of the world.

For this reason, a survey in New Zealand suggested that farmers in most parts of that country should not invest in housing because it would create more welfare and production (and therefore economic) problems than it would solve.

Some restrictions of normal behavior, such as farrowing crates, are obvious. Farrowing crates restrict movement (in order to prevent piglet crushing) and this prevents many aspects of normal behavior, such as maternal behavior and social interaction with other adults. However, some restrictions are only highlighted after scientific investigation. For example, the lying surface in a cubicle shed can affect the lying time as much as the design of the cubicles.



This study on cows assessed the time they spent lying in a 24-hour period on different lying surfaces in a cubicle shed. Cows provided with a soft compressible bed would lie down for about 70 per cent of the time, which is similar to a cow grazing at pasture. However, this time was reduced when a harder rubber mat or concrete surfaces were used. These harder surfaces, therefore, restrict normal behavior. Furthermore, this restriction of lying behavior has health implications – increased lameness is associated with reduced lying times.

Problems with the Five Freedoms

The Five Freedoms are ideal states that are extremely difficult to achieve. For example, some freedoms may conflict.

- To be free of disease sometimes requires treatment, and this induces fear during handling.
- To allow an animal to express normal behavior will inevitably cause distress on certain occasions during 'normal' social interactions.

When one of the freedoms is compromised (e.g. during handling and/or during normal social interactions), this can have both short-term and long-term negative effects on an animal's welfare. See Balcombe et al. (2004) for more information on this.

In farming, as in the wild, it is impossible to fully provide the Five Freedoms at all times. Sometimes it is undesirable to satisfy them all, for example:

- If a dog is free to express normal behavior, the dog should be allowed to chase and kill sheep or cats – but this is undesirable;
- Restraining farm animals inevitably causes some distress, but is necessary in order to vaccinate them, trim their feet and keep them free from disease. Clearly, the distress of restraint should be minimized, but some animals will feel it more than others, no matter how good and concerned the stockperson.

Such compromises are inevitable. The only way for wild or domesticated animals to avoid some form of welfare compromise at one time or another is for the animals not to exist at all. Therefore, the more realistic question is: what is the extent and the nature of the compromises that we should accept? This is an ethical question; which science informs us about but cannot answer on its own. The question of which compromises are acceptable, and why, causes a lot of disagreement in society.

Additionally, the list of Five Freedoms emphasizes avoiding negative experiences for the animal (there are four 'freedoms *from*') and does not promote positive experiences.

The Five Freedoms in the 21st Century

The Five Freedoms are intended primarily to prevent suffering, not to completely eliminate stress. As such, they are a list of the outcome of good husbandry. As a result of the widespread popularity of the Five Freedoms as a basis for assessment, they have been adapted and modernized in various forms to help the public, legislators and farmers everywhere to understand how best to care for captive animals.

Five examples of this are:

1. The development of the Welfare Quality® project to assess the welfare of farm animals from birth to death. The project involves the EU and four South American countries, and the areas of welfare assessment were developed directly from the Five Freedoms.
2. The literature increasingly mentions the Five Freedoms:
    - Freedom from hunger and thirst
    - Freedom from discomfort

- Freedom from pain, injury and disease.

- Freedom to express normal behavior

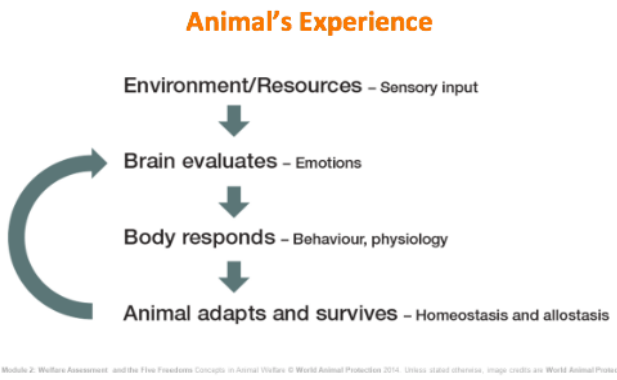
- Freedom from fear and distress

However, there is growing appreciation that all five are interrelated. For example, a recent review of ocular pain (Williams 2010) in livestock points out that "diseases that compromise vision have significant effects on the freedom to behave normally and increase fear and distress. We should continually reflect on how these conditions are affecting all five of these freedoms". In a completely different paper (Jongman 2007), the Five Freedoms are cited as the basis for assessing the welfare of indoor-only cats.

3. The third example is from international finance. The International Finance Corporation of the World Bank Group supplies loans to businesses in developing countries. This includes livestock businesses, and the Corporation has publications specifically on the topic of animal welfare. "At the project appraisal stage, the International Finance Corporation (IFC) will review and assess how the applicant addresses or plans to address various animal welfare aspects. IFC will decline, at their discretion, selected projects where the system is incompatible with the Five Freedoms" (p.17, World Bank, 2006).

4. The fourth example is from the World Organization for Animal Health (OIE). This organization is there to "take the lead internationally on animal welfare with guidelines and recommendations". The opening statement of the chapter on animal welfare within the OIE's Terrestrial Animal Health Code says that "the internationally recognized 'Five Freedoms' provide valuable guidance in animal welfare" (OIE, 2011).

5. Finally, private retailers also use the Five Freedoms as a basis for assuring customers that the food they are buying has come from animals who were well treated. For example, the international retailer Marks & Spencer specifies "ensuring that farming systems meet as many of the Five Freedoms as possible".



In order to know exactly which aspects of animals' experience we might measure in welfare assessment; it helps to break it down into a sequence. Here we see that animals get sensory input from their environment – e.g. they see, hear and touch aspects of their housing or the events around them.

Next, the brain evaluates this sensory input in accordance with the animal's experience, genetics, etc. For example, the brain may evaluate the input as novel (e.g. the arrival of a new animal), or as a potential threat (e.g. the vet), or as a source of pleasure (e.g. the approach of another animal for mutual grooming or play), or as neutral (e.g. the tractor passing by).

The brain's evaluation may, then, create an emotion that is negative (e.g. anxiety on seeing the vet or seeing a new animal), or positive (e.g. pleasure because of anticipated grooming or play). Or, there may be no new emotion because the sensory input is neutral (e.g. the sound of the tractor).

Next, the body responds to the emotion, as appropriate. For example, fear can increase the heart rate and cause the animal to behave differently (e.g. stop grazing, get up, run away, etc.). Pleasure can also increase the heart rate and cause the animal's behavior to change: he or she may also stop grazing or get up, but will probably approach rather than run away.

Therefore, the final result of this sequence is that the animal can adapt to its environment and the events there and thus 'survive' in a very general sense. For example, the animal ignores the tractor and does not waste energy avoiding it, because he or she has learned that it is benign. However, he or she does expend energy trying to get away from the vet (not knowing that the vet's diagnosis and treatment may be what he or she needs to survive).

There are two important concepts applied to the adaptive process – 'homeostasis' and 'allostasis'. We shall now look briefly at those, and at the central role of the brain.

Animal Adapts and Survives

Homeostasis

Animals need to maintain their cellular environment around narrow set points, so that the vital organs keep functioning. This steady internal state that is necessary for the basic processes of life is called 'homeostasis', which literally means 'same state'. Maintaining homeostasis is an automatic process involving central control by the brain. An example is the pH of the blood: in domestic mammals, blood pH needs to be kept within a very narrow range, otherwise the vital organs do not function as well and this may become life-threatening. Consequently, the body has sensors that enable the appropriate excretion of bicarbonate and acid ions, via breath and urine respectively, so that the pH is maintained at the set point of 7.35 to 7.45. At the cellular level, homeostasis is essential. However, the concept does not adequately describe how animals adapt in order to survive.

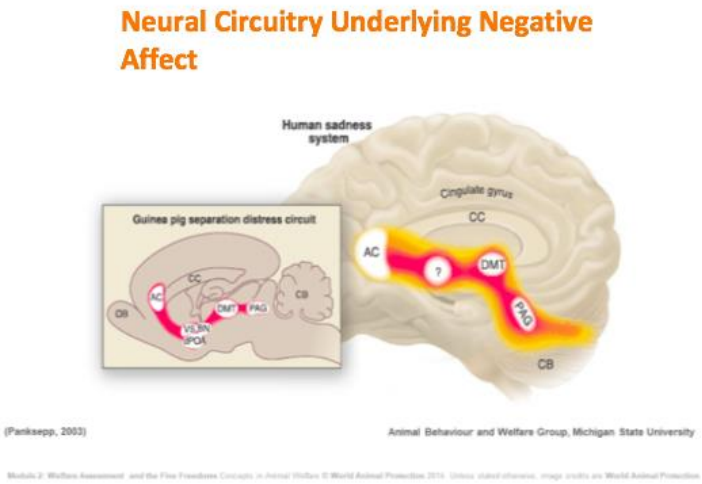
Allostasis

The broader adaptive process is called 'allostasis'. It literally means 'other state': it is a state of stability that is achieved through change. Hence it is different from homeostasis, which is a steady state that revolves around unchanging, narrow set points. 'Stability through change' comes about because the brain has a memory: it evaluates sensory input against its existing information, so that the animal can respond appropriately to the events in future. Those events might be part of the life cycle, such as pregnancy, or they might be a completely novel challenge, such as the first time a cow experiences milking by a machine. In all cases, the animal has an expanding repertoire of physiological and behavioural adaptations that enable him/her to keep functioning within his/her environment. The brain, memory and emotions play a central role in 'driving' adaptive changes in physiology and behaviour, which we can then measure in welfare assessment. So, we will look at the brain next.

Brain

The brain is of interest with regards to welfare, because of emotions. We cannot assess emotions directly in animals. However, we can now assess their brain activity under specific conditions and compare that with the activity in humans who report themselves to be feeling a particular emotion. For example, the main picture shows typical human brain activity when a person is feeling sad. The

insert shows a guinea pig's brain activity when the animal is showing distress on being separated from others. You can see how similar the anatomical circuits are in both brains; both involve clusters of neurons within structures such as the PAG (para- hippocampal gyrus) and the DMT (dorsal medial thalamus), both of which we see in each picture here.



Research on the neurobiology of emotions is growing but is not exhaustive for all our domestic species in all husbandry conditions. However, close similarities with human studies, as illustrated on the picture, allow us to infer what emotions the brain may generate in animals that are in particular conditions.

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Going back again to our framework: let us now look at the aspects of the four elements of an animal's experience we can measure, so that we can assess welfare:

1. First, environment and resources create sensory input. As animal owners, we provide animals with resources, e.g. we breed them to have a particular genetic makeup, we house them in a certain way. Also, various events happen around our animals during the day. There are regular daily events such as the change from day to night, or the arrival of food. Other events will be occasional, such as a clinical examination, or transport to market. There are also internal events,

such as the animal's bladder filling with urine. All these events and resources create ongoing external and internal sensory stimulation for the animal. We cannot easily measure that sensory input. However, we can record the resources that are available to them, and many of the events in their environment.

2. Next, the animal's brain evaluates the sensory input. For example, is what the animal sees familiar or not? If it is familiar, is it associated with anything threatening, painful or pleasant? The brain's evaluation gives rise to emotions (e.g. fear, happiness) and to physical feelings (e.g. pain, excitement, nausea).

3. The animal's body responds to these feelings, both physiologically (e.g. increased heart rate) and behaviorally (e.g. urinating, vomiting, hiding). There is no easy way to measure their emotions and feelings for welfare assessment. However, we can measure their responses.

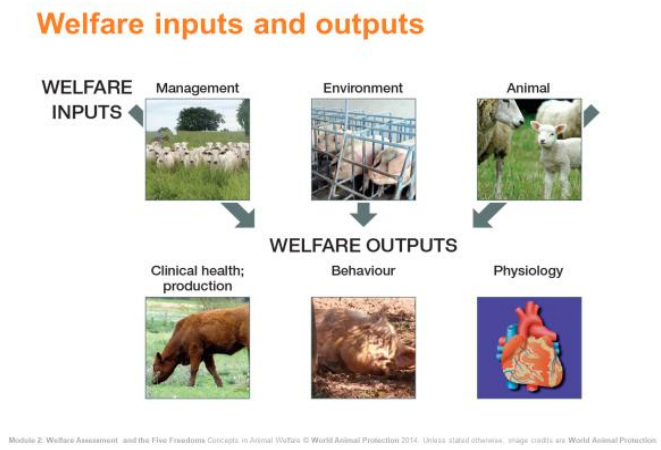
4. Moving down, we see that these responses enable the animal to adapt to the initial event as appropriate, and therefore to survive. Survival, or death rate, can be a very crude indication of welfare within a group of animals.

What to Assess

1. Measures of the environment and resources – 'welfare inputs' (e.g. handling, housing),

2. Measures of the animal's responses – 'welfare outputs' (e.g. their physiology and behavior)

The events and resources which give rise to sensory input are known as 'welfare inputs' or 'resource-based measures'. The animal's responses to this input are known as 'welfare outputs' or 'outcome-based measures'.



These pictures illustrate this more clearly

Welfare inputs – the resources that are available to the animal – fall into three main categories:

1. Management/ stockperson resources (e.g. how well trained the stockperson is; how much time he or she has to care for the animals).

2. Environment resources (e.g. the kind of housing; the quality and amount of the animals' food; the use of vaccines, anthelmintic, etc.).

3. Animal resources (e.g. the animal's genetic makeup and early experience, which affects disease resistance, fear thresholds, etc.).

Welfare inputs are relatively easy to measure – especially stockperson and environment related ones. Because of this, some welfare assessments only look at inputs. However, you cannot know how an animal is experiencing his/her life if you do not also gather data directly about the animal.

Consequently, welfare outputs – the animal-centered measures – must be part of the welfare assessment. There are three main categories of welfare output:

1. Measures of disease (e.g. lameness, coughing and other clinical signs) and of production (body weight; milk production).
2. Measures of behavior (e.g. the amount of time a cow spends lying down, or the presence of stereotypic behavior).
3. Measures of physiology (e.g. heart rate).

The Five Freedoms and Welfare Inputs and Outputs

We shall now pull all this together by looking at how the Five Freedoms can direct us, broadly, to the most important welfare inputs and welfare outputs.

Freedom from Hunger and Thirst

Inputs: Ready access to fresh water, and a diet that maintains full health and vigour, e.g. how often stockperson delivers feed

Outputs: Body weight; body condition score; evidence of dehydration on the skin-pinch test

Freedom from Discomfort

Inputs: Appropriate environment, including shelter and a comfortable resting area

Outputs: Pressure sores on the skin

Freedom from Pain, Injury and Disease

Inputs: Veterinary advice disease prevention or rapid diagnosis and treatment

Outputs: Prevalence of coughing, etc.

Freedom to Express Normal Behaviour

Inputs: Sufficient space, proper facilities and company of the animal's own kind

Outputs: Signs of injury from fighting; abnormal behaviours

Freedom from fear and distress

Inputs: Conditions and treatment which avoid mental suffering, e.g. stockperson's training

Outputs: Behavioural tests, e.g. avoidance distance

Note that, as they are written, these examples would not help you very much in doing an actual assessment because they are too vaguely worded. Let us look at how we could do a welfare assessment using the Five Freedoms:

Using the Five Freedoms to Assess Welfare Inputs and Welfare outputs

For each freedom, estimate:

- percentage of animals affected (e.g. by hunger, thirst, fear, etc.)
- how badly they are affected (e.g. how many are moribund vs. how many have mild clinical signs vs. how many are healthy)
- how long the problem has been going on for

Example: Freedom from hunger in thin sheep

Percentage affected: How many sheep in the flock are thin?

Severity: How thin are the sheep (body condition score)?

Duration: How long have the sheep been thin?

This shows you how you would apply those principles in a flock of sheep, in the area of freedom from hunger. We noted much earlier that, while it is convenient to then provide an overall welfare score, it is difficult to do and may, in fact, not be desirable because it may not adequately reflect the animal's experience in each area of concern.

If you were doing the assessment in our example here, using the Five Freedoms, you could simply provide the numbers for each specific point. By doing so, the farmer would now have a benchmark against which to measure progress, and to compare his farm with other farms.

Conclusions

Five Freedoms: Limitations observed as assessment tool but is a useful framework for investigating animals' experience of their lives

Animals' experience: Sensory input to brain; emotions observed; body responds and adapts (allostasis and homeostasis)

To assess their experience: Welfare inputs (stockman, environment, animal); Welfare outputs (animal-based percentage affected, severity, duration)

To sum up:

- You now know the theory of the Five Freedoms, and how they have influenced the development of assessment tools around the world. For example, we mentioned the Welfare Quality® project – which is academic and practical – and the International Finance Corporation of the World Bank which is economic, and the retailer Marks & Spencer, which is commercial.
- You also know the limitations of using the freedoms as an assessment tool by themselves because they are anthropocentric, and they focus on the negative experiences rather than suggesting the promotion of positive experiences. They also do not account for any adaptation the individual animal may be able to make in response to a bad situation.

- You know too, however, that the freedoms can guide us in finding out more about what is important in an animal's experience. In particular, you have seen that an animal's experience has four main elements: sensory input to the brain, emotions, body responses and consequent adaptation through allostasis and homeostasis.
- You also know that the brain's evaluation and the emotions that this generates are very important.
- Next, you know that, to assess the animal's experience, the easiest things to measure are the welfare inputs; i.e. the resources that create the sensory input, which are the stockperson, the environment, and the animal (e.g. his/her genetics).
- Also easy to measure are welfare outputs – i.e. the body's responses, which you can assess in terms of the number of animals showing a given response (e.g. body condition, fearful behavior), how severe that response is, and how long that problem has been going on.

Chapter 3

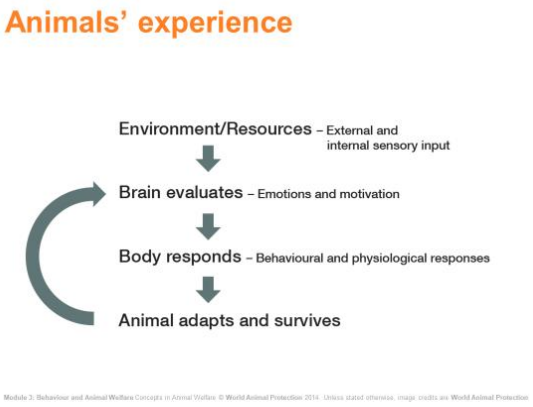
Behavior and Animal Welfare

Introduction

The chapter investigates how we know if performing a particular behavior is important to an animal. As part of this, you will learn the basics of behavior, i.e.

- The importance of understanding the natural behavioral repertoire
- The role of motivation in behavior
- How emotions and genetics can influence the way the brain processes information and how this can affect behavioral responses.

Then we will look at how to find out which behaviors are a priority for the animal and will end by noting some examples of important behaviors in a variety of animals.



We are interested in behavioral measures of welfare, because they can tell us something about an animal's experience. They can give us information such as:

- The animal receives internal and external sensory input.
- The brain evaluates the input, which may generate emotions and the urge to perform a particular behavior, as well as to exhibit physiological responses such as the stress response
- The responses should enable the animal to adapt and survive, and this information is stored by the brain, as shown by the arrow on the left.

Many physiological responses are not visible. Furthermore, most of them are non-specific and do not indicate if the experience is positive or negative.

Many behavioral responses on the other hand are easy to observe and possess a more complex level of functioning than physiological responses. This can be seen in how animals change and control their environment.

Physiological Responses**:** More specific measure of emotional state and experience. Later you will look at the different types of physiological response that animals may have to a particular sensory input. In short, most physiological responses are difficult to observe directly. Also, they are largely non-specific. For example, the stress response can occur when an animal experiences positive or negative sensory input. Therefore, measures of the stress response do not tell us if the animal is having a positive or negative experience.

Behavioral Responses: In contrast, behavior represents a more complex level of functioning than physiological responses, because animals' behaviors allow them to change and control their environment (e.g. run away, build a nest). Also, the behaviors an animal shows are relatively easy to observe. Therefore, measures of behavior should tell us something more specific about an animal's experience than physiology alone can.

Behavior and Welfare

Behavior is a measure of welfare. We must remember that animals' experience concerns three interrelated areas: physical (including functioning), mental (including feelings), and aspects of naturalness including the performance of behaviors that are important to the animal. So, we can see that the performance of behaviors is one of the important elements of welfare. In addition, behaviors can reflect animals' physical functioning and associated feelings.

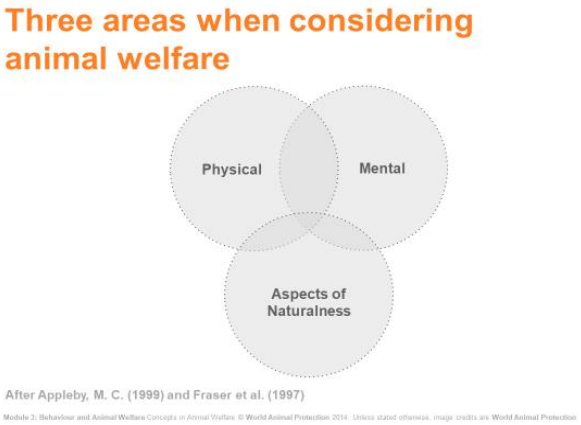
We are very aware of behavior measures associated with physical functioning and feelings. These are called 'clinical signs', and veterinarians use them to diagnose disease (a physical functioning aspect of welfare), and to identify associated negative feelings such as pain and nausea. When it comes to veterinary science there has not been much attention towards behaviors in other regards. That is:

- When advising clients, veterinarians have not traditionally talked about the third area of welfare, i.e. about whether their animals have opportunities to perform behaviours that are important to them.
- Their clinical work has not typically included behavioral measures of how animals feel when they are unable to perform behaviors that are important to them.

Part of the reason for both these oversights in veterinary practice is that:

- Animals may function very well even though they may be experiencing negative feelings as a result of being unable to perform important behaviors.
- Owners themselves are not aware of the broader behavioral aspects of welfare, so they do not typically consult vets about them.

This is changing, however, as public concern for animals grows and research shows how important some of these behaviors are to animals, and that not being able to perform them can affect physical functioning and mental state.



Behavioral Repertoire

If we want to know how important a behaviour is to an animal in human care, we first need to know what behaviours they are capable of performing. We therefore need to learn the full behavioural repertoire of the species. To do this, we need to observe the animal in the wild. For example, domestic chickens are descended from jungle fowl, so studies of jungle fowl in the wild can tell us about the potential behavioral range of hens and broilers. However, many domestic species no longer have relevant wild counterparts. In that case, we can put them in extensive, naturalistic conditions and study their behaviors there. When doing this, we need to observe many different types of behavior. 'Ethology' is the scientific study of animal behavior in the wild, and detailed discussion of the full behavioral repertoire of our different domestic species is beyond the scope of this lecture. However, briefly, there are several broad categories of behavior. Within each category, each species has typical behavioral patterns which may be unique to that species and are often very complex.

Examples of these categories of behavior are:

- Reproductive behavior: This includes courtship behavior, mating behavior, parturient behavior, and maternal behavior.
- Feeding behavior: This includes behaviors directed towards seeking and obtaining food and behaviors involved in consuming food. For example, predators seek and obtain food by using their senses to detect prey, which they then chase and kill. The consumption of the dead prey may follow a particular pattern within the social group, e.g. the group leader feeds first, or the oldest animals are unable to compete and feed last.

By making detailed behavioral observations over many days, we can establish the relative amounts of time that animals allocate to performing different behaviors within the categories. This is known as their time budget, and we can use this as a point of comparison for how animals allocate their time in captive conditions.

Time Budget

How animals allocate their time to different behaviors.

Domestic Sows

- Captive animals do not need to perform the full repertoire (Stolba & Wood-Gush, 1989)
- Many behaviors in the wild are responses to adverse conditions but are not otherwise necessary (Mason & Burn, 2011)

A landmark study of the behavioral repertoire of domestic pigs was carried out in 1989 (Stolba & Wood-Gush, 1989), when domestic sows were introduced to a large woodland enclosure. These animals had been reared and lived in intensive conditions, as had generations of pigs before them, so they had not had experience of natural living. As adults, the sows had been confined in stalls. Studies of sows in such conditions have indicated that typically they tend to be still and show relatively few behaviors, and that some of them bite the bars of their stalls.

However, in the 1989 study, when the sows were released into the woodland enclosure, they soon showed a wide range of behaviors and spent very little time doing nothing. For example, they rooted, moved through the woods, interacted with others, wallowed when the temperature was warm, and created nests with grass when they were about to give birth. They no longer showed the repetitive biting behavior. This indicated that when the environmental cues were different, the sows had the urge to perform a range of behaviors. This provided impetus for research on whether close confinement might cause them to suffer because they were unable to perform those behaviors.

Note that captive animals do not need to perform the full range of behaviors shown in the wild. That is, some of the behaviors are only necessary to enable the animal to survive in adverse conditions (e.g. escaping from a predator). In conditions of good husbandry, the animals should not need to perform those behaviors.

Behavior and Motivation

Motivation is the urge to perform behavior (Hurnik et al., 1995). Results from brain's evaluation of sensory stimuli that may be internal or external. Some behaviors motivated internally, others externally, while still others a mixture. Having observed our domestic species and established its full behavioral repertoire, we then need to establish which of all the possible behaviors animals choose to perform. Therefore, we are concerned with the strength of the animal's motivation for performing the different behaviors.

There is no universally agreed definition of motivation. However, a simple one is the urge to perform a behavior. This urge results from sensory input to the brain. As we saw earlier, sensory input can be internal or external. When the brain evaluates that sensory input, this can create an emotion and an associated urge to perform a particular behavior. The result is a measurable behavioral response. Some behaviors are motivated largely by internal stimuli, others by external stimuli, and yet others by a combination of both.

Behavior motivated by internal cues is generally related to an animal's physical state (Nicol, 2011). Motivation can be to feed, to drink, to groom, to rest, etc. Motivation increases if the behavior is not performed . Such behaviors must be permitted (eg calves and sucking; de Passillé & Rushen, 2006). Behaviors that are mainly to do with preserving the animal's physical state are generally the result of internal sensory cues – the behavior is motivated by internal sensory input. Examples are the motivations to feed, drink, rest and groom.

Animals need to perform these behaviors in any environment and research shows that, if animals

are housed in such a way that they cannot eat, drink, rest, etc., the motivation to perform these behaviors increases until these life-sustaining behaviors can be performed. They must therefore be housed in such a way that they can satisfy these basic motivations. Note that some farming systems may not completely satisfy these basic motivations. So, although farm animals are fed, the food may not be delivered in a way that satisfies their species-typical feeding behavior. For example, calves who are housed in groups and fed on milk from a bucket will sometimes suck each other; however, this occurs much less if calves consume their milk ration via free access to a teat – either the cow's own teat or an artificial nipple drinker. This suggests that there is strong motivation for sucking behavior in young calves, and that the ingestion of milk does not satisfy the urge to suck – only sucking can do that.

External and Internal Cues

External Cues: sight of predator, smell of food

Internal Cues: social behavior, e.g. play, conflicting motivations

Other behaviors are motivated by external sensory input, such as the sight of a predator causing flight, or the smell of food causing approach behavior. Other behaviors are the response to both external and internal sensory input. This is true of many social behaviors. For example:

- An animal may commence play behavior in response to the external sensory input of seeing another animal who has played with them in the past, and the internal cues that motivate play behavior in their species
- However, if they see another animal who had not responded to their attempts at play, and may even have responded aggressively, the first animal will not commence in play behavior, despite being motivated to play.

Sometimes cues may give rise to conflicting motivations. For example:

- An animal may be thirsty and have the internal cue to go and drink from a known water source nearby. However, he or she may smell or see a predator nearby, or may know that the predator is often there. Therefore the urge to seek water and drink it may conflict with the urge to avoid the predator.

Importance of Understanding Motivation

It is essential that we understand the motivation underlying animals' behavior so that, for example, we can tell if animals are fighting or playing. The study of applied animal behavior is therefore very important because without that knowledge we may misjudge welfare in our patients.

Examples: fighting vs. playing, aggression etc.

Affects Handling: when animals interact, we need to understand if they are playing or fighting. Playing is a measure of a positive emotional state and therefore of good welfare. Fighting can be a sign of poor welfare; if it is a repeated occurrence it may reflect unstable social groupings caused by factors such as uniformity of age within a group, and overcrowding

Advice to Owners: another example is aggression in dogs. When a dog growls at a vet during examination in the clinic, the vet may interpret this as dominance aggression and may try to

dominate the dog. However, because the vet is not a member of the dog's social group and is not competing with the dog over the dog's resources, dominance cannot be the dog's motivation. Instead, the motivation is generally fear, which is very different from social dominance and requires a different solution.

These two examples illustrate how we need a full, scientific understanding of animal motivation and behavior in order to accurately assess their welfare.

Central Role of Brain

Emotion: Evaluation of sensory inputs like emotions, motivation, learning, expectations and anticipation. As with physiological responses to sensory input, the brain is also central to behavior. The brain is where emotions arise, in turn creating behavioral urge or motivation, all as a result of evaluation of sensory input. That evaluation is a consequence of the brain's capacity to store information. It enables animals to learn, to anticipate negative or positive events, and to have expectations.

Cognition: Brain's capacity to perceive, process and store information. E.g. sheep: spatial memory of grazing, expectations. The capacity of the brain to perceive, process and store information is called 'cognition'. For example: a sheep's brain stores information about where within a pasture he or she can find his/her preferred plants. This ability to remember creates expectations about where to find the plants. However, these expectations may in turn be modified by whether the sheep is dominant or subordinate. So, when you see sheep grazing, the behavior of the group reflects subtle and complex processes within each animal's brain.

Cognitive Bias

The influence of emotion on judgment and other cognitive processes such as memory is termed 'cognitive bias'. People in a negative emotional state focus on negative memories and make more negative judgments than people in a positive emotional state. There is growing evidence that an animal's cognitive capacity is affected by his/her emotions. influence of emotion on judgment, memory, etc. Cognitive bias is a well-recognized concept in human beings.

Anecdotally, many of us may have found that when we feel sad, we tend to be more pessimistic about future events than when we feel happy. Psychological research supports this: people who are in a negative emotional state tend to pay more attention to negative memories and to make more negative judgments about ambiguous stimuli than happier people. In this way our mood can tend to make us judge uncertain events positively or negatively. There are many neural similarities between human beings and many domestic animals, so the possibility of cognitive bias arises in animals too.

For example, if animals are kept in conditions that induce mainly positive or mainly negative emotions, this may affect how their brains process new sensory information. In particular, animals who are already experiencing negative emotions, such as fear, may be more likely to interpret an ambiguous stimulus as a threat rather than a signal of something neutral or positive. Therefore, their wider experience may be unnecessarily distressing.

Cognitive Bias in dogs

24 dogs from a shelter were exposed to a known test of separation anxiety. They were then exposed to a test in which they learned where they might find a bowl containing food, or an

empty bowl. After that, they were exposed to ambiguous cues about whether they would find food or not. The authors concluded that dogs who showed higher levels of separation-related behavior in the first test also showed pessimistic-like behavior in regard to finding food. Because of their controlled study design and methods, the authors were able to conclude that this difference among dogs was due to cognitive bias, and not to other factors such as differences in motivation, learning ability, etc.

Cognitive bias is a relatively new field of research. So far, the data support the idea that animals' emotions can influence their behavior because emotion influences how the brain processes information. Research continues to answer questions about how animals' experiences affect their emotional state, so that we can better predict the effect of housing and husbandry on their feelings and, so, their welfare.

Research on the effect of emotion on cognition is now being conducted on animals. The most common area of research focuses on whether animals who are already in a negative emotional state are more likely to respond to ambiguous cues as if they predict a negative event (a 'pessimistic' response) than animals who are in a more positive state.

There are many scientific challenges in designing appropriate tests of this hypothesis, and we do not yet have enough data to tell us how we might recognize cognitive bias in animals. However, it is likely that this will become known during near future. A practical example of some of the research to date concerns dogs in a shelter.

Emotion and Motivation

While cognitive bias research looks at how animals' emotions create different expectations about future events, earlier research has examined how emotions can be the motivations for behavior in the present. This research indicates that negative emotions such as pain, fear and frustration typically motivate behaviors that meet an immediate need.

Negative Emotions: Motivate relevant behaviors that meet an immediate need. For e.g. pain, fear frustration occurring from an injury or on seeing a predator.

Positive Emotions**:** Motivate behavior that is not needed urgently, for survival, but brings a long-term benefit. For e.g. pleasure, excitement during play.

In contrast, positive emotions seem to motivate behaviors that are not needed urgently for survival in the present moment, but that bring a long-term benefit to the animals.

Genetics and Motivation

We have now seen that emotions are closely linked to the urge to perform a behavior. Emotions modify how animals process sensory input. We have just seen that emotions can give rise to behaviors that have short-term or long-term survival value. Just before that we learned about cognitive bias and how an animal's current emotional state can affect how he or she processes new sensory input.

There are other internal factors that can affect motivation in animals and therefore affect the behaviors we perceive. Genetics are very important here. Good stock people have used breeding to select lines of animals who show calmer behaviors. However, new scientific tools such as

genetic mapping can give more specific information about the influence of genetics on behavior, by quantifying differences in the genes themselves within a given part of the chromosome. For e.g. Gene mapping (behavioral differences are associated with differences in chromosomal regions), feather-pecking in poultry (lines with lower tendency to peck had higher egg production) or temperament in cattle (docility in the milking parlour)

Examples are given below:

- Hens and other poultry commonly peck the feathers and body of other birds in the group. This is thought be a form of redirected feeding behavior, arising partly because the housing does not permit normal pecking in the search for food. Hens can be selected for a low tendency to feather-peck, and this is associated with higher levels of egg production and with measurable numeric differences in genes within a locus on the chromosome.
- Similarly, dairy cows with more docility in the milking parlour show quantifiable differences in genes from cows who are less docile. The genetic details of this do not concern us today. The point is only that research at the molecular level shows us that genes can strongly affect animals' motivation to perform a particular behavior in a particular context.

In addition to emotional state and genetics, there are other internal and external factors that can affect motivation. These factors can interact in a complex way, which is why research into which behaviors are the most important for animals to perform can take many years.

Some examples of the many other factors that affect the motivation and therefore expression of a behavior include:

- The stress response – this can inhibit eating, defecation and urination. This means that when animals are hospitalised, they may not eat readily or eliminate readily
- Availability of substrate – some behaviors are directed towards specific substrates. If the substrate is not present in the animal's environment, the behavior may not occur at all, or his/her motivation may be so strong that the animal will redirect the behavior towards whatever other substrate they can find that suffices
- Disease – when an animal is debilitated by disease, or feels unwell, the resulting feelings of weakness, pain, etc. may inhibit the performance of behaviors that might otherwise be important to the animal.

Summary

To sum up what we have covered so far:

- We are examining how we can find out if performing a particular behavior is important to animals.
- We have seen how you can establish an animal's behavioral repertoire, and that all behaviors are the response to urges or motivations which are brought about in response to internal and external cues.
- We have also seen that the capacity of the brain to process and store information, known as cognition, can modify animals' motivations and behaviors.
- We have also seen that cognition and resulting behavior may be affected by factors such as animals' pre-existing emotional state and their genetics.

- We shall now move on to measures of behavioral priority, and see how these can tell us which behaviors are important for an animal. We shall conclude with examples of behaviors that are known to be priorities in different species. Behaviors that are important for animals to perform have a very strong motivation. The strength of motivation can be identified using a variety of research methods. We shall look at them very briefly here. First, you can measure how hard an animal will work for the opportunity to perform a particular behavior. This methodology has shown that:
    - When hens are ready to lay they will squeeze through narrow gaps, or push open heavily weighted doors, in order to gain access to a nesting area. Therefore, nesting behavior seems to be important for hens to perform when they are getting ready to lay
    - In one test, heifers pressed a panel repeatedly in order to have the opportunity to rest for a total of 13 hours per day. They were not motivated to work for the opportunity to rest for longer than 13 hours. So, resting for 13 hours a day seems to be important to heifers.
- A second methodology concerns the fact that, in particular housing conditions, animals may develop behaviors that are not typically seen under natural conditions. When this happens, it can indicate that an important motivation is not being satisfied. An example is cross-sucking between group-housed calves who are not fed from a teat. You do not see this in calves who are reared with their mothers and providing access to the mother or to a nipple drinker largely eliminates the behavior. Therefore, as noted earlier, sucking seems a very important behavior to calves.
- In other situations, when an animal's environment prevents him/her from performing a behavior that is highly motivated, his/her behavior may suggest frustration. For example, when hens are ready to lay but do not have access to a nesting site they pace when they have the room to do so. We need to be aware that the housing of some of our animals may neither allow them to perform important species-typical behaviors nor to relieve their frustration at this by performing other behaviors. In the case of laying hens, traditional cages do not provide nesting areas and do not have the space to allow the hens to pace.

- There are other categories of behavior that animals may show if their urge to perform an important behavior is not met. Two important ones are:
    - Stereotypies: Stereotypies are repetitive behaviors that are relatively constant in form and serve no obvious purpose in the context in which they are performed. Stereotypies are thought to occur as a way for an animal to cope with being unable to perform an important behavior; for example, sows biting the bars of their stalls. There are many other examples of stereotypies in confined animals.
    - Redirected Behaviors: Redirected behaviors are behaviors that are not abnormal in themselves, but that are directed towards an abnormal substrate. In our calves' example, the sucking behavior that they show towards other calves is performed normally; however, it is not normal to direct it towards other calves.
- We have looked at some of the important tools used by researchers to establish which behaviors are important for animals to perform. Such research has supported the idea that animals have "behavioral needs" (Widowski, 2010) and that depriving animals of the opportunity to perform these behaviors could cause suffering. Some academics disagree that "behavioral needs" is an appropriate or accurate term. However, the idea of animals having "behavioral needs" is useful to us to be able to assess the welfare status of animals... We shall conclude with some examples of behaviors that research has shown are important to different species. Some of them are now

legally required for the species concerned in certain countries. For example:

- In Switzerland, hamsters used in research must have access to bedding that is at least 40 cm deep (Hauzenberger et al., 2006).
- In EU countries, pigs must have access to rooting materials (Nicol, 2011)
- In EU countries, laying hens must have access to a nesting area and so cannot be kept in barren cages (Nicol, 2011)

- In this chapter we have focused on the area of animal welfare, aspects of naturalness. We may otherwise overlook this area of welfare in our clinical work, and focus only on the physical and the negative mental state that arises when animals are diseased. This has given you a brief overview of how we can understand behavior in domestic animals, including the concept of motivation and the close relationship between behavior, cognition and emotions. This has also shown you how we know that performing certain behaviors is important for animals. We have also seen that the inability to perform the behaviors may give rise to negative feelings, especially frustration.

Chapter 4

Improving Animal Welfare through Legislation and Incentives

Introduction

In this chapter our goal is to understand the legal framework within which animal welfare operates in our country. Much of our discussion will be about farm animals, as they greatly outnumber other domestic or wild species under human care.

First, we will review what law is and look at why the level of legal protection for animals varies between countries. We will then spend some time examining why legislation may not always be an effective way to protect animals' interests. We will also outline the features of a model animal protection law. We will also briefly touch on what you should do, if you are involved in a court case concerning animal welfare.

We will see how (even with a model law in force) World Trade Organization (WTO) rules can create challenges for local standards of animal welfare. Finally, we will review other approaches that can also help to improve animal welfare, including incentives.

What is legislation?

- "A law or set of laws suggested by a government and made official by a parliament"
- "The question is not, can they reason? Nor, can they talk? But, can they suffer? Why should the law refuse its protection to any sensitive being?" Jeremy Bentham
- Reflects ethical concerns and usually based on science
- Protect animals from cruelty or from treatment detrimental to their welfare
- The Cambridge Dictionary definition of *legislation* is "A law or set of laws suggested by a government and made official by a parliament". In countries that are governed by religious authorities, the law is also derived from religious texts and interpreted by religious leaders.
- Animal welfare legislation reflects the ethical concerns of a society and tends to evolve with the growing findings of animal welfare science. In more and more countries, a significant proportion of the population wants to protect animals from cruelty or from treatment that is detrimental to their welfare.

Ethics and Law

Protecting animals to benefit people as opposed to protecting animals for the sake of their mental and physical needs. Differing opinions and interpretations of science and ethics can lead to different laws around the world. For example, the use of gestation crates in farming. Modern laws on animal protection are usually informed by scientific information about animal welfare and by ethics, i.e. what the public, the government, the animals' advocates, retailers and others believe is the right or wrong treatment of animals.

Depending on those values, experts (and in turn governments) may reach different conclusions about what animal protection legislation should allow. This point explains, in part, why different

countries may have very different laws about the same animal protection issue. In some countries, animals may only be seen to need protection insofar as doing so benefits people. Consequently, when formulating laws, those countries may not seek or value scientific information on animals' mental state or capacity to suffer under different types of husbandry. Similarly, those countries may not value philosophical reasoning about animals' requirement for moral consideration.

For example, European countries have traditionally been concerned about animals' mental state and opportunities to perform species-typical behavior. Thus, much of the scientific research on the effects of different farm practices on mental states and behavior has been carried out in Europe, and has contributed to a ban on the use of gestation crates for pregnant sows in European Union (EU) member countries, from January 1 2013. The EU directive states: "The Member States shall ensure that sows and gilts are kept in groups during a period starting from four weeks after the service to one week before the expected time of farrowing" (EU, 2009). In contrast, many other countries still permit the use of gestation crates because this method produces higher outputs.

Legal definitions

- Law**:** A rule established in the community by authority or custom; a body of such rules
- Legislation**:** The rule or group of rules relevant to a particular topic
- Statute**:** A specific law passed by a legislative body
- Offence**:** An act contrary to the law
- Defendant**:** A person accused of an offence in a court of law
- Plaintiff**:** A person or body bringing an action in a court of law

Different Types of Laws

In order to assess the effectiveness and scope of legislation it is necessary to find out its status. It may be primary or secondary legislation, a code of practice or a guidance document.

- State laws apply only to the relevant state where they are passed. This can lead to problems with uniformity throughout the country if state laws differ, e.g. cow slaughter prohibition in India.
- Federal/Central laws are laws which apply across the country. These are good, as they set one standard but in diverse countries, they can be hard to enact and change as all the individual states/local governments may need to reach agreement to change the law.
- By-laws are local laws which are created and enforced locally. The precise size of the location they affect will depend on the structure of that country's administration. These have limited effect due to their geographical boundaries but are usually much easier to enact due to the fact that agreement from fewer stakeholders is required.

- Primary legislation means the initial document outlining the law. This tends to be developed following repeated debates in the national legislative body. It is used to create federal or state laws.
- Secondary legislation gives more detailed provisions about the subject than those contained

within the primary legislation. This is usually drawn up after the primary legislation is passed. It is more readily amended (as it does not have the same need for prolonged debate), so is seen as more flexible than primary legislation, which can take many years to pass. Infringement of this law usually constitutes an offence.

- Regulations may be secondary legislation, but this will depend on the terminology used in that country.

- Guidance documents and codes of practice are guidelines written specifically for those who need to comply with the legislation. May be used in the interpretation of statute, but failure to comply does not usually constitute an offence. Failure to comply with codes does not normally result in a prosecution, but meeting or failing to meet these standards could be used as evidence in court to support a prosecution's case under the primary legislation. Primary legislation may also include a provision for a member of government to oversee the production of codes of practice, or departments/ministries may produce guidelines for certain pieces of statute.

- Supranational agreements may also be binding in national law. For example:
    - The rules of the WTO often influence animal protection law nationally.
    - EU member countries are legally bound to follow the requirements of some treaties and protocols

Types of Animal Laws

Not every law relating to animal welfare is called an 'Animal Welfare Act' or an 'Animal Protection Law'. Provisions protecting some or all animals can be hidden away in laws which have been passed for a very different reason. It is fair to say that every country in the world has laws that impact upon animals, but that does not mean that all laws relating to animals are positive in terms of protecting those animals' welfare. Some laws can be harmful to the welfare of animals; the content will depend on the purpose of the legislation.

On the basis of differences in purpose of the legislation they can be categorized as follows:

- **Protecting Species:** though protecting a species is good for that particular animal, the legislation may not specifically state anything relating to the animal's welfare. A 'do not kill' statement does not need to acknowledge the sentience of that animal. Without sentience being recognised, the penalty for committing the offence is likely to be minimal – similar to that of destruction of property – so does not provide a strong deterrent. These laws are often not very useful to campaigners for animal welfare.

- **Banning Activities:** traditionally, laws about animals have been prohibitive – they decree what you must *not* do. Banning specific actions involving animals such as fighting (e.g. dog-fighting, bull-fighting, etc.), animal testing for cosmetics, , etc. These are usually positive for animal welfare.

- **Prohibiting Cruelty:** prohibiting cruelty will prevent or punish the occurrence of certain acts (hitting, kicking, burning, etc.) and the action usually has to cause the animal 'unnecessary suffering' for it to be an offence. However, legislation of this kind limits prohibitive acts to what is defined as 'cruel', and there is a requirement to prove that suffering has been caused to the animal; this can cause confusion, as people's tolerance of cruelty differs and often an animal has to undergo extreme pain or distress before s/he is deemed to have 'suffered'.

- **Controlling Methods of Production:** for example, setting standards while farming for meat or fur, etc. These are usually minimum standards that prohibit the very worst conditions which are deemed by many to permit cruelty – for example, battery cages for hens, stalls for sows, etc. The problem with these laws is that many people will only work to these low standards and not look to create higher welfare improvements.

- **Improving Animal Welfare:** these laws tend to be prescriptive (i.e. state what a person *must do*) and so require positive action for the particular animal, usually specifying minimum standards of care. The best types of animal legislation place a duty of care on those who are responsible for an animal to ensure his/her welfare. Laws of this nature state positive actions that must be taken for those animals in order to improve or set standards for their general welfare. These laws tend to be the most effective in terms of improving animal welfare.

- **Improving Public Health:** this is an example where the inclusion of animals in legislation can actually be detrimental to animal welfare. This kind of legislation is not designed to improve the situation for animals, so it might allow the use of poisons, traps, snares, etc. While it is legislation regarding animals, it is not passed with helping animals in mind. Animal welfare groups sometimes campaign for the repeal of this type of legislation, as it can allow for the inhumane death of certain species with very limited punishment for misuse.

- **Improving Animal Health:** some laws are passed regarding animal health in order to prevent the spread of diseases. Even though the regulations that are put in place are related to animals, their purpose is normally always to benefit humans – it is to stop the spread of diseases which affect animals that are farmed or consumed by people. As the protection of people is key, the welfare of the animals relevant to the law may not be acknowledged or prevalent.

Which Animals are Included?

In order to determine the scope of a piece of legislation, it is essential to determine to which set of animals it applies to. A law might be limited by a restriction on the animals to which it can be applied. For example:

- The USA federal Animal Welfare Act 1966 does not apply to farmed animals, birds or rodents.

- Botswana's Cruelty to Animals Act 1936 defines 'animal' as any horse, mare, gelding, bull, cow, ox, heifer, steer, calf, mule, ass, sheep, lamb, hog, pig, sow, goat, ostrich, dog, cat, or any other domestic animal, fowl or bird and includes any wild animal in a state of captivity.

- India's Prevention of Cruelty to Animals Act, 1960 (PCA Act) applies to any living creature other than a human being.

- Peru's Law No. 27265 covers "all species of domestic animals and wild animals maintained in captivity".

But even within a species, the legal protection may depend on the animal's status.

- Animals specifically listed

- Domestic, wild or captive animals
- Vertebrate and invertebrate animals
- All sentient animals

Often the legal protection afforded to an animal is dependent on its status and circumstances. This means harmful activity can legally be carried out on a laboratory rabbit which it would be illegal if applied to a pet rabbit. Often exemptions exist for certain animals even within comprehensive laws; for example, in the UK a rabbit is protected by different legislation depending on whether s/he is a pet, a farmed animal, a zoo animal, an experimental animal or a pest. Even though it is reasonable to assume that the welfare requirements of a rabbit are consistent, rabbits in each situation are given a different level of protection from harm.

Why Legislation May Not Be Effective

This may be on account of the following:

- Legal status of animals as property: Legislation may not be effective if animals are classed as property in the law.
- Sentience may not recognized: More progressive laws recognise animals as *sentient beings* and so the offences and penalties are written accordingly and better protect animals.
- Strict liability offence or intent needed: It is important to know what action the law makes illegal – i.e. what the offence is. Is it to ' cause unnecessary suffering' or maybe 'not to meet the animal's needs'? It might be written that an offence can only be proven if there is 'deliberate intent' to cause an animal to suffer. Proving deliberate intent can be very hard, and so restricts the protection given to animals. Contrary to this, some offences are called 'strict liability offences': here a person can be found guilty of an offence without the necessary 'guilty mind' (known as *mens rea*), so committing the act amounts to a crime, regardless of intention.
- Exemptions due to religion and culture: Sometimes exemptions are made in legislation which seriously restrict the effectiveness of the law in its protection of animals. For example, the Protocol on the protection and welfare of animals in the EU, while requiring that Member States "pay full regard to the welfare requirements of animals when formulating and

implementing legislation", allows exceptions on the grounds of "legislative or administrative provisions and customs of the Member States relating in particular to religious rites, cultural traditions and regional heritage". This provides a wide scope for practices to remain lawful which many would consider cruel to animals, such as bullfighting and the force-feeding of geese for the production of foie grass.

- Accepted practices: Farms in particular have accepted practices that include not using pain relief for routine surgical procedures such as castration and using nose rings to control buffalo. It is unfortunate that these may be exempt from legal concern by virtue of their traditional status

Wording

- Compromises in wording altering the original meaning and intention: compromises in wording of text due to single-interest lobbying during the consultation and drafting stage; small changes in text can make a big difference in meaning
- Reinterpretation by industry bodies: industry bodies may reinterpret the terms after the law has been passed to find a loophole so that they need not change practices. If no clear definitions are given, reinterpretation of legal requirements is easily carried out, which immediately reverses the intention of the legislators
- Subjective interpretation of courts or juries: the subjective nature of the offences can cause different interpretations between courts. Ambiguous terms included in legislation may be interpreted differently by different courts in identical circumstances. For example, a court in which the jury is made up of people with a rural background may view issues of animal suffering differently from a court where the people are from an urban background
- Poorly worded texts: Poorly worded legislation may cause unexpected welfare problems or be unenforceable.
- Other weaknesses in legal protection include: inadequate laws are sometimes enacted in haste in response to political, public or industry pressure.

Lack of Enforcement

In some countries there is a considerable body of animal protection legislation which does not appear to be enforced. This can be on account of the following factors:

- Responsibility for enforcement spread between different government departments: If responsibility for the enforcement of welfare legislation is spread between different government departments, the result can be a lack of consistency in approach and confusion about roles. It also usually results in low priority being given to animal welfare law enforcement.
- Limited resources: In order for the enforcement of animal protection legislation to be fully carried out there must be sufficient numbers of enforcement personnel provided with adequate training and equipment, and they need to have suitable facilities to house animals and funds to provide adequate veterinary care. Lack of sufficient resources is the main barrier to adequate enforcement.
- Conflicting priorities of the enforcement body: If the enforcement body for a law also has a mandate to assist those policed, the impetus to enforce the legislative requirements may be lost. For example, a department responsible for the success of a country's agricultural industry is unlikely to enforce welfare legislation which impedes productivity.

- Limited powers of the enforcement bodies: The limited powers of enforcement personnel, such as the authority to enter property, to stop and search suspects, or to seize and detain evidence, may impede the collection of sufficient evidence to ensure conviction.
- Commercial confidentiality: Issues of commercial confidentiality, for businesses such as pharmaceutical companies or farms, often prevent members of the public from seeing and reporting animal suffering to authorities.

Conflicting Regulations

This includes other difficulties with animal protection legislation may be that there are clashes with other legislation, including international agreements on trade.

1. International Agreements

The WTO rules are an example of where International agreements on trade can actually reduce animal welfare, despite strong domestic legislation. The factors leading to conflicts are as follows:

- Legally binding agreement to encourage free trade: International agreements on trade are legally binding. The WTO was set up to encourage free trade. Tariffs and subsidies are forbidden. The particular rules relevant to animal welfare concerns are part of the General Agreement on Tariffs and Trade (GATT).
- Goods must be treated equally whether imported or locally produced (e.g. no subsidies allowed): Article III of GATT obliges countries to treat imported goods and locally produced goods equally.
- Goods cannot be discriminated against on the grounds of production methods: This means that you cannot discriminate between goods on the grounds of production methods and you can substitute one egg for another, for example, regardless of how each egg was produced. This creates a problem for countries that have or want to have their own legislation to improve animal welfare. Consequently, imported lower-welfare food may be cheaper than local higher-welfare food.
- Higher-welfare products are usually more expensive to produce, so lower-welfare imported food might be cheaper in a country where there is good legislation protecting farmed animals. Where there is good domestic legislation for animals, Article III is seen to encourage a market for low-welfare imports, resulting in suffering for many animals in other parts of the world. Article XX of GATT does allow for some exemptions to the general trading rules, but these exemptions are not obviously helpful in improving animal welfare.

2. Domestic Agreements

Further problems with animal welfare legislation can arise if it clashes with other domestic laws.

- Inspection of an animal when there is suspected cruelty or lack of welfare provision: This deals with the conflict between access to premises for inspection and the question of

privacy. First, implementing the law on cruelty or provision of care requires inspection of an animal, usually in private premises. There is a chance this could clash with domestic laws regarding privacy. So, the animal welfare law should ensure that there is a reasonable suspicion of an offence before an authorized person is allowed access to a property.

- Common farming practices: This deals with the conflict between food safety and. fasting stock prior to transport to slaughter plant. With farm animal welfare legislation, where pre-transport fasting is required to improve food safety, the duration of fasting period could be restricted by law and legally enforced reductions to slaughter line speeds introduced.
- Animal experimentation requirements: This deals with the conflict between the requirement to test products on animals and the welfare of animals. This example is of animals used in experimentation – where restricting the use of animals for medical research may clash with the legal requirement to test drugs on animals, there can be obligations placed for non-animal replacements to be used wherever possible, and for welfare requirements to be put on experimentation establishments, including the training of personnel.

Economic Pressures

These can heavily limit animal welfare enforcement. The reasons behind it are:

- The insufficient availability of enforcement personnel
- The high cost of legal action
- The high cost of veterinary bills to treat sick or injured animal(s) who are part of the prosecution
- The high fees for boarding the animal(s) while the matter goes to court if they have not been re-homed.

From a business perspective, an animal who needs treatment may be considered to be of insufficient value to warrant veterinary intervention, which is usually expensive. It does happen that when animals have no or very low economic value, owners may object to spending money on caring for them or on killing them humanely in compliance with legislation This opinion raises ethical concerns, as sentient animals are not simply a commodity, like machinery, or stocks and shares. Many would also say animals have *inherent* worth and an animal's *economic* value is not a sufficient ethical basis for deciding to enforce (or not enforce) welfare legislation.

Other Influences: World Organization for Animal Health (OIE)

- "Veterinary legislation is the foundation of any efficient animal health policy, including the protection of animal welfare." (Vallat, 2009)
- "Many member states do not have adequate legal protection of animals" (Stafford & Mellor, 2009)
- "Discussion of welfare vs. actual standards." (Keeling et al., 2012)

Most countries are members of the World Organization for Animal Health (OIE). As you know, this international body has codes for the health and welfare of terrestrial and aquatic animals. Member countries can (and some do) use this as a basis for updating and formulating their own animal welfare legislation. The OIE is keen for that to happen, arguing that veterinary legislation including protection of animal welfare is the key to efficient animal health with resulting benefits in food safety, environmental protection and public health.

However, a survey of the appropriate representatives of OIE member countries (Stafford & Mellor, 2009) indicated that although many countries had some laws to protect animals in various ways, e.g. slaughter and cruelty, not all countries had good enforcement. For e.g. 45 per cent of member countries participated in the survey. Of those, 44 per cent had a law requiring animals to be stunned before slaughter during a disease outbreak. Moreover, some countries' legislation fell short of the OIE's minimum standards, as laid out in the Codes, or it was lacking altogether. Even though they were members of the OIE, some countries were not aware of the OIE standards.

Although in the case of stunning and slaughter, for example, lack of legislation or enforcement are causes for real concern, note that countries with more traditional farming practices but which lack legislation on animals may have a generally high standard of farm animal welfare. For example, animals may be healthier because of being raised on the farm where they were born, at low stocking densities, both of which practices reduce infectious disease. Also, animals may be free to perform all the behaviors that are most important to them. However, for the highest standards of animal welfare all round, you do need public awareness and effectively enforced legislation.

A Model Welfare Law

Knowing the potential difficulties with animal welfare law which have been outlined in this chapter, here are some features of a model animal welfare law.

- **Applies to all sentient animals:** All sentient animals should be protected by the law.
- Clearly written: The law should be clearly written – outlining the offences and how these are breached – so that it is easily understood by the public and those in industry alike.
- **Offences include failing to meet an animal's needs:** The law should be prescriptive, comprehensive and coherent, laying down what must be provided for each species (based

on its physiological and behavioural needs) as identified by scientific research.

- **Easy to amend in line with new scientific knowledge, ethics, etc.:** The law should be easy to amend in line with scientific or other developments.
- **High legal status, allowing for prosecutions:** The law should have the highest legal status, making it possible to convict anyone who contravenes it.
- **Enforcement responsibility is clear and enforcement body has sufficient power and funds:** Enforcement of the law should be the clear responsibility of a body which has been given sufficient powers and adequate funds to be able to carry out this role.
- **Includes education of public and industry:** Ideally there should be an education element for the public and industry in order for the understanding of animal sentience and needs to grow, leading to a decrease in the numbers of offences committed (much of the poor welfare provided for animals is due to a lack of education of the person responsible; once issues of welfare and animals' needs are explained, breaches are often easily corrected).

Adequate Consequences of a Model Law

- There should be sufficient penalties in place in line with other similar offences in the country
- The law should also have provision for:
    - Power of seizure of the affected animals (and those dependent on them) to prevent defendants retaining ownership of the animal(s) during proceedings.
    - Prohibition of ownership of animals, to ensure the convicted party is banned from owning animals.
    - Prohibition of care or control over animals, to prevent ownership being transferred but the convicted party still taking care of animals.
    - Penalties for breaching the requirements of a model law must also be included in the text. These need to be set at an appropriate level for the offence committed and are likely to include fines and/or imprisonment for the more serious offences.
- It is important that the law also goes one step further in terms of preventing the person convicted from having responsibility for an animal in the future, for either a set or indefinite period of time. If not, a successful prosecution for causing an animal suffering may still be detrimental for the animal concerned, as well as any others the person might own.
    - It is important that the law allows for seizure of the affected animals once a possible offence has been detected. If the animal stays in the care of the defendant during possibly lengthy court proceedings and appeals, s/he may continue to suffer for all this time.
- Similarly, if there is no power to prohibit the defendant from keeping or caring for the animal following conviction, then:
    - the animal may continue to live in the same environment which caused him/her to suffer or did not meet his/her needs and
    - a deterrent to cruelty (the removal of the animal) will be lost.

- It is important that a further step still is taken – that it is clearly stated in the law that a ban on owning animals extends to having care or control over them, otherwise a convicted person may simply transfer legal ownership of an animal or group of animals to a relative or other person and continue to look after them as before, or s/he might continue to work with animals despite having a conviction for mistreating or harming them.

We have defined legislation and you now understand some reasons why the level of legal protection for animals varies between countries around the world. You also know that there are many technical and other reasons why legislation may not always be effective in protecting animals' interests. Based on that, you now know the features of a model law to protect animals. In addition, you know where to find a basic resource to guide you if you are involved in a court case about animal welfare.

Summary

- There is a growing international understanding that we need to protect animal welfare. One important positive change is that consumers in many countries are demanding assurance about the welfare of animals, and this public awareness is creating local markets for high welfare products.
- There is also mounting international pressure from animal welfare organisations and bodies such as the OIE for higher welfare standards at all stages of an animal's life. In addition, governments are – through trade agreements with other countries – encouraging welfare standards to be met when animals or their products are traded overseas.
- However, other approaches may also be valuable, especially in the current climate when so many countries lack adequate, enforced legislation on farm animals. Financial incentives can help farmers to make changes. In different countries, different models have been applied. For example:
    - farmers have received a direct payment for voluntarily adopting higher standards of welfare than the legal minimum
    - grants have been provided to farmers to help them comply with new legal standards of welfare.
- There can also be financial incentives for farmers in poorer countries that may not yet have clarified their own animal welfare standards. For example, the International Finance Corporation of the World Bank Group (which supplies loans to businesses in developing countries) includes the Five Freedoms as one of the set criteria for business proposals (World Bank, 2006). The national and international marketplaces also provide financial incentives. In many countries, these schemes are driven by retailers on behalf of consumers, rather than being required by law. However, note that they are similar in that both need clear standards and proper enforcement.
- Bilateral agreements between countries can also encourage local producers to raise their standards in order to gain access to overseas markets with higher welfare standards; examples of this include a beef quota for farm assured beef from Namibia to the EU, and EU markets for organically produced chicken from Thailand and Argentina. A similar type of bilateral arrangement between the EU and New Zealand helped to advance welfare standards in New Zealand.

  Note, however, that not all such non-legal incentives are effective, and some may even be a

waste of money. For example, in countries such as Sweden and Norway, farmers and consumers largely believe that the government should use legislation to ensure high welfare standards. Consequently, consumers are not willing to create niche markets. Thus, using labels to differentiate products in their supermarkets does not increase the sales of the products concerned, and there is little or no value in voluntary assurance schemes. However, if imported products are also available, a label to clarify the country of origin helps consumers to ensure that they are buying products from animals kept at the appropriate standard.

- Other non-regulatory methods that can help improve animal welfare include:
    - Public education – so that the public and some other specialist interest groups understand the issues and may be more willing to support future legislation or higher prices to ensure animals are protected. This includes educating children, youth and sensitizing groups such as veterinarians, law enforcement agencies, as well as public as a whole.
    - Government-funded research is important in the long term, to address questions of science, willingness to pay, etc., so that policy reflects the local situations and animals' needs.
    - Another non-regulatory avenue to improving animal welfare is the building of connections with present and future public representatives. This is typically done by animal welfare organisations and animal protection groups. In addition, some organisations may also petition or urge their country's government directly on issues of concern, or may develop connections with public representatives of good faith who likewise want to see better protection for animals. Some professionals (vets, lawyers, etc.) may themselves become public representatives and may take a particular interest in animal protection, as part of their role.
    - A resource that can help inform policy development work is the **Gateway to Farm Animal Welfare** (FAO, 2011), hosted by the Animal Welfare Portal of the Food and Agriculture Organisation (FAO). The gateway is home to international and national information related to farm animal welfare, providing a wide range of constantly updated information on welfare standards, policies and debates.

- A further approach has been termed "soft law". For example, World Animal Protection has been spearheading the development and acceptance of a Universal Declaration of Animal Welfare with the support of the OIE, governments, professional bodies and others. The principles of which are as follows:
    - The welfare of animals shall be a common objective for all [states].
    - The standards of animal welfare attained by each [state] shall be promoted, recognized and observed by improved measures, nationally and internationally. [Whilst there are significant social, economic and cultural differences between societies, each should care for and treat animals in a humane and sustainable manner][in accordance with the principles of the Declaration].
    - All appropriate steps shall be taken by [states] to prevent cruelty to animals and to reduce their suffering.

- Appropriate standards on the welfare of animals be further developed and elaborated such as, but not limited to, those governing the use and management of farm animals, companion animals, animals in scientific research, draught animals, wildlife animals and animals in recreation.

The Declaration would be a non-binding agreement under which governments would commit to making and enforcing laws to protect animals. Many governments have signed up to indicate their agreement that a formal Declaration should be developed; these include the governments of Indonesia, Fiji, all 27 EU countries, and many Latin American countries. Private individuals and organizations are also very supportive; for example, in Mexico in 2001 five veterinary organisations and 13 veterinary schools gave formal support to the Declaration.

- To conclude, you now have a basis for comparing the legal protection of animals in this country with that of other countries. You also know some of the main reasons why animal- related laws (and their enforcement) may differ between nations.
- You have seen a framework for drafting a model law, and you are aware of the many possible pitfalls, from unclear wording to clashes with other legislation on public safety, working hours, privacy, etc.
- You know, too, how international trade rules interact with and often override high standards of animal welfare locally. Specifically, you are now aware of the problem with Article III of GATT and that the four potential areas of WTO exemptions do not help animal welfare advocates much (i.e. Article XX of GATT).
- Finally, you know that, even with the best law in the world, animals can still benefit from non-legal methods of improving welfare such as public education and financial incentives. Those incentives may include bilateral trade agreements which help countries to avoid WTO penalties for protecting welfare.

Chapter 5

Behavioural Measures of Animal Welfare

Introduction

To recapitulate, we need to have a good understanding of an animal's behavioral repertoire. To obtain this we need to refer to what we know about the full behavioral repertoire of the species as they exist in the wild. As many domestic species do not have relevant wild counterparts any longer, we can place domestic animals in extensive, naturalistic conditions and study the behaviors there.

Having a good understanding of an animal's behavioral repertoire provides us with the basis for understanding which specific behaviors are important for the animal to perform. An animal having the opportunity to perform certain behaviors that are important to the animal (also referred to as 'behavioral needs') is an essential requirement for good welfare. keep using this knowledge as a basis in order to consider if an animal is able to fulfil his/ her behavioral needs. For example, when hens are ready to lay, they will squeeze through narrow gaps or push open heavily weighted doors in order to gain access to a nesting area. Therefore, nesting behavior seems to be important for hens when they are getting ready to lay.

Finally, an adequate level of familiarity with the normal behavior of the individual animal is important. Different members of the same species can vary in their behavior. This may depend in part on their breeding and previous experience. For instance, one will see during a routine health check examination on two perfectly healthy dogs, one dog (Dog 1) may generally be calm in nature, while the other dog (Dog 2) is highly excitable and alert. In each case, if the owners of Dog 1 and Dog 2 can confirm this is normal behavior for their dog then you could in turn conclude with some confidence that the behavior you saw is normal for each dog.

If on the next occasion you see Dog 2 you notice that he or she is behaving in a subdued manner, you would know this is out of character and this would signal a possible welfare issue in terms of physical functioning, mental state or naturalness. Normal animals who are functioning well, feeling well and able to perform behaviors that are important to them typically show a range of behavior if their environment gives them the space and facility to do that.

In this chapter we will cover which behavioural measures of animal welfare you can use, both:

1. Behaviors indicating that an animal is functioning well (healthy), feeling well, and able to perform important behaviors; and
2. Behaviors indicating that an animal is NOT functioning well (healthy), feeling well, and able to perform important behaviors.

Behaviour and Animal Welfare

This chapter summarizes some general types of behavior in the normal animal. Looking down the list, some of these behaviors are inhibited in the animal either inherently or because of past experiences, e.g. they may be extremely alert but not show exploratory behavior, and they may show aversion to their vets by pulling away when they examine them.

Overall, we can quantify how often an animal shows normal behaviors (or any behavior) and how long each bout of the behavior lasts, in order to provide an indirect, numeric measure of the animal's experience. This is a quantitative approach. However, there is a different approach, which is qualitative.

Behavioural Indicators of Good Welfare: The 'Normal' Animal

1. Is alert about his/her external environment: In evolutionary terms, alertness is essential. Prey species evolved constantly to monitor their environment for signs of danger, so that they could react swiftly to avoid it. Although sheep have been domesticated for hundreds of years, they remain watchful and alert for any change in the environment. Equally, the survival of hunting species depends upon active and watchful monitoring of the environment. A dog who has a good state of welfare and is sleeping will usually respond at once to an unusual sound.

2. Is curious about his/her external environment: Animals who are introduced to a new environment will explore it. Often a lag phase precedes the exploration phase, while the animals assess whether there may be dangers associated with their new environment. The level of curiosity shown varies with age. Adult cattle or horses, for example, quickly settle down to graze, while young animals may spend a longer time exploring. Individual responses may vary with experience – animals who have been badly treated or have never experienced novelty make take a very long time before they show signs of curiosity about their environment. Again this is probably a result of evolutionary change- wild animals evolved to explore new environments while looking for food, water and habitats for nesting or breeding.

3. Shows a range of activities, e.g. exploration: Many factors affect the range of activities seen. Some of these are-

    - species (for example, a dog has very different activities from a chicken)
    - breed
    - age – young animals are more active, more likely to play, and spend more time sleeping
    - environment – may be limited to what is available within a pen. Animals in the wild may have adapted to new urban environments
    - group size and interaction (e.g. the presence of dominant male and young males)
    - season (e.g. breeding, migration).

4. Interacts with other members of the herd/flock: Positive social interactions within a group indicate that animals generally have good welfare. Behaviors that indicate social bonding are called 'affiliative behaviors'. One example is when animals groom each other. This is called 'allogrooming', and it is thought to indicate positive emotions. Many species engage in allogrooming; for example, horses typically bond in pairs, partly for the purpose of grooming each other. A number of factors can influence interactions between members of the group under domestic husbandry conditions-

    - Breed may affect sociability. For example, Siamese cats are typically very sociable compared to most other breeds of cat.
    - Range in age and size: for important practical reasons, we may keep animals in groups according to age or weight. However, this may not permit normal social structures to be formed, and animals may require a period of adaptation. There may be competition

- between animals of the same or different ages in a group. For example, older cows may bully heifers when they join a dairy herd, and prevent them from feeding.
- Size of group: animals get to know individuals in small groups, but not in very large groups. Hierarchy can be established much more easily in small groups. On the farm, group size may be very large (e.g. broiler chickens, dairy herds). This may modify the social behavior that you would normally expect to see in animals who enjoy good welfare.

5. Interacts with humans: The behavior of a 'normal' animal varies with the animal's previous experience.
   - If never handled or wild, the animal is likely to be fearful and may show aggression when cornered.
   - If his/her previous experience with humans has been positive, the animal is likely to be friendly and curious, and will approach a stationary human after a period.
   - If his/her previous experience with humans has been negative, the animal may be fearful, restless and/or aggressive.
6. Avoids humans – flight distance: You can assess whether an animal is 'normal' with regards to human contact using measures of flight zone and measures of approach. The 'flight zone' is an animal's personal space with regard to how close they wish to come to humans. This can vary from 0 to about 50 metres. You can see that the pony in the picture is used to being handled and has allowed the boy to come right up to him. If the pony were feral, not used to people, or afraid of them, he or she might have moved away when the boy got much closer than about 50 meters. Another way to measure how comfortable an animal is with humans is to calculate how long it takes the animal to approach the person. The greater the time taken to interact, the more fearful or, at least, cautious the animal is of humans.
7. Plays: Play is another behavioral measure of welfare. Play is thought to indicate positive emotional states in animals, and research is being carried out on this topic (Held & Spinka, 2011). Young animals tend to play more than adults. Potential reasons for play include:
   - To develop activities, they will need when older, e.g. young cats learn to hunt by stalking other members of the group, or their mother's tail
   - To develop and strengthen muscles (needed for flight, hunting, fighting, etc.)
   - To strengthen bonds with other members of the group.

Behavioural Indicators of Poor Welfare

As we can see from this chapter, when we look for behavioral indicators of poor welfare, we look for the absence of behavioral signs that indicate normality. The behavioral signs listed here are examples that you may see frequently:

1. Sickness Behaviour: When an animal is sick or injured, his/her body's inflammatory response includes chemical messengers which are detected by the brain and result in changes in behavior. For example, a sick animal may sleep more and tends to withdraw or to reduce his/her social interactions and exploratory behavior. He or she will also reduce his/her food intake and may

even stop eating.

These behaviors have adaptive value and can help the animal to recover for example, resting conserves energy for use by the immune system. We are very familiar with these signs clinically, but what can be overlooked is how the motivation to rest, withdraw and so on means that sick animals have new behavioral needs. For example, they need a comfortable, safe place where they can withdraw to, and where they are not at risk of aggression from other members of the social group.

Therefore, it is important that farms and other facilities that keep animals in groups have appropriate hospital pens that give sick animals the comfort and space they need while they recover, but which do not induce other welfare problems (such as the stress of complete social isolation in the members of a social species such as a sheep).

2. Pain Behaviours: When animals show a limited range of or a change in behavior, this may be because of pain caused by injury or disease, neither of which may be apparent externally which we may not have the capacity to identify/diagnose. Therefore, it is important to recognize pain behaviors so that we may seek the necessary intervention. However, this is not always easy, and we do not yet have valid measures of pain for most domestic species. Detecting pain takes practice, as some species do not demonstrate pain obviously. For example, some herbivores tend to become still and passive when in pain, probably so as not to attract predators. Generally, you can assess pain using the behavioral indicators outlined on this here. For example, acute pain normally causes some combination of:

    - Altered posture, e.g. hunching over
    - Altered gait (such as lameness, e.g. sheep with infected feet may graze while kneeling on their front legs)
    - Altered demeanor: animals may seem depressed and unresponsive to their surroundings
    - Inappetence
    - Increased respiratory and heart rate
    - Grinding teeth (this is common in ruminants with visceral pain)
    - Response to palpation or manipulation of the affected area: this may make the animal tense up or show aggression
    - Vocalizations (these may be common in acute pain, e.g. during and immediately after castration without analgesia).
    - If the behaviors above resolve when you provide analgesia, this strongly indicates that pain was the cause.

Chronic pain may be difficult to detect and, in older animals, is often mistaken for ageing so owners may not report the above changes to you. Some of the signs of chronic pain include:

- Altered demeanor (irritability, social withdrawal, aggression)
- Animals may not tend to move much, and they may sleep a lot

- Altered grooming and toileting behaviors, e.g. cats may stop grooming because it is painful to move in the necessary ways. He or she may therefore have an unkempt coat
- Altered gait (lameness)
- Weight loss
- Response to palpation or manipulation response to analgesia: this again is a very useful way to discover if pain is present. 'Blocking' the nerves of a horse's foot with local anesthetic is a diagnostic method to help a vet locate the source of lameness.

3. Abnormal Fear**:** The next behavioral sign that an animal may not be enjoying good welfare is the presence of abnormal fear or aggression towards people. It is normal for animals who have had little contact with humans to show signs of fear. Aggression may be displayed if the animal feels that he/she is cornered. Also, certain individuals or breeds may be particularly prone to showing aggression. However, domestic animals and pets who have plenty of contact with humans should not show fear or aggression in normal circumstances. For example, the water buffalo in this picture is alert, friendly and curious.

4. Limited Range of Activity**:** Many domestic conditions include marked behavioral restriction for e.g. no play, no response to external stimuli. This often means a relative lack of environmental stimulation, which can result in animals showing a much more limited range of activity. This may be partly because animals are confined in a very small area, and because they do not have enough variety in external cues.

   Another reason why animals may show a limited range of activity is because of illness. These behaviours are the clinical signs that we use to diagnose and treat disease. However, they also serve a purpose for animal welfare, and we shall now look at them more closely.

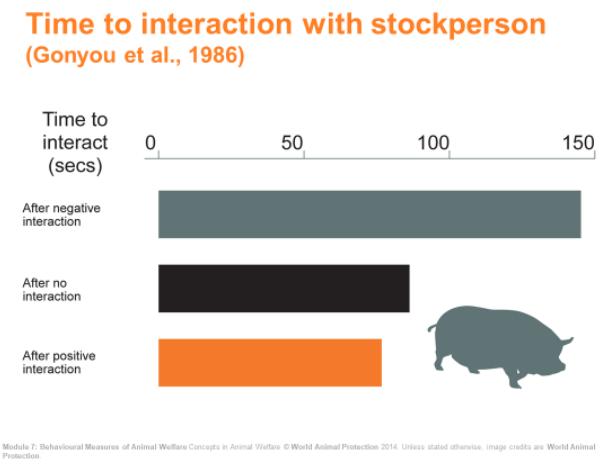
   For example, pigs are naturally very curious. A barren environment may cause frustration because they cannot perform rooting behaviour, or they may feel more non-specific boredom. Frustration may be manifested as the repeated expression of abnormal behaviour, sometimes for long periods of time. An example of this is bar-biting in sows confined to stalls.

5. Abnormal Aggression Towards Humans**:** Often the underlying cause of aggression is fear, but there can be other motivations as well (e.g. sexual, territorial). In turn, there are many different triggers for aggression, including group size, age at weaning, and space. If you see signs of aggression, either when you are observing animals or in reports from an abattoir that indicate bites or wounds on the skin, this can indicate conditions of poor welfare and it is a signal that you should investigate.
6. Fighting**:** Fighting can occur when animals are mixed with new animals, such as after weaning, at markets, and during transport to slaughter.
7. Stereotypies**:** Stereotypies are common in animals who are housed in very restrictive environments. However, it is not clear that animals who perform stereotypies are suffering more than animals who have not developed these behaviors. In fact, performing stereotypies may be some animals' way of adapting to their environment.

Stereotypies are repetitive behaviors which are constant in form and which serve no obvious purpose in the context in which they are performed. The sow in the picture is repeatedly chewing the bar in front of her. This is an example of a stereotypy. Stereotypies may have complex motivations, but they can often be linked to some normal activity (such as foraging) that is frustrated in a particular environment, or that was in an earlier one. For example, the sow in the picture has probably developed the behavior because she has no substrate to root in, and no room to move round, explore, or experience novelty.

Research indicates that when animals perform stereotypies, this typically releases endorphins in their brain. Endorphins are associated with pleasurable feelings. Therefore, these animals may gain some relief from frustration and some pleasure by performing the stereotypy. They may be better adapted to a restrictive environment than animals who do not show stereotypies. Stereotypies may continue to be shown when animals are moved from a restrictive environment to a more complex one that provides the space and substrates needed for them to perform important behaviors. For example, zoo elephants may continue to rock even when offered access to plenty of space and a stimulating environment. We still do not completely understand stereotypies. However, a review of research on signs of poor welfare and stereotypies indicates that the presence of stereotypies is strongly associated with known measures of poor welfare. Therefore, there is now general agreement that the presence of stereotypies is a sign that an animal has lived, or is living, under conditions of poor welfare.

8. Non-Specific Boredom**:** More non-specific boredom may arise because of the monotony of an animal's environment. This may result in passive or depressed behavior, whereby the animal is very still and does not respond to his/her surroundings. Some sows who are confined in single stalls assume a posture like a dog sitting and are very inactive. In other cases, non-specific boredom may cause animals to develop stereotypies which may be complex but may not be clearly related to one frustration; for example, tail-chasing in dogs.



This diagram illustrates the findings of a study on the effect of positive or negative handling on the time pigs took to approach humans.

The grey bar indicates the time taken by pigs who had been slapped and hit by the stock people. The black bar shows the time taken for pigs to react to stock people when they have been subjected to neither positive nor negative experiences. The orange bar indicates the time taken by pigs who had been stroked in a positive manner.

The diagram shows that pigs who were hit (grey bars) took much longer to come forward and interact with the stockperson than pigs who had had no interaction with stock people (black bars) and those who had been stroked in a positive way (orange bars).

Summary

- Horses develop a characteristic behaviour called crib-biting, where they rest their top teeth on a solid horizontal service and perform swallowing movements. This can lead to weight loss and the marked over-development of neck muscle. It is likely that this behaviour results from a combination of the animals' genetic predisposition and lack of opportunities to forage. The behaviour is not seen in horses living wild, and seems to develop when horses are kept in stalls where they cannot move around or select from various forages.
- Many captive carnivores, such as bears, develop locomotory stereotypies, e.g. pacing. It seems likely that these behaviours develop because their enclosures are too small to permit the normal ranging behaviour that the animals perform as part of food-seeking.
- Laying hens kept in cages may start feather-pecking, where they peck at the plumage and limbs of other birds in the cage, removing their feathers and injuring them. This stereotypic behaviour has a strong genetic component and is also associated with high stocking density and activity levels.
- Dogs may also develop repetitive behaviours such as barking, pacing and chewing. These behaviours may be misunderstood as seizures or other physical pathologies. We need to understand motivation and other aspects of behaviour in order to correctly identify when the behaviour may be a sign of underlying frustration, rather than physical illness.
- While looking at behavioral indicators of poor welfare, we have already talked about a limited range of activity, sickness behaviors, abnormal fear and aggression towards people, and stereotypies. We shall now look at other behaviors that may reflect poor welfare. This last group consists of other behaviors that are not usually seen or expected in the context. They may be classified as redirected behaviors: these are normal behaviors that are directed towards inappropriate substrates. Examples include:
    - Cross-sucking in calves who do not have access to their mother or an artificial teat to suck on
    - Tail-biting in pigs: this is a common problem, and its causes are not entirely clear. However, it is thought to be triggered by the lack of opportunity to root and forage for food, and therefore it is a redirected foraging behavior.

Another category of behavior is self-injurious behavior. Examples are:

- Lick granuloma in dogs, which occurs when dogs lick the same part of their body repeatedly, sometimes even exposing the bone. The cause of this is not clear, but it may be related to neural pathology or to anxiety/boredom
- Self-mutilation in horses who lunge at objects or bite themselves. Sometimes, these behaviours may be caused by local pain. In other cases, they may reflect frustration with the animal's environment.

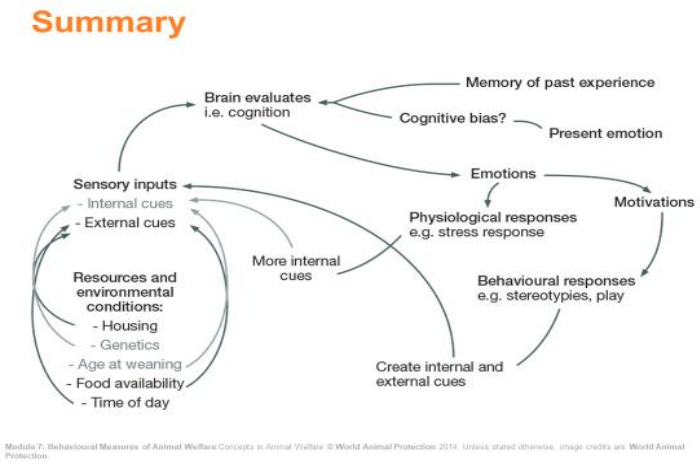
- We have now considered a range of behaviors that may result when one or more of the three aspects of welfare (physical functioning; mental state; performance of behaviors that are important to the animal) are compromised. We finally need to consider how you might measure these behaviors in order to make a judgment about welfare.
    - We do not typically quantify the different behavioral signs of illness or good welfare. Vets note these observations, together with quantitative measures such as heart rate and blood tests, to reach a conclusion about how the animal seems to be faring overall.
    - A technique that can be used to judge an animal's welfare is known as qualitative behavioral assessment (QBA). Its use in veterinary clinical assessment has not been assessed; however, QBA has been developed and used more formally in research.
    - Briefly, different observers have used spontaneous descriptive terms to summarize a live animal's emotional state and the animal's manner of interacting with his/her environment. For example, an observer might rate the sow in the picture as 'content' or 'passive'. The researchers then use statistical processes to summarize those terms into an overall assessment of the animal's welfare. The assessments are then compared with known quantitative indicators of the animal's welfare.
    - The approach is subjective and there is a concern that it emphasizes anthropomorphism; however, research into its validity indicates that sometimes descriptive terms correlate well with quantitative measures of welfare.
    - For example, some qualitative measures are included in some of the Welfare Quality® project assessment tools for assessing the welfare of farm animals in studies in the European Union (EU) and Latin America. However, it is unlikely that qualitative assessment on its own will ever be sufficient to assess the welfare of animals. You also need to consider quantitative behavioral (and physiological) measures.
- When you are assessing the welfare of an animal using behavioural measures, you should find out how often the animal performs the behaviour of interest, and how long each episode lasts for. In a group of animals, you will also want to know how many animals show the behaviours.

  For example, if you notice fighting as you walk through a barn of pigs, you would want to find out how often fighting occurs, how long each bout of fighting lasts, how many animals are involved and any high risk factors such as age. By gathering this information, along with the farmer, you can then make a judgment about the cause of the fighting you saw and whether it indicated a bigger welfare concern, or was only a very infrequent occurrence. When auditing the welfare of animals at slaughter, one of the welfare measures is the percentage of animals who vocalise during handling and stunning.
- To finish, we shall put together what we have covered today with the first lecture on behavioural measures of welfare, and with the two earlier lectures on physiological measures of animal welfare.
- We have talked about physiological and behavioural measures of welfare, because they can tell us something about an animal's experience. That experience is a reflection of the animal's physical functioning, mental state/feelings and the opportunity to perform important behaviours. It is complex, but we can understand it as a sequence, as shown in the picture.
    - Starting on the left, we see that sensory input is created by internal and external cues.
    - These cues come from all the environmental and inner resources of the animal in that moment. Examples in the picture include housing (which you see provides external

sensory input) and the animal's genetics (which influence the animal's internal sensory input).

- Nerves transmit all this sensory information to the animal's brain, which then evaluates it.
- This evaluation is possible because the brain has cognition: it can perceive the incoming sensory information, store it and process it. On the top right of the diagram you can see that memory is involved in the evaluation. You can also see, just below, that the emotion the animal was feeling as it evaluates the sensory information may affect that evaluation – this is cognitive bias.
- The end result of the brain's evaluation is the generation of emotions and the urge, or motivation, to perform a particular behaviour. These are on the right-hand side. Emotions can modify and cause motivation.
- Emotion gives rise to physiological responses such as the stress response, which is below.
- Motivation gives rise to behavioural responses which are at the bottom on the far right. As we have seen today, the behaviours may reflect positive emotions and good welfare, or they may reflect poor conditions and possibly reduced welfare (e.g. stereotypies).
- Finally, these behavioural and physiological responses create further sensory input, as you can see by the arrows going across to our starting point on the left.

- The diagram shows that the brain is constantly evaluating ongoing sensory input. This results in the physiological and behavioral responses that we measure and use to make judgments about whether animal welfare is acceptable or not, i.e. whether the animal is having a good life experience or a bad life experience.



Chapter 6

Assessing Welfare in Practice

Introduction

This chapter will teach you:

- Why you carry out welfare assessments:
    - The reason this is important is that animals are sentient and we do not want them to suffer.
    - Instead, and in accordance with the three-part concept of welfare, we want animals to function well, to feel well and to be able to perform the species-typical behaviours that are important to them.
    - Standards of care in any of these areas can slip, such that a particular area of care is bad. Welfare assessment prevents 'bad becoming normal'.
    - The impetus for welfare assessment has largely arisen out of public concern for farm animals, and assessing their welfare will the main focus of this lecture, although we will also consider laboratory animals. Those approaches can be adapted to animals under other conditions, such as zoo animals and shelter animals.
- How you carry out welfare assessments in the different contexts listed here. Moving on to the different types of standards that may apply to farm animals, there are three main types:
    - The World Organization for Animal Health (OIE)'s minimum standards of care for terrestrial and aquatic animals – these are not legally binding but have been agreed upon by the ~174 member countries of the OIE.
    - The second type of standard is the legally binding standards that countries may have written into their legislation. Some countries may not have much legislation, but they may have recommended guidelines for treatment and welfare of farm animals.
    - Most common of all are private standards of care, designed to satisfy the concerns of those consumers interested in certain aspects of that care, in this case animal welfare. Because private standards are the most common, we will now look at these in detail

Quality Assurance Schemes

There are many different types of quality assurance (QA) schemes in countries around the world. Some schemes operate for the internal market. A few examples of the same are:

- The very first animal welfare assurance scheme was developed by the Royal Society for the Protection of Cruelty to Animals (RSPCA) in the UK and is known as the Freedom Foods scheme. It covers meat, eggs and dairy products (see

www.rspca.org.uk/freedomfood).

- Chile operates a quality assurance scheme for beef
- McDonald's and some other American chain restaurants operate welfare assurance schemes

  for some of their animal products both in America and in some of the other countries where they operate, e.g. for egg production, and at the slaughterhouses that supply their meat.

Other assurance schemes may be in place to satisfy consumers in external markets, enabling producers to benefit from a particular consumer demand. For example:

- Brazil operates such a scheme for beef exported to the French supermarket chain, Carrefour
- Namibia operates a Farm Assured Namibian scheme to enable the export of beef to the European Union.

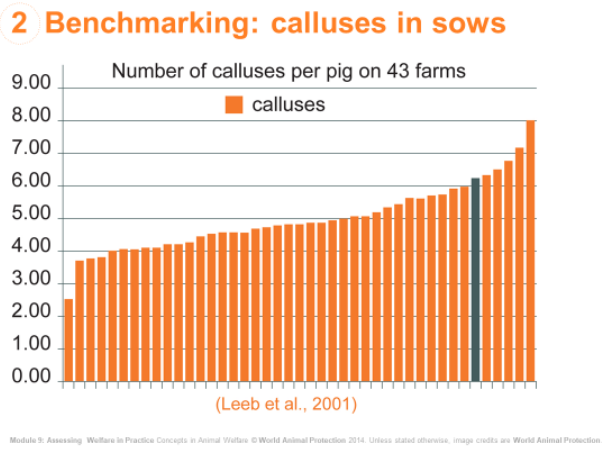
Further, there are voluntary schemes that establish standards in areas that consumers value, like welfare. Regular, independent checks are run to ensure these standards are met:

- The first type of private standards are voluntary schemes that provide standards in animal welfare and, often, other characteristics that are also deemed to be important by consumers (e.g. food safety, environmental protection).
- Farms that participate in these schemes undergo regular, independent checks to ensure that they follow the rules.

As vets in practice, you are unlikely to perform such checks because you will not be independent. However, if your clients are members of such schemes, you can help them to ensure that their standards of care meet or exceed the standard required by the scheme.

Benchmarking

It is a private scheme that may involve welfare assessment. A benchmark is defined as a standard or point of reference. Here, farmers may participate in regular assessment and anonymous comparison with their peers, as a way to voluntarily uphold and improve their standards of welfare and production. Benchmarking enables the farmer and the farmer's veterinarian to identify both areas of concern and positive areas where welfare is already very good. This helps to produce farm- specific priorities for action. Benchmarking schemes require administration and detailed assessment and they have not typically been organized by veterinarians in practice.



This diagram gives an example of the feedback that a benchmarking scheme can generate.

The graph compares the mean number of calluses on the legs of pregnant sows on an individual farm (grey bar) with that on 42 other farms. On all farms, the sows are housed individually, in gestation stalls. The *y*-axis shows the mean number of calluses per farm and the *x*-axis represents the 43 individual farms, ranked from best to worst. The darker bar highlights one farm, which had an average of 6 calluses per pig. You can see that all the farms had at least two calluses per sow, and many had four to five per sow. However, the farm in question is doing slightly worse than that, with six per sow, and ranks 38th out of 43 in this area of welfare.

Benefits of Benchmarking

The benchmark system operates through regular feedbacks being given to the farmers. The benefits of this are as follows:

- It encourages farmers in the following ways:
    - Stimulate competition between farmers
    - Build an incentive system
    - Use better returns as an incentive for maintaining higher welfare standards
- It educates farmers in the following ways:
    - Creates awareness regarding their performances
    - Makes them aware of the husbandry solutions available to the problems being faced
- It helps in the enforcement of the following:
    - A fixed definition of minimum welfare performance
    - Yardsticks to either pass or fail a farm
    - Convinces the farmer to chart out and implement an action plan if it is failing

Assessment of Welfare

Levels at Which Assessment Functions

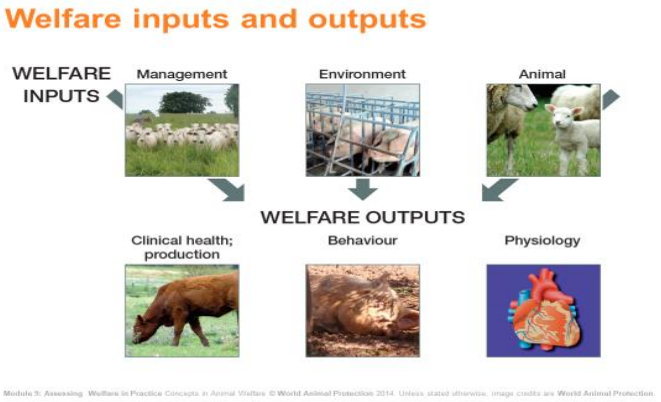
Now that we have seen the different types of standards that farmers and veterinarians themselves might choose to adhere to, we need to look at how you would assess animal welfare to see if those standards are being met. They can be done both at the group as well as the individual levels. The first four operate at the group level whereas the last one at the individual.

- We will start by looking at how you might incorporate welfare assessment into your advice to farmers in farm planning at the group level.
- Then we shall look at how welfare assessments are used on-farm as part of quality assurance schemes.
- Then we shall look at the assessment of welfare at the slaughterhouse.
- Then we shall look at how you might assess the likely impact of research procedures on laboratory animals.
- We will also look briefly at how, when an individual animal is examined in veterinary practice, we should include the 'feelings/mental state' and 'important behaviors' aspects of welfare, and not only the 'physical functioning' aspect.

Measures that Can Be Assessed

Before we look at the assessment of welfare in animals. There we saw that the two measures of animal welfare that we can assess are:

- The events and resources which give rise to animals' sensory input. These are known as 'welfare inputs' or 'resource-based measures. Welfare inputs concern the three areas:
    - Management factors including the stockperson's training and how they handle the animals
    - Environmental factors such as the housing, nutrition and other areas of husbandry
    - Animal factors such as genetics and early experience.
- Animals' responses to this input. These animal-based measures are 'welfare outputs' or 'outcome-based measures. Welfare outputs also concern three main areas:
    - Clinical health and production.
    - Behavioral measures.
    - Physiological measures.



How to Do the Assessment

The process for carrying out a welfare assessment has four stages:

1. You gather information about the animals themselves (welfare outputs).
2. Then you gather information about the management of the animals (welfare inputs).
3. You inform the farmer or owner of any welfare problems, what the risk factors are and how they can overcome them.
4. Finally, you encourage and support the farmer or owner in making your recommended changes, e.g. by explaining the financial and non-financial benefits of making the changes.

Welfare and Positive emotions

Welfare assessments currently tend to focus on preventing suffering more than on promoting positive emotional states such as happiness and pleasure. This is because animal suffering is of such concern and there has been much more research on the factors associated with negative emotions and how to avoid them than there has been on positive emotions. At present, all we can say is that some behaviors seem to indicate positive emotional states, and we need more research to know how husbandry can be adapted to maximize these states in different groups of animals. We need to be aware of the behaviors concerned, which are:

- Play behaviors
- Positive behaviors between group members, such as grooming each other or resting together
- Some vocalizations, e.g. purring in cats may be a sign that the cat is content or happy.

Farm Health Planning

Moving on to our first example of how to assess animal welfare. This example concerns how you can assess welfare in practice as part of your service to your farm clients. You would normally do that best within the context of farm health planning, which involves creating a practical and structured preventive health

program that includes welfare and visiting the farm to monitor the success of the program. Visits might typically occur every three to six months, perhaps at times of year when welfare may be at greatest risk. For example, in the case of sheep this might be in the lambing season, during shearing, and during transport of lambs for slaughter.

Example: sheep farm

Example: extensive sheep farm
(Goddard, 2011) (continued)

Plan Area	Welfare benefit
Nutrition	Freedom from hunger and thirst, better disease resistance, faster growth rate
Housing	Protection from extremes of weather, especially after shearing
Biosecurity	Less risk of introducing disease
Routine preventive health treatments, e.g. vaccination for clostridial disease	Less risk of endemic disease outbreaks
Lambing intervention strategy	Less peri-natal suffering and loss of ewes or lambs
Intervention point when a risk factor reaches a specified level	Early relief from/reduction in suffering, e.g. when weather becomes very dry or cold

This table indicates some examples of key areas of your plan, with the welfare benefit stated.

In each area, you need to advise the farmer about the appropriate level of care required. For example, housing needs to provide enough space and protection. The last example on the list considers when you

might intervene to prevent a risk factor giving rise to a major welfare problem. An example of a risk factor is the weather: at what temperature or degree of drought would the farmer intervene to ensure his/her animals do not become dehydrated, too cold, etc.?

Monitoring Success of Plan

Having devised a plan with your client to help him/her provide high levels of welfare to the animals, you will monitor the success of the plan during your periodic visits. Monitoring involves reviewing relevant data that the farmer has collected. These data would include disease records,

mortality rates, antibiotic expenditure, etc. and you might need to train the farmer to observe some of the relevant signs such as lameness. Other data the farmer may receive automatically, e.g. wool grading or carcass quality. The important thing is that you cannot help the farmer if he/she does not keep good records, and you may help him/her to collate the information by supplying easy-to-use record sheets.

Inspecting Farm and Animals (Welfare Inputs and Outputs)

The next part of your routine visit would be to inspect the farm and the animals (welfare inputs and outputs). As the farm's regular vet, you may already know the farm quite well. However, it is still important to carry out a formal assessment so that you do not overlook welfare inputs that may have changed since you visited on a clinical call. The method includes four main areas of welfare concern, as shown here, and they have a total of 12 welfare criteria, details of which depend on the species and husbandry concerned. Use the four concerned areas to inspect the welfare quality:

- Good nutrition
- Good housing
- Good health
- Appropriate behaviour

These four areas can further be divided into twelve criteria as shown in the figures below:

Extensive sheep farm
(Goddard, 2011)

Area	Criteria	Example of measure
1. Nutrition (absence of)	1. Prolonged hunger	*Body condition score; extra feed*
	2. Prolonged thirst	*Reliable supply of clean water*
2. Housing (comfort)	3. Resting area	*Dry, clean lying area (shelter)*
	4. Ease of movement	*Rough terrain?*
	5. Environmental temperature	*Shelter from extreme weather. Panting; huddling; shivering*

The tables show the 12 welfare criteria. The column on the right gives examples of what you need to observe about the resources (welfare inputs) and the sheep (welfare outputs), when you are on a routine visit at an extensive sheep farm.

Extensive sheep farm
(Goddard, 2011)

Area	Criteria	Example of measure
3. Health (absence of)	6. Injuries	*Lameness, injuries*
	7. Disease	*Mastitis, foot rot, sheep scab, etc.*
	8. Pain caused by procedures	*Protocols for castration, tail-docking, disbudding as appropriate*

This third area of criteria concerns the clinical nature of everything in veterinary medicine.

Extensive sheep farm
(Goddard, 2011)

Area	Criteria	Example of measure
4. Appropriate behaviour	9. Positive emotional state	*Absence of fearful behaviour; playing (lambs)*
	10. Expression of social behaviours, as appropriate to the species	*Sheep are generally social except at lambing and breeding*
	11. Expression of other *species-typical* behaviours	*E.g. grazing. Response to sheepdog*
	12. Good human–animal relationships	*Stockperson's handling; avoidance distance*

This table shows behavioral criteria. Note that sheep are social animals who are distressed by isolation, and who respond to sheepdogs as if they were predators. Therefore, it is important how well sheepdogs are trained. It may be valuable to watch how a farmer's dogs behave with the sheep, and whether the sheep are able to retain some distance from the dogs, especially in corrals.

In regard to the animals' relationship with the farmer or other stock people, there are no quick, proven tests of this in sheep, but if your routine visit coincides with shearing, for example, you can observe how the animals are handled and how they behave.

Assessing Risks

Your routine farm health visit has now included your review of the farmer's records, and your own assessment of welfare inputs and outputs during your visit. Your next step is to inform your client of your findings and compare these with the plan you had laid out together at the beginning. You can see where things are going well in terms of welfare and the benefits of this to the farmer and his/her animals, and where things are not going so well and may be putting animals at risk of welfare problems now or in future.

You can then explore the causes of successes and difficulties, adjust your original plan if appropriate, and set feasible and specific goals to be achieved by the next review, including the costs and benefits of reaching the goals. This is only a very brief outline of how you approach farm health planning with your clients, and how you can include all aspects of welfare in that, not just measures of disease.

However, note that some welfare problems are inherent to the farming system and cannot be altered without a big capital investment that the farmer might not be able to afford. In contrast, the premium that your sheep farmer may earn for producing meat, milk or possibly wool, under a quality assurance scheme, may enable him/her to make the investments needed to improve animal welfare.

Next, we shall look at quality assurance schemes.

Quality Assurance Schemes through Group Assessment

We saw earlier that there are many different quality assurance schemes for animal welfare. Valid, reliable assessment methods are essential if the standards of the scheme are to be met. To this general end, the Welfare Quality® project was developed. The project involved research centres in 15 European and 4 Latin American countries (Mexico, Uruguay, Chile and Brazil), with the

goal of developing standardized and valid welfare assessment protocols for common farmed species, at the different stages of their lives. Another example is the AWIN Animal Welfare Indicators project which involves developing concepts further for these and other species and provides online information about animal welfare education.

Sample Result:

Here we see some results when this tool was used to assess growing pigs on 30 farms (64, 496 pigs) across Spain. Performing all these assessments took approximately six hours per farm. The protocol was easy to use and could identify farms that posed a welfare risk to the animals in some areas. However, the animal-based measures of behavior were difficult to interpret. They showed a lot of variability, but it was not clear what was causing the variation from farm to farm. The authors concluded that more research is needed here if the assessment tool is to help animals in a quality assurance scheme. Otherwise it will only show that some farms are better than others, but it will not be clear what the farmer could do differently to benefit the pigs, in order to meet the standards of the scheme.

Note that this approach to welfare assessment does not mean that other aspects of animal handling during the slaughter process are not important. For example, welfare problems that occurred on the farm and during transport can also be assessed in a slaughterhouse welfare audit:

Few Important Considerations in Slaughterhouse

Vets assess welfare on-farm and in the context of treatment or quality assurance schemes. Another important aspect of quality assurance for everyone is that farm animals are slaughtered humanely. Therefore, auditing welfare at the slaughterhouse is essential. It is required for a vet to conduct an Ante-mortem inspection to certify an animal fit for slaughter and conduct a post-mortem inspection of their carcasses. In the capacity of a veterinarian or as a member of the slaughterhouse monitoring committee, you may be called upon to conduct internal audits of welfare.

The main purpose of the audit is to prevent 'bad' from becoming 'normal'. When there is a high throughput of animals, standards can easily slip. If you have clearly worded audits, it is relatively easy to measure the extent of problems at specific points in the process of handling and slaughter of the animals. Professor Temple Grandin is the world's leading authority in the auditing of slaughterhouses for animal welfare. She stresses the importance of clearly worded audits. You can see that the first wording, "most of the animals were handled roughly", is vague, and this makes any concern over rough handling difficult to correct. In contrast, the second wording is very specific and makes it easy to demonstrate whether or not the slaughterhouse is meeting standards.

- Five Animal- Based Measures

  Based on the OIE standards of transport and slaughter, five variables should be measured when auditing animal welfare at slaughter.

  1. The percentage of animals who are effectively stunned at the first attempt, e.g. at least 95 per cent of cattle must be stunned effectively on the first attempt.
  2. The percentage of animals who show signs of regaining consciousness before slaughter. This should be zero: if any animals show signs of regaining

consciousness before being hung on the rail, the slaughterhouse fails the audit.

3. The percentage of animals who vocalize during handling and stunning, e.g. fewer than 5 per cent of pigs should vocalize when in the restrainer box or stunning pen.

4. The percentage of animals who fall during handling, e.g. handling practices or flooring need to be improved if more than 1 per cent of the animals fall during handling.

5. The percentage of animals who are moved with an electric goad. e.g. this should be fewer than 25 per cent, and the goad should only be picked up when an animal refuses to move.

These standards are easy to assess for each animal the criterion of care is either met or not met. Then you calculate the total number of animals where the criterion is not met and estimate the overall percentage of animals affected. That percentage tells you if you have met the standard of care concerned or not.

- Prohibited Practices
    - No dragging of animals
    - No dropping of animals
    - No throwing of animals
    - No use of puntilla (stabbing behind the poll) or cutting tendons to immobilise
    - No hoisting live animals before ritual slaughter
- Measures of welfare on farm, during transport and at the abattoir
    - Percentage of lame animals
    - Percentage of thin animals
    - Percentage of dirty animals
    - Percentage of animals with sores, bruises or lesions
    - Percentage that die before slaughter
    - Percentage morbidity (illness or injury)
    - Percentage of birds with broken wings and legs

Animal Welfare Grading

When researchers plan an experiment using animals, many countries first require an animal care committee or individual to assess the expected impact of the study on the animal's welfare. If the welfare impact is too severe, and if the benefit of the research is not significant enough to merit the use of animals, the researchers may not be allowed to proceed, and may have to adjust their proposed methods and resubmit their application for review.

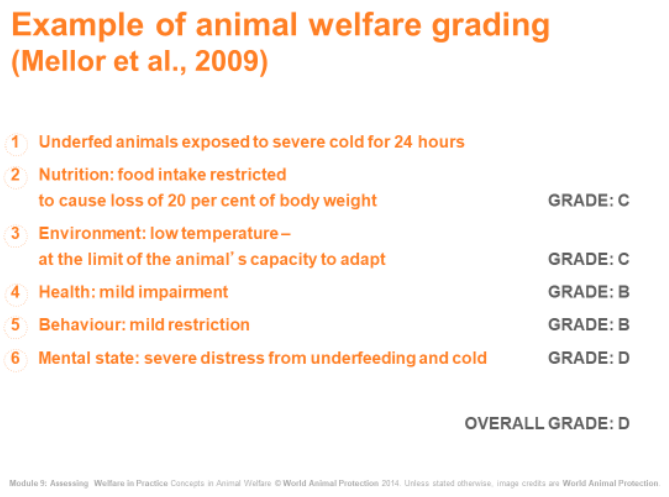
Assessing the likely impact of a research protocol is challenging because the study itself may be a

new procedure or approach, and the assessment has to be made in advance. Animal welfare grading was developed by researchers in New Zealand in the 1990s, as a way to assess the impact of research on animals' welfare. The approach is based on the Five Freedoms and estimates how long animals might experience any compromise in the Freedom concerned, and how severe that compromise would be. So, there are five domains and each domain is graded from A to E, where A represents no welfare compromise in that area, B represents mild compromise, etc., and E represents very severe suffering. Each graded A to E according to specific criteria, and one overall grade is then assigned. Moving away from farm animals, we shall now consider laboratory animals.

The five domains are as follows:

1. Nutrition: dehydration, malnutrition, under-nutrition e.g. body condition score.
2. Environment: cold exposure, heat exposure e.g. shivering, panting, body temperature.
3. Health: disease, injuries e.g. fever, cuts, diarrhea
4. Behavior: absence of normal behaviors, presence of abnormal behaviors
5. Mental State: feelings and emotions, anticipated intensity of nausea, pain, fear, etc**.** e.g. posture, vocalization, heart rate, behaviors, physiological measures

As in the Welfare Quality® project, within each domain, there are specific areas of assessment. For example, domain 2 – environment – includes the two areas of exposure to cold and exposure to heat. The first four domains assess the likely impact of a research procedure on animals' functioning, as measured by its expected effects on behavior and physiology. The fifth domain, mental state, assesses the anticipated impact of the procedure on the animals' feelings. Each domain is then graded from A to E for the impact of the procedure within that domain of welfare. The grades are mutually exclusive. The overall grade for the welfare impact of the procedure is normally based on the fifth domain, mental state.



Mellor et al. (2009) use this grading system to assess the welfare impact of a hypothetical study on the effect on underfed animals of exposure to severe cold.

You can see from the chapter that the first four domains of welfare, concerning the animals' physical functioning, were predicted to be mildly or moderately affected by this relatively short experiment. However, mental state gets a worse grade than all the others because marked suffering is anticipated based on the extreme cold and under-nutrition, and the length of exposure to this.

Consequently, the overall grade for the anticipated welfare disruption caused by the study is D. It then becomes a matter of ethics and judgment whether the experiment would be allowed to go ahead.

Chapter 7

Companion Animal Management

Introduction

In this chapter we will look at an overview of common welfare problems in companion animals, why these problems occur, and how the welfare of companion animals can be improved. In this last part we will emphasize your role within a wider, coordinated approach to controlling overpopulation of dogs and cats, which is a worldwide problem.

Around the world, humans have developed a special relationship with certain animals. The relationship can take many forms, but it fulfils a psychological need and provides us with companionship. So, we can define companion animals as species that humans keep primarily for social contact and for pleasure, rather than for performing a task or producing food, fibre, etc. Another word for companion animals is 'pets'.

Companion animals include birds, reptiles and fish, and small mammals such as rabbits. We can see from this list that companion animals are usually domesticated species. However, birds and reptiles may be wild caught. The most common companion animals are dogs and cats. If these animals run away or if the owners relinquish them, they create populations of street animals. Street animals live freely without homes or owners. With uncontrolled reproduction, street animals' population can become very large and they are a major problem around the world.

Common Welfare Problems

We will encounter many welfare problems in owned companion animals. There are many problems in street animals too, and you may be involved in helping to treat and manage populations of street dogs, e.g. on the street, or in shelters. Before we look at the problem of street animals more closely, we will briefly list the main welfare problems that you will encounter in companion animal species, starting with owned dogs and cats.

In some parts of the country , depending on the income level and the culture, the main problems you will see will be associated with lack of basic husbandry, e.g. emaciation through lack of regular balanced meals; infectious diseases due to a lack of vaccination and of anti-parasitic treatment; injuries from fighting and accidents; litters of young that do not thrive.

In areas where owners have an adequate income, you are more likely to see:

1. **Health problems arising from the animal's genetics**, especially in dogs. This is because breeders have selected animals for their appearance instead of their function or health. Consequently, many breeds are made up of individuals that are predisposed to health problems (McGreevy & Nicholas, 1999). Recent studies in the UK indicate that the 50 most popular breeds registered with the UK Kennel Club all had hereditary disorders (Asher et al., 2009; Summers et al., 2010).

   Examples are hip dysplasia that accompanies the low sloping hindquarters in German Shepherd dogs and mitral valve disease in Cavalier King Charles spaniels. The organization

UFAW (Universities Federation for Animal Welfare) has a website that lists genetic diseases in pets and there are others. You can explain to your friends, family or as a representative of an organization conducting public awareness that if they know about the breed specific disorders, In that way, encourage adoption from a shelter or rescue organization..

2. **Undesirable behaviors**. Undesirable behaviors in dogs and cats are very common. For example, in a survey of dog owners in Iran, 85.6 percent of dogs had exhibited specific behavioral problems such as inappropriate elimination, fearfulness and destructive behavior (Khoshnegah et al., 2011). Undesirable behaviors are the main reason why animals are relinquished to shelters in Western countries (e.g. Salman et al., 2000). This can be prevented with the knowledge of ethology in general and understanding the cause of the behavioral problems in the individual animal and by seeking the advice of canine behaviorists.

3. **Obesity** is a growing problem in human beings in developed and developing nations, and it is also becoming a widespread problem in pets. Obesity in dogs and cats can have many adverse effects on health (e.g. it predisposes them to diabetes mellitus and osteoarthritis) and comfort (in hot weather, it is difficult for obese dogs and cats to cool down).

Moving on to pet birds, fish and reptiles, there are many different species and a detailed discussion of their welfare problems is beyond the scope of this lecture. However, the commonest cause of illness in most of these species is lack of proper husbandry, i.e. inadequate diet, such as feeding parrots mainly on seeds, and inadequate housing, e.g. not enough space, incorrect humidity, etc.

There are so many different species involved that often there is little veterinary knowledge of their physical and behavioural needs; many of these animals are not suitable pets. For example, a review of the suitability of parrots and related birds (Psittaciformes) concluded that they are not suitable as companion animals for many reasons including owners' widespread ignorance, the longevity of the birds (e.g. African grey parrots live for 30–70 years), and the difficulty in meeting their species-typical needs, e.g. to fly (Engebretson, 2006). Schuppli and Fraser (2000) provide a framework for assessing whether a species is suitable to keep as pets, and use the Five Freedoms as a guide.

Small mammals such as rabbits and rats are growing to become popular pets, especially for children. In these species, there is adequate veterinary knowledge, but owners are often ignorant of husbandry. For example, in a study assessing the welfare of pet rabbits in the Netherlands, the average lifespan was ~4 years whereas the maximum potential lifespan is 13 years (Schepers et al., 2009). Most health problems seen in pet rabbits are due to a poor or incorrect diet, with consequent problems for dentistry and digestion (Sayers, 2010).

We have now looked very briefly at the common welfare problems in dogs and cats, and other companion animals. Next we will look at how these problems arise and how to address them, and we will focus mainly on the problem of street dogs and cats and how to control their populations.

Why Do Companion Animals Have Poor Welfare?

There are many reasons why companion animals may have poor welfare. A few primary reasons have been discussed below:

- Pet ownership and marketing**:** In many countries the pet industry is responsible: pet

owners are a big market and a lot of advertising presents pets as a desirable commodity, because owners will then buy pet food, toys and accessories for them. As people become more affluent, they may acquire pets without knowing much about them or their care. In India, sale of pets on the internet contributes to this problem because suppliers will sell to anyone who will buy, without providing any advice or screening of owners. In 2017, the Dog Breeding & Marketing Rules as well as the Pet Shop Rules were notified under the Prevention of Cruelty to Animals Act, 1960. These regulations if implemented will address a lot of these issues with dog breeding and pet trade.

- Ignorance**:** most of the welfare problems that you will see are related to owners' ignorance of the needs of the animal in their care.

- Poverty: as people find themselves with less disposable income, human poverty may also create welfare problems in companion animals, because basic health care is not affordable. It is therefore essential for government veterinary infrastructure and extension facilities for livestock improvement or animal husbandry practices.

- Uncontrolled Reproduction: This is an issue affecting all owners and is often related to owners' attitudes as well as to access to appropriate clinical procedures.

The solution to welfare problems in companion animals is responsible pet ownership. One cannot address all the wider problems that prevent owners from taking full responsibility (e.g. human poverty, marketing).

How to prevent Cruelty in Clinical Consultations?

Let's look at the main areas to focus upon during any clinical consultation about companion animals. The goal is to facilitate responsible citizens who have happy, healthy pets. There are five areas that you would cover. These mirror the Five Freedoms and are interrelated. However, health is at the top of the list because this will probably be why the owner has brought the animal to you.

Understanding the behavior of dogs and cats takes knowledge of applied ethology, and it is a clinical discipline in itself. One aspect of it is encouraging owners to use humane training methods (based on rewards, not on punishments like electric-shock collars). This is important so that the dog can understand the owner's communication and benefit from being in a predictable environment. Training is also essential so that the owner has humane control of the dog and it does not bite or injure other people or animals. These areas can be summed up as:

- Health: Prevent and treat disease; routine neutering and permanent identification
- Social needs: For e.g. housed with conspecifics (e.g. rabbit) or solitary (e.g. cat)
- Nutrition: Suitable diet to avoid obesity, dental problems, etc.
- Environment: Space; stimulation
- Behavior: Training, species-typical behaviors, e.g. flying

How Can One Help?

Neutering

The main reason for neutering is because, in most countries, un-neutered pets reproduce and

create overpopulation which in turn results in street animals and overcrowded shelters. However, a few countries are an exception to this rule: the neutering of pet dogs and cats is rare in Scandinavian countries, and yet in those countries there is not a massive problem with pet overpopulation and street animals. This is probably due to a cultural antipathy to uncontrolled breeding.

However, in the majority of countries around the world, there is not such a strong ethic of responsible dog ownership. Moreover, un-neutered animals can be more prone to some health problems such as pyometra (womb infections) and prostate infection or enlargements in dogs and uterine cancers in rabbits. Consequently, for clinical reasons, and for the wider issues around overpopulation, routine neutering of dogs, cats and other companion animals in accordance with essential scientific standards is critical. In India, the Animal Birth Control (Dogs) Rules, 2001, mandates spay and neuter of street dogs to manage dog population. A revised module for Dog Population Management, Eradication of Rabies and reducing man-dog conflict provides the process for implementing ABC in the country.

Permanent Identification

At the time of neutering, or before, you can also provide permanent identification for the animal. There are many reasons why it may be useful to identify companion animals, and it is valuable to explain these to your clients and to encourage them to use some form of identification. Generally, registration, proof of ownership or veterinary certification (for export or hereditary disease schemes) require the permanent identification of the animal with a unique code or number, linked with a coordinated database to keep the rest of the appropriate data. Identification is also important if a pet runs away, so that a shelter or other authority can return him or her to the owner.

In some countries, street dogs and, to some extent, cats are not allowed to live freely but are taken in by animal control or shelters. While research is very limited, it seems possible that many pet owners in such countries do not appreciate the value of identification, whereas people in countries where street dogs that are not owned may be killed might be more likely to use permanent identification.

For example, research in America, where rabies is endemic, indicated that only 30 per cent of owned dogs and 4 per cent of owned cats in the city studied had any form of identification. This was usually a tag rather than a microchip. Moreover, only 36 per cent of dogs and 4 per cent of cats wore a rabies tag. It is not clear why so few owners used permanent identification, and most owners reported positive attitudes towards identification of any kind and said they would normally arrange this with their veterinarian (Slater et al., 2012).

Tattoos and Microchips

Tattooing and microchipping have been used successfully as methods of permanent identification, and each has had advantages and disadvantages.

- **Tattoos**

  Tattoos can be applied by using crush forceps on the pinna or by a ‘handwritten’ technique to the skin of the ventral abdomen. The forceps method is more painful, and in both cases the number may fade or be changed. There is scope for human error in transposing the number or using the same number in more than one animal. The ‘written’ method has the great disadvantage that people from different countries form letters and

numbers in different ways. If one considers an international system which requires a large number of digits to signify country, region, etc, a tattoo generally cannot carry enough digits – they would not all fit on the ear of a cat or small dog. The advantage of tattoos is that the numbers do not require specialist equipment to visualize them.

- **Microchips**

  Microchips are small (grain-of-rice sized) coils encased in a non-bio reactive casing. They are pre-coded with a unique number at the time of manufacture and implanted under the skin in a sterile manner (usually in the midline between the shoulder blades, or the left side of the neck). The animal and the owner's details are then registered with the microchip number, in a central database. To read microchips, you use a specialized scanner that automatically shows the number on a screen. If carried out correctly and rapidly, the implantation technique inflicts limited pain and is easy. Migration of chips following implantation has been described but is rare.

  The major disadvantage of microchips is the cost of scanners used to read the chip (pictured on the right). The shelters and local authorities in your area may not be able to afford a scanner. In that case, tattooing is probably a better option. A disadvantage of both approaches is that the owners must keep the central database informed of their contact details, e.g. if they move house. This is especially important during a disaster, when pets may be separated from their owners, and also if a pet runs away.

We have seen that permanent identification is helpful, but that there is no perfect system for implementing this. In addition to permanent identification, a collar tag has its uses. Tags are criticized because they can come off, especially in the case of cats. However, a tag is an easy way to identify a pet who may have lost his or her owner, especially during a disaster when there may not be access to a central database because phone lines are down, or electricity has been cut off. Also, tags are often easier to read than a tattoo in a frightened animal. Following Hurricane Katrina in the USA in 2005, it is estimated that fewer than 1 percent of rescued dogs had identification tags or microchips, and even fewer cats did (Breton, 2010).

To summarize, we have looked at how the welfare of companion animals can be promoted and the number of street animals be reduced by neutering and responsible pet ownership. However, in some cultures, dogs (and perhaps cats) are not owned by an individual client but by the community as a whole. To encourage the responsible care of those animals, you will have to be sensitive to the structure of the community.

Responsible Ownership in Communities

In regions where there are 'community dogs', you need to promote a degree of 'community responsibility', otherwise the animals can suffer from a lack of food, shelter and veterinary treatment. To achieve this, you have to understand the culture of the community.

For example, in Kathmandu, Nepal, the arrangement of the housing into discrete squares (chowks) means that dogs tend to be restricted to specific groups associated with each square. There is also a strong community structure, such that annual mass canine vaccination and worming programs have been carried out.

In contrast, in a remote indigenous community in northern Australia, the culture did not include an attitude of personal or collective responsibility for the condition of the numerous dogs. Also, the

dogs had strong spiritual significance. There, a program to improve the dogs' welfare had to take a very individual approach, house by house, and included close communication with spiritual leaders and others (Donelan, 2005).

Summary

To summarize so far, we have seen that companion animals are not only dogs and cats, but can include birds, rabbits, etc. We have also seen that a wide range of health and behavior problems can arise in them, and that often these occur because of owners' actions.

Then we looked at how responsible pet ownership can be promoted, especially by recommending neutering and permanent identification, and by owners being advised about their pets' behavior.

We will now focus on programs to control the overpopulation of street dogs and cats. Street dogs and cats are a massive problem in many countries, both for the welfare of the animals and for the health and safety of the humans too. For example, in a survey of animal welfare standards carried out in 2008 in 172 member countries of the World Organization for Animal Health (OIE) , where ~75 countries completed the survey, "the problem of street dog management was ranked as 'major' or 'severe' more often than any of the other issues" (Stafford & Mellor, 2009).

The Welfare of Street Dogs

Street cats and dogs are a problem for two main reasons: the animals suffer reduced welfare in many ways, and they create considerable risks to other species around them, particularly humans. However, the lives of street animals are not all bad. Street dogs and cats have much more freedom of movement and control over their lives than many pet dogs and cats. This picture shows street cats in Banjul, Gambia, and they seem very healthy and well fed and content. Schemes to stabilize cat populations by trapping them, neutering them, and releasing them can be very successful. We will return to those schemes later in this lecture.

First, however, we will look more closely at the welfare problems often experienced by street dogs and cats. The specialization within veterinary medicine that deals with street animals and their management and care is called *shelter medicine*, there are also resources that can help build your capacity in shelter management that will develop your skill at operating a shelter. Be aware that managing the problems of street animals is not your responsibility as an individual. You can be very much part of the solution, and some of you may work with local authorities and animal shelters to design and implement control programs. The rest of this lecture gives you an overview of that. Street animals' populations tend to grow in number. This is because:

(a) they have their numbers replenished because of their own uncontrolled breeding, and

(b) because pet owners abandon their animals, which then become street animals, or allow their intact (un-operated) pets to roam freely and contribute to overpopulation.

As a result of the large populations, there will be a relative lack of food and water, and competition for mates and food may encourage fighting and cause wounds and stress. Street animals in towns and cities are also exposed to a high risk of injuries from road traffic accidents.

All these factors can be a source of fear and distress. However, because the animals live freely, they have a better opportunity to adapt to their circumstances than many pets, who have little or no control over their environment and cannot escape from chronically stressful situations.

Overall, however, the many welfare challenges that street animals face limits growth of the population, because so many animals will die from disease or injury. This means that if the population is allowed to reproduce in an uncontrolled manner, and no additional food provided, it will reach a sustainable level. However, the associated welfare problems for those animals and the risks that these animals pose to humans all make the control of street dogs and cats an urgent public issue.

Wider Problems with Street Dogs And Cats

We have looked at the welfare problems for street animals. The first concern is direct injury to other animals and to people, from bites. For example, in 2008, a survey of 472 households in Todos Santos, Guatemala, where there are many free-living dogs, indicated that 78 of respondents (17 per cent) had experienced at least one dog bite incident during the past two years (Lunney et al., 2011).

Next, in towns and cities, car drivers may swerve to avoid dogs and cats which street animals into the road. This can cause accidents, with injury and even loss of life to the animals and people concerned. As cities become more congested, these risks increase. (This may call into questions the logic of introducing 'neuter and release' programs in large modern cities, and this will be discussed later.)

Street dogs and cats can be a reservoir of disease organisms that can affect humans or their pets. Diseases that are transmitted from animals to humans are called zoonoses. The most important is rabies. Another, in tropical areas, is leishmaniasis: dogs are a reservoir for the leishmania parasite and infected dogs are a real risk to humans who are immunocompromised because of HIV (AIDS) infection..

The Size of the Problem

Here we see the scale of the street animals' population. This is a major problem, and it will become worse as the human population also expands. There are simply too many dogs and cats. Managing the problem involves: Humane methods to control further breeding and so reduce the future expansion of the population and Further breeding.

Added Pressure in Areas Where Rabies is Endemic

Humans are very afraid of rabies because it has the highest case-fatality ratio of all infectious diseases (Rupprecht et al., 2002). Once the symptoms appear, death is inevitable. In areas where rabies is endemic, most human rabies cases are due to the bite of a rabid dog (Knobel et al., 2007). This understandably influences public attitudes towards street dogs and cats.

It is clearly important that any control program for rabies includes mass dog vaccination and identification (including non-owned dogs). However, the additional costs of vaccination and post-exposure therapy may be prohibitive and may not be readily available everywhere. This may cause the authorities to favor mass killing of the animals instead. We will see later in this lecture

why mass killing is ineffective in the long run.

Stakeholders in Resolving the Problem of Street Animals

You can see that animals and humans all have an interest in resolving the problem of street dogs and cats; the general term for a group or individual who has an interest is a *stakeholder*. The column on the left side lists all the stakeholders who have a direct interest in resolving the problem of street dogs and cats.

The right-hand column lists all those who have an indirect interest – that is, they act on behalf of the direct stakeholders, in some way. This does not mean that they are always acting in the stakeholders' best interests. For example, animal protection societies may decide to take in all street animals. This helps to reduce the problem of injury to the animals on the roads, barking in the streets, etc. However, the animals may then have to live in overcrowded shelters where they have no freedom of movement and fight a lot. We will look at the role of shelters because street animals do not have identifiable owners and pose significant risks to human welfare, and to their own welfare, local authorities have to take responsibility for managing the risks. One approach is mass killing of all the street dogs and cats that can be found.

However, often methods of mass killing of street dogs and cats are not humane, e.g. electrocution, poisoning, mass drowning or bludgeoning the animals to death. Slaughter is defined as killing with any procedure that causes death by bleeding (OIE, 2011). It should be humane (e.g. with the animals being stunned first), this is a requirement under Indian law as well.

Direct Stakeholders	Indirect Stakeholders
Street dogs or cats	Local authority
Pet animals / owners	Human and animal health ministries
Those in contact with wild animals	Veterinarians
Those in contact with domestic animals / farmers	Animal protection societies
Those working with human society in relation to health	Educators

Why Mass Killing is Ineffective

The population density that a particular environment can sustain is related to the availability of food. Killing large numbers of dogs will increase the relative amount of food available to the survivors. This:

- Leads to increased fertility and survival
- Attracts dogs from other areas

Apart from the difficulty of killing masses of street dogs and cats humanely, the approach is not effective for many reasons and the veterinary profession has a role collectively in showing strong leadership to the authorities on better ways to manage the street animals' population. The reason that mass killing is not effective is that the population density of dogs and cats is related to the availability of food. Once the population rises above this critical level the relative starvation will cause reduced fertility and survival, hence stabilizing the population size.

If a program of mass killing effectively kills (let us say) 75 per cent of the street dogs or cats, the increased food availability for the survivors will improve fertility and the survival of puppies or kittens to adulthood. In addition, there may be a migration of animals into the area from outside, perhaps increasing the level of aggression as they try to establish new territories. Within a few years' numbers could return to the original level. The greatest argument against mass killing is that the method is ineffective in the long term, for the reasons above. It is therefore not a good use of public money.

Other Problems with Mass Killing

- Often inhumane methods makes inhumanity 'normal'
- Indiscriminate
- Risks to pets and humans
- Alienates sections of society
- Ignores some 'stakeholders'
- Encourages inhumane treatment.

Even though mass killing is not effective in the long term, the problems associated with street dogs and cats put pressure on the municipalities to come up with an instant solution. This sometimes involves inhumane methods such as poisoning, drowning, electrocution, gassing and starvation. Using inhumane approaches to control street dogs and cats creates other problems, such as alienating the public and disregarding their concerns. Other issues are important to consider too, for example: poisoning may cause a prolonged painful death and is very indiscriminate. Poisoned baits may be accidentally picked up by pets and children. Promoting an inhumane approach to unwanted life is important because it may predispose people towards inhumane treatment of humans too.

Mass killing is Linked to Violence

Strong link between animal abuse and violence to humans (Benetato et al., 2011). Mass killing encourages violence in society. If a municipality sanctions methods of street animals' population control that are inhumane or violent, they are inadvertently encouraging a violent society. If the public authorities expose children to violence to animals, this could make children feel that violence to street animals and to humans is acceptable.

Your Role

If we are to advise public authorities against mass killing, it is important to propose something more effective. The plan is more time-consuming than simply finding animals and killing them but does offer a more effective and sustainable means of population control. With your knowledge of animal laws, you can make a particular contribution in the first area (assessing the nature of the problem) and also in the fourth (advising about humane methods). The roles can be summarized as follows:

- Accurately assess the nature of the problem
- Balance the need for retaining the benefits of pet ownership while addressing the street animals' problem
- Take account of all 'stakeholders'
- Coordinate the activities of all appropriate groups and providing advice
- Employ humane methods only
- Change attitudes by education

We will now look more at the first step in these programs, which is about making an accurate assessment of the population of dogs and/or cats before you design the protocol to control street animals. This is very important because quoted estimates of the population are often inaccurate.

Assess the Nature of the Problem

Essential to estimate the population accurately *before* selecting the protocol. Methodology must be standardised to allow comparison of results. Most important use of studies: which animals are owned, and which are not owned. Monitor your program by repeating the population surveys

When assessing the population, you must use standardised, consistent methods in order to obtain reliable data so that when you repeat the survey to see how your strategy is working, you can be sure that any reduction in numbers that you find is real. Also, if you use a standardized method across a city, you can make comparisons within the same city, and it might also then be possible to compare the outcomes of your program with similar programs used in different locations.

Discussion of the different ways of accurately estimating the population of street animals is outside the scope of this lecture. However, the most important distinction to make is between those dogs and cats that are *owned* and those that are not (you need to remain considerate of the difference in how we may value the status of animals within the same species that vary in their status as pets or pests). You need to continue to survey the population of street animals once you have started your chosen program, to monitor the success of the program.

Population of Street Animals (i.e. Roaming Dogs)

- Owned dogs
    - Accidentally lost, or
    - Allowed to roam freely, or
    - Abandoned
- Community dogs
- Feral dogs

The list indicates more about the different groups of animals that you will want to estimate in your population surveys. Not all groups will be present in every situation. In addition to individually owned dogs, you may find community dogs and feral dogs. Community dogs are those which usually wander freely within a populated area, in close proximity to humans, and are usually cared for by the neighborhood or community in that area. Feral dogs are ownerless and untamed, but while some may be of truly 'wild' origins (e.g. *Canis lupus dingo*), others are simply domestic dogs that have gone back to a wild lifestyle, but nevertheless remain a domesticated species (*Canis lupus familiaris*).

Cats can also be classified under the same categories, except that they do not tend to become 'community' animals – free-living cats in a populated area tend to live in colonies and do not usually seek human contact. Again, as we noted earlier, the most important distinction to make is between those dogs and cats that are *owned* and those that are not. If the street animals' population is principally 'owned', civic approaches like legislation, and the registration and identification of all owned animals, will help to reduce the population of street animals. The owners will also be a specific target audience for education on responsible pet ownership. If the population is largely 'unowned' (non-owned), other strategies become more important. However, you would still need to take account of the minority of 'owned' animals.

Credit: Ray Butcher

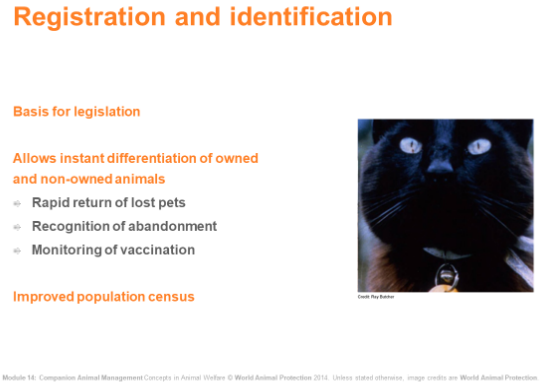
Photo**:** Dog with a collar allowed to scavenge for food. The collar indicates that this is probably a pet dog that has been allowed to roam freely for part of the day or even forage for food at night.

Photos (from left to right):

- Street dogs in Guatemala. These dogs live in close proximity to humans and may be termed 'community dogs'. However, the local human population, though tolerating them, has no real responsibility for them.
- Semi-feral dogs on Chennai beach, India; they have less close contact with humans than in the two other cases.
- A dog guarding the entrance to a 'chowk', Kathmandu, Nepal. The group of dogs has a distinct territory, and the human families within the 'chowk' seem to take on a greater degree of 'community responsibility' for the dogs than in Indian cities.

In 2009, the World Small Animal Veterinary Association, World Animal Protection and others jointly produced updated recommendations on humane management of dog populations (ICAM Coalition 2009). Each item is important and must be included. However, the details of each will depend on the particular place being discussed. Responsibilities for each item will fall to different agencies, e.g. legal department, animal control, public cleaning etc. It is essential that all these groups agree to coordinate their activities from the start. You may be involved in parts of the plan because you are working for the local authority or for an animal shelter. The items listed are as follows:

- Legislation: Generally, requires clear proof of ownership. Identification. Legislation is the basis of any street animals' population control program. It may include codes relating to responsible pet ownership.
- Realistic, practical and clear**:** It is important that it is realistic, practical and clear. If it is not, people will ignore it because they have no hope of meeting the requirements or because it is difficult to interpret.
- Balance the need for penalties with education**:** The law does not have to be entirely punitive. Much of the inhumane treatment of animals during population control is probably the result of lack of awareness rather than a specific intention to treat animals inhumanely. However, this is not always the case, and appropriate penalties must be in place. However, instead of punishing perpetrators, providing education that enables someone to act appropriately and humanely in the future might be preferable in some cases.
- Enforcement: A further essential element is that there must be adequate provision for enforcement. Who is responsible? Is it the police or another agency? If it is the police, do they understand the provisions of the law? Enforcement is only possible if you can prove that an animal belongs to a particular person, so identification of the animal is important.



We looked at tattooing and microchipping earlier in this lecture. Many owned animals do not have identification. In many countries, dogs that are wandering in the streets without their owner are taken to some form of municipal 'dog pound'. Generally, the dog is kept for a period of time (usually from three to ten days) in case an owner comes forward to claim him or her. After that time, the dog may be destroyed or offered for re-homing. If identification and registration are compulsory, the owner can be found quickly and the dog reunited with them (for a fee), avoiding unnecessary time in the shelter.

If the dog has been abandoned, the owner could be traced and dealt with appropriately. Repeated offences can be recognized and dealt with more harshly. If there is no owner, the dog can enter the re-homing program from day one, which saves a number of days of kenneling costs. Street cats are not usually treated in the same way, and in many places animal protection societies deal with street cats by catching, neutering and releasing them, sheltering, re-homing or euthanizing them according to their policies. In countries where rabies is endemic, annual vaccinations may be compulsory. Without adequate identification, such a requirement is difficult to enforce.

Photo**:** Cat with a collar and name tag, indicating the owner's name and address. It is cheap, readily visible and does not require special equipment to see the number. However, it can be lost or removed and is not permanent.

As identification is such an important element in the control of street animals' populations, we will look at why only tattooing or microchipping are recommended.

- Ear-tagging is not suitable. The tag can get lost, and the ear may become infected. Also, if dogs fight, it can be the cause of more severe injuries.
- Ear-notching or ear-tipping is not a suitable method for identification of dogs. The distribution of blood vessels in the ear means that there is a danger of excessive bleeding. The notch cannot be seen in long-haired breeds, and it may resemble a bite wound – which would make it useless as a method of identification.

  In cats, however, removing the left ear tip does not create these problems. It is used in trap– neuter–release programs to identify animals that are neutered, before releasing them again. Bite wounds to the ear can mimic the removal of the ear tip, but the system has proved to be useful in practice.

Garbage Collection

We have already mentioned that the size of a street animals' population is dependent on the availability of food. Garbage will also attract other potential disease-spreading agents (e.g. rats)

so it is important for general human public health that it is dealt with appropriately. Poor hygiene around slaughterhouses or markets selling food for human consumption is especially hazardous.

If more efficient garbage collection is achieved in an area that operates a neuter and release program, not all the street animals' population will have enough to eat. In such circumstances, a degree of selective humane culling may be necessary to avoid starvation and disease in the future. An alternative is to provide the population with feeding stations.

The Role of Feeding Stations

Some people will feed street cats and dogs, and this must be accepted in the overall plan. One requirement of neuter and release programs is that there must be some guaranteed source of food. Often local animal protection groups or individuals will attempt to take on this role. Given that encouraging street animals to some areas may be associated with special human health risks (slaughterhouses, butchers' shops, hotels, restaurants, etc.), it may be advantageous to set up specific feeding stations some distance away.

'Cat Cafes' have been successfully introduced by some hotels in holiday resorts in southern Europe. The cats have generally been regarded favorably by the hotel guests, who are usually quite sensitive to poor treatment of animals in these regions. The cats are fed at specific stations away from the hotel kitchens. They may also be taken away for neutering and veterinary check-ups. The hotel gets the added 'bonus' of appearing to care about the cats, which is important to many tourists and conveys to children a humane message of having reverence for other living beings.

Neutering

It is important that you encourage all pet owners and caregivers to have their pet and community animals respectively, neutered. Some authorities and humane organizations may offer a financial incentive to pet owners to have the surgery. Looking next at non-owned animals, all dogs and cats should be neutered before they are re-homed from shelters. If the onus is on the new owner to have the animal neutered, many owners will not do this; for example, when kittens and puppies

were re-homed from charity shelters in USA, with a voucher offering neutering free of charge at a later date, only 50 per cent of the new owners complied. Early-age neutering is therefore important (i.e. neutering puppies and kittens at ~6 weeks old).

Neuter and Release Programs

One way to stabilize populations of street animals is by neuter–release schemes. Such programs are popular in certain situations where there is a relatively high street companion-animals' population, and where the availability of food will favor the survival and reproduction of a population of street animals. The capture, neutering, rabies vaccination, identification and release of animals to the same area ensures that a large, uncontrolled population is replaced by a smaller, vaccinated and non-breeding group. This fills the niche and prevents inward migration. A guaranteed source of food is an essential requirement of these schemes, or the animals will starve. Municipalities can ensure a supply of food, but in many cases, this is undertaken by animal welfare organizations or the community. If effective rubbish control is also implemented, the size of the population that can be maintained will be reduced.

Neuter and release programs raise a number of concerns, both about their success in terms of public health as well as in terms of animal welfare. In densely populated areas such as large cities and towns, where these programs are popular, the municipalities or animal welfare organizations conducting the activities do not usually catch a sufficient number of animals to make a difference to the population. Resources for these programs are also usually insufficient. Although the animals are vaccinated before release, there is usually no re- vaccination program. The animals can still constitute a danger in terms of aggression and can continue to pollute the environment and cause road accidents.

The situation is also not suitable for the welfare of the animals. They have no guaranteed source of food,

shelter or veterinary care, even when they are 'community' animals. They can be injured in road accidents (especially in densely populated areas), and can suffer from fight injuries, starvation and abuse by humans. Neuter and release programs do not, in general, tackle one of the main causes of continued overpopulation – irresponsible pet ownership and the abandoning of animals. Education and properly enforced legislation are required to tackle this complex problem at its roots.

Requirements for the Neuter and Release Programs

If you are involved in a neuter–release scheme, it is important that the program is part of an agreed coordinated strategy. There is no value in an animal protection society funding such a program in a city in which the municipality still catches and kills street animals – the easiest animals to catch are the ones that have been neutered, and so no benefit is gained by expending considerable cost and effort. It is also essential that the local community is in agreement with the program since, without their support, it will fail. In fact, a very high degree of community responsibility is required, both to ensure that most animals in the locality are caught and neutered, and also to care for the animals following release.

Also, neuter–release schemes only work if a large number of dogs or cats in a specific area are neutered. Failure to do this (due to lack of resources or attempting to deal with too large an area) will jeopardize the success of the program. A further point is that the schemes are not feasible in

cities with a lot of traffic where many of the animals may die in traffic accidents; e.g., in the UK, it is illegal to return a street dog to the streets.If you are involved in a neuter–release program, animal welfare is an important consideration at all stages.

The different stages of welfare concern are:

- The initial catching from the street
- Transport to the kenneling area
- Pre-operative kenneling and treatment

- The surgical procedure: you must use proper asepsis and analgesia and you need to have a good surgical technique, as it will not be easy to treat complications once the animals are released
- Post-operative care and kenneling
- Transport and release
- Monitoring after release.

Non- Surgical Neutering

It would be potentially cheaper and much quicker and easier not to have to neuter animals surgically. Research into this continues.

- The first is a drug for permanent chemical castration of dogs and cats, by intra-testicular injection. The Gonadotrophin-releasing hormone is the pituitary hormone that supports the development and function of the gonads in males and females. This approach shows promise for the long-term control of reproduction, and would control sex-related nuisance behaviours that disturb people. The approach is still being researched.
- The second is contraceptive vaccines (Levy, 2011). The zona pellucida is the layer of the wall of the ovum that regulates interaction with sperm during fertilisation. The zona pellucida vaccine has been successful in controlling some wildlife populations, but it has been difficult to produce one that is effective and successful in dogs and cats. Also, even

if the vaccine were successful, it would not control sex-related nuisance behaviours.

Summary

We have now looked at most of the elements in the WHO/ World Animal Protection framework for controlling street populations of dogs and cats. To review, they are:

- Legislation
- Registration and identification of pets
- Garbage control
- Neutering – of both owned and non-owned animals. And we have seen here that neuter–release schemes have a place, but often they are not feasible, for the reasons discussed above.

To finish up, we will now look at the last two points. We said earlier that the best solution to the problem of street animals is prevention. This includes controlling the sale of pets and educating vendors and owners about responsible pet ownership.

Control of Markets / Pet Shops

Traders share in the responsibility to educate potential pet owners. Selling puppies and kittens in street

markets relies on the 'emotional factor' to encourage sales, and so favors impulse buys rather than considered actions that would be more likely to ensure long-term responsibility.

Basic Requirements

Licensing would help here; whereby pet shops would have to buy a license to sell animals and could only get a license if they met these basic requirements. However, licensing needs enforcement if it is to work.

Education: Promotion of Responsible Pet Ownership

Education of existing and future pet owners, including children at school, remains the greatest challenge. All agencies have a role to play, including:

- Municipalities
- Community groups
- Schools
- Animal protection societies
- Veterinarians in private practice
- Animal legislation enforcement agencies.

It is also important that all these groups give the same message and use resource material that is appropriate for the target audience.

Chapter 8

Welfare of Working

Introduction

By the end of this chapter students should be able to:

- Identify what species of animals are used for working and the tasks which they undertake
- Understand why they have welfare problems
- Recall how to identify problems affecting their welfare
- Identify short- and long-term improvements and alternatives
- Understand the benefits of improved working animal welfare to the owner and the animal.

Purpose of Working Animals

- Agriculture
- Hauling carts
- Power to devices
- Carrying loads on back, e.g. bricks, people
- Herding, guarding, hunting, assistance
- Also: meat, milk, fibre

The principal work done by animals around the world is draught work, i.e. pulling and transporting people,

equipment and goods. At least 400 million working animals, mainly draught used by at least 2 billion people in about 30 countries. Updated data on the numbers of working animals being used worldwide are difficult to find. In 1982 the Food and Agriculture Organization (FAO) of the United Nations estimated that 400 million working animals were used by 2 billion people in 30 countries. Draught animals make a useful contribution to agriculture because they are not dependent on fuel. For poor people, draught animals do not require such high capital cost, running costs or maintenance costs as machines. Dogs work in herding, guarding, hunting, and human assistance (e.g. de-mining, search and rescue, and helping people with visual impairments or disabilities). Note that working ruminants may also be kept in order to provide their owner with meat, milk and sometimes fibre.

Working animals are used for:

- Pulling agricultural implements for land preparation and other agricultural operations, including logging with elephants
- Pulling carts

- Providing power to devices, such as water pumps and cane and seed crushers
- Carrying loads and people on their back (pack animals).

Types of Working Animals

This section introduces the types of working animals and the regions where most of them are found.

- Working equids are used for draught work in the Middle East, many African countries, several countries in Central and South America, and India, Pakistan and China. Note that mules and horses may be used by the military and police in countries around the world.
- Various species of ruminants are also widely used for work.
- Buffalos are found mainly in Asia (India, Pakistan, China, Nepal, the Philippines, Vietnam, Indonesia and Thailand), Egypt, and Brazil. There are water buffalo, swamp buffalo and river buffalo.
- Cattle (humped and non- humped) are used all over the world for milk, meat and work. Various local types of cattle are used. One example is the Gayal cattle (*Bos frontalis*) which are used in India, Indonesia and Malaysia. They are agile in the mountains, and good milk producers.
- Yak are also cattle. They are used in the high mountainous regions (6,000–20,000 feet) of Asia (e.g. Tibet) because they are well adapted to steep areas, cold conditions and snow.
- Camelids, including camel species and llamas, are also used for work in their respective regions, i.e. llamas in Andean regions of Latin America, and camel species in arid regions such as parts of India and North Africa.
- Elephants are hind-gut fermenters, not ruminants. They are used for draught work in parts of Asia.
- Dogs are used around the world for various types of work. In the Arctic regions, they are used for transport. More generally, they are used to guard property, including livestock, to herd, and to assist humans in more artificial situations, e.g. to detect explosives and drugs, and to assist people with disabilities, e.g. visual impairment.

Common Welfare Problems

Overall, the most common problems suffered by draught animals are listed here.

- Overwork/insufficient rest: this is a common problem, especially when the animal is the owners' only source of income.
- If the animal is the owner's only source of income, she or he may not allow the animal to stop working and may rent the animal during intensive seasons such as the ploughing season. a lack of responsibility in the individuals borrowing the animal can result in long working hours under bad conditions almost every day of the year.
- Overloading and inadequate loading technique: overloading is a common problem, often as a result of ignorance. The weight which can be carried/pulled and the duration of work depends on many different factors, such as species, breed, condition of animal, temperature and harness.
- Inadequate equipment: if the equipment is badly designed, the animals have to use far more energy than necessary and are working inefficiently. If there is a bad fit between animal and equipment, chafing and sores will develop and the outcome is acute pain.

- Inhumane handling: beating, tail-twisting and prodding with sharp devices leads to acute pain, injuries, suffering and a bad human–animal relationship.
- Working while in poor health or too young: for example, donkeys should not start to be used for work until they are aged four. Back deformities can result from working at too early an age.
- Road accidents: travelling on busy main roads or at night without lights or reflectors are all risk factors for working animals being involved in road accidents.
- Seasonality: outside the working season, animals may be kept on a low-maintenance diet with no exercise – this can make them very weak by the time work begins again.
- Lack of health care: if an owner cannot afford treatment and/or allow the animal to rest, or if there is no health care available.
- Poor nutrition: if the owner cannot afford adequate nutrition or feeds the animal insufficient amounts of food or food of insufficient nutritional value.

Underlying Causes: Welfare Inputs

You will recall from earlier lectures on other species that welfare inputs create the conditions for good or bad welfare in the animal.

The three principal inputs are:

- Husbandry – including feeding, veterinary care and housing
- Genetics
- The stock person or owner.

For working animals, the two most common underlying causes of welfare problems are:

- Poverty, which affects the owner's ability to provide adequate feed, rest, etc.,
- The owner him/herself.

Often, draught animals are owned by very poor people who have little formal knowledge of animal care. This problem may be made worse if new species or equipment are introduced without adequate training being given to the owner. The owners may not have enough for their own daily survival and so they have little emotional energy, and no resources, to care about their animals. This was found in a study of working equids among people living in rubbish dumps in Mexico (de Aluja, 1998).

Another aspect of attitude is cultural. For example, in some countries the donkey is seen as the animal of the poor or of women, and so is seen as having little inherent value. When an animal has low value, they are cheap to replace, and this may contribute to an irresponsible attitude among owners with more than minimal income. Also, there may be no normal or healthy working animals in the district for owners to compare their animal against. This is an example of when 'bad' can become 'normal'.

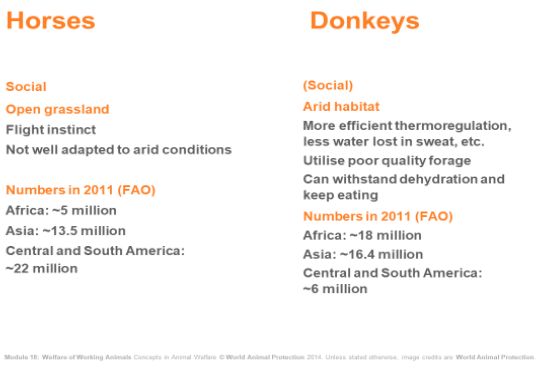
How to Identify Problems

Area	Criteria
1. Good feeding	Animal should not suffer from prolonged hunger
	Animal should not suffer from prolonged thirst
2. Good housing	Animal should have comfort around resting
	Animal should have enough space to allow ease of movement
	Animal should have thermal comfort
3. Good health	Animal should be free of physical injuries
	Animal should be free of disease
	Animal should not suffer pain caused by procedures
4. Appropriate behaviour	Animal should have a positive emotional state, and negative emotions should be avoided as far as possible
	Animal should be able to express normal social behaviours
	Animal should be able to express species-typical behaviours
	Promotion of good human–animal relationships

We shall now look at particular welfare problems among the different types of working animal. We will use the Welfare Quality® project framework as a guide. As you know, it was developed for livestock in the European Union (EU) and Latin America, but it provides a useful guide for considering the welfare problems of working animals worldwide. As you may already know, there are four main welfare areas, and a total of 12 welfare criteria. Please take a minute to review the different criteria.

The Welfare of Working Equids

There has been relatively little research carried out on the welfare of working equids and working animals generally. However, there is somewhat more on horses than on the other draught species. We will start with some background on the different equids.



Horses are much less hardy and less efficient workers than donkeys.

Horse belongs to a social species that was highly adapted to temperate open grassland habitat with little access to cover. Physiologically they are not well adapted to arid conditions. Behaviorally they retain a strong flight instinct.

Donkey is adapted to living in arid conditions. In the wild they will live in groups but may also live individually. Donkeys survive well on poor-quality food and can survive longer without water than horses or oxen. They are better adapted to arid conditions than horses or most ruminants (except camels) because:

- The donkey has less subcutaneous fat and stores fat in local fat deposits. This facilitates body heat loss, so efficient thermoregulation is possible
- Donkeys can utilize a relatively large amount of poor-quality forage that is high in roughage (and they need less time to digest it than oxen do)
- Donkeys can withstand dehydration of up to 30 per cent of live weight
- Donkeys can continue feeding during periods of water deprivation
- Compared to other species, donkeys lose less water through sweat, faeces and urine
- Donkeys are sure-footed on rough terrain and more resistant than horses to certain diseases; for example, they are more resistant to trypanosomiasis and some lungworm than horses are.

Mules are another equid used for work is the mule, which is a cross between a male donkey and a female horse. Mules are excellent draught animals, larger than donkeys and hardier than horses, but they are not as common as either species. However, there are still several million working mules around the world.

Male donkey bred with female horse

Numbers in 2011 (FAO)

Africa: ~1 million

Asia: ~3.5 million

Central and South America: ~6 million

Area 1: Good Feeding

The first main area of welfare that we will look at is good feeding. Many working equids probably experience prolonged hunger because they are not fed enough for the work that they do, and if there is a period when they are not working, they may only be fed a low-maintenance diet, so that they are weak when the working season starts again. This is made worse if they have dental problems or parasitism and other diseases. One sign of possible hunger and malnutrition is if the animal is thin. Bad nutrition, unsuitable feed can cause colic. This is the most common equine problem that is seen across equids. There are different body condition scores (BCS) available, mostly on a scale from 1 to 5, with 1 being emaciated and 5 being obese.

In a study of ~10,000 working equids from nine developing countries (e.g. Guatemala, India, Ethiopia), BCS predicted other aspects of welfare. That is, thinner animals were more likely to have skin lesions, firing lesions, gait abnormalities, etc. Two large-scale studies of working donkeys around the world have found that approximately 70–80 per cent had a BCS of 1 (emaciated) or 2 (thin). 70□80 per cent had a BCS of 1 or 2 (Pritchard et al., 2005; Burn et al., 2010)

Area 2: Good Housing

The second main area of welfare is good housing. The three criteria of interest for working animals are the animal's resting area, their ease of movement, and the environmental temperature.

Resting area: Equids may be housed in a variety of different ways and if they have no bedding, they may not have a comfortable resting area. Many equids are kept outside and tethered or hobbled, which can severely restrict their ease of movement. When they are working, they may not be given time to rest. Note that horses used by the police and the military typically have stables or stalls with straw.

Ease of movement: Tethers and hobbles are intended to restrict animals' movement, so that they do not wander off. However, some can be very restrictive. The picture shows a donkey who is hobbled. This makes even small movements very difficult.

Environmental Temperature: When animals are working, their ease of movement is strongly affected by their harness and cart, the weight and distribution of their load, and the environmental temperature, which can give rise to heat stress. There is no clear rule about the maximum load, because that depends on the terrain, the animal's weight, etc. Most working equids are in countries with hot climates that may be arid, or sometimes very humid. Draught and Pack Animals rules provide for when not to work an animal at what temperatures.

Symptoms of Heat Stress:

- Panting, laboured breathing
- Increased body temperature
- Less elastic skin

Treatment: Pour on cold water

Prevention:

- Shade when resting
- No overwork
- Water horses, 40 – 60 litres per day; donkeys, 20 litres per day (Heleski et al., 2010). 40□50 per cent of 4,903 animals were dehydrated on skin-pinch test (Pritchard et al., 2005)

An intervention study with donkey owners in the city of Lahore in Pakistan recommended that small donkeys should not pull weights above 400kg, and large donkeys should pull no more than 700kg. The load requirement for India is in the Draught and Pack Animals Rules under the PCA Act.

Note that donkeys' range in body weight from ~100–500kg. In developed countries, it is recommended that draught animals should not pull more than 25–35 per cent of their body weight on a daily basis, although donkeys are known for their ability to carry more than that. You can see that the recommended maximum load for working donkeys in Lahore is high, so factors such as nutrition, comfortable harnesses, etc. are even more important.

Refer: Prevention of Cruelty to Draught and Pack Animal Rules, 1965.

Harnessing

We cannot go into detail of the design and fit of different harnesses, carts, tethers and hobbles here. What we can say is that ill-fitting equipment not only restricts movement, but also causes health problems, which we will discuss later.

Area 3: Good Health

The main problems here are painful conditions of the limbs and skin, most of which are related to ill-fitting harnesses and hard work. Infectious diseases may also be common in working equids. PCA Act requires for registration of farriers.

The study of ~10,000 working equids mentioned above found that many animals had abnormal gait, especially older donkeys in rural areas who pulled carts. Those abnormalities were all indicative of pain (e.g. head-bobbing, uneven gait) and we can call them, collectively, lameness. In that study, equids in Jordan had the lowest prevalence (17 per cent). However, in most of the other countries it was 90–100 per cent.

This picture illustrates a harness with a flawed design

Note that although that study was large it did not use random samples, so we cannot generalise about all the equids in each country.

Few common health anomalies are:

Lameness: The underlying causes of these different types of lameness include working on hard surfaces, inadequate shoeing, the donkey's hoof having an abnormal frog, lack of foot care (inspecting/ cleaning of feet) and wet/unhygienic conditions in the animal's housing. Further, they are caused due to improper hooves, e.g. overgrowth, trimmed too short, cracks, ulcers, thrush, etc.

Arthritis: Or tendonitis is swelling of joints

Injuries: Caused on account of falling on the carpal joint, or from the animal kicking himself, causing brushing wounds; abnormal angulations of joints or limbs occur through tendon damage or fractures

Firing: This is the application of a hot iron or hot needle onto swollen tissue, typically on the limb. It used to be a common part of veterinary therapeutics around the world. However, research indicates that it has no therapeutic value and only causes further tissue damage.

Infectious Diseases (Prevention of Infectious and Contagious Diseases Rules, PCA)

Infectious diseases can affect working animals, as well as livestock or wild animals. Examples of these diseases are tetanus, rabies and leptospirosis. There are some special factors to take into consideration for working animals:

- The source of infection might be connected to work. For e.g. tetanus can be introduced via small puncture wounds from nails and foot lesions from tethering or hobbling.
- Most working animals live in close contact to humans and some diseases are zoonotic (e.g. rabies, leptospirosis). Therefore, it is also important for human health to prevent infection in working

animals. Note that Leptospira is a water-borne organism and is a potential hazard when owners are being conscientious and giving their animals water during the day. This was noted in studies in Brazil, for example.

- Parasites may also cause disease. Note that in tick-borne diseases, research on working equids in Brazil indicated that mowing the grass may be as effective as ectoparasite treatment, as the ticks cannot get on to an animal so easily if the grass is short and does not touch an animal's legs or body. Some common parasites in this category are Helminths and Ectoparasites.

Disposal of Old / Sick Animals

A further welfare consideration for working animals is the treatment of those who are old or sick and can no longer work. The welfare concern is suffering, as animals may just be left to die and suffer ongoing pain and illness until they die. Some of the reasons for this mistreatment of animals include:

- Poverty – if the animal is an important or sole source of income the owner may still hope he or she might recover. Alternatively, as we mentioned earlier, if the owner is very poor and in despair, he or she may not have the motivation or the resources to ensure the animal has a humane death
- there may be a cultural objection to euthanasia
- the slaughterhouse or market may be some distance away and the animal has no monetary value.
- There could be a lack of alternatives or a lack of knowledge about them.

Alternatively, they may be sold to dealers and transported to markets. This can be particularly distressing and painful for these animals as they are already weak or injured. They have little economic value and are often not provided with water or food. They may be slaughtered without being stunned but the problem lies in its enforcement. Potential solutions that can encourage a humane death for old or sick animals could include:

- Euthanasia by owner – this might be difficult and has the potential for poor welfare if there is not adequate equipment and/or knowledge available to ensure a humane killing

- Animal health technician/ vet: a professional could offer humane killing to individuals along with adequate equipment and knowledge for humane killing
- Government agencies could develop some infrastructure for spent animals for example ICAR's report recommends 'dry dairy' for housing spent cattle. In the Vaishno Devi case, the counsel Ms. Gauri Maulekhi filed asking for rehabilitation of mules used to ferry people up and down the pilgrimage path in Jammu and Kashmir. The court ruled out some rehabilitation recommendations.

Area 4: Appropriate Behaviour

We now move on to the fourth area of welfare, appropriate behaviour. Working equids and draught animals may be treated inhumanely, e.g. beaten, overloaded, and worked in harnesses that cause pain. This would make them reluctant to work, which may cause the owner to become frustrated and treat them with less concern, e.g. beat them more, not take care to check them for sores, etc. All those experiences are likely to cause negative emotional states, especially fear and apathy.

Note that negative emotional states may create a form of cognitive bias. Cognitive bias is a new area of research in animals and it is not clear if it occurs in equids. If it does occur, it means that if equids are already experiencing negative emotions, such as fear of humans because of ill-treatment, they may be more likely to interpret an ambiguous stimulus (such as the people walking past) as a threat. This means their wider experience may be unnecessarily distressing.

Another important aspect of welfare in the area of appropriate behavior is that horses, and some donkeys and mules, are social and should not be housed alone. Even a hen, sheep or cat can provide companionship for them, although another animal of the same species is best.

Note also that some working females may have foals, and the foal and the mother will be distressed by separation while she works. As far as possible, they should have regular contact.

Changing Owners' Behaviour

There is existing research on the human–animal bond in order to understand why people may, or may not, treat their animals well. It cannot be assumed that owners will adopt your recommendations for improving the welfare of their working equids. In their book *Sharing the load*, van Dijk et al. (2011, p.4) explain that participatory learning approaches can be used to "encourage, support and strengthen a community's ability to identify their own animals' needs, set their own objectives for improving welfare, and to plan, implement, monitor and evaluate their own initiatives" (see this book for further information on working animal welfare, how to implement animal welfare interventions with communities, and for a toolkit of tried and tested participatory action tools to improve animal welfare).

Recent research with donkey owners in Lahore, Pakistan, used a participatory method whereby the owners themselves came up with a list of regular actions for caring for their animals. The owners then used a monthly checklist to monitor themselves. The researchers noted that this was an experimental approach and very time-consuming. However, it may be that you need that degree of involvement in order for some owners to engage with the needs of their animals.

Summary So Far

Species of animal are used for working: Equids

Areas Observed:

- Why do they have welfare problems?
- How to identify problems affecting their welfare?
- What are the short-term improvements that can be made?
- What is needed for long-term improvements and alternatives?
- Why improved welfare benefits the owner and the animal

Next: Ruminants, elephants and dogs

You now know the main types of working animals, and the main welfare problems seen in working equids, and a little of how you can identify and improve them. Many of those issues also apply to other draught animals. We will look at them next, then at dogs, and we will finish by looking at other factors which might help to improve the welfare of draught animals in the long term.

The Welfare of Working Ruminants

Ruminants are used for work in Asia, particularly South-East Asia, in sub-Saharan Africa and in parts of South America. They are also used in some parts of Eastern Europe. It is difficult to get accurate estimates of the number of working ruminants because, unlike most working equids, ruminants are rarely used for work alone. They are often kept primarily for their produce (meat, milk, young, dung), and may only be used for agricultural work or transport for a relatively short part of the year. However, they may also be used primarily for haulage, in which case they may work most of the year. Nonetheless, we can say that there are many tens of millions of working ruminants around the world. We will briefly review each type of working ruminant, and the main welfare problems affecting each.

Water Buffalo: The water buffalo was domesticated in India from the wild water buffalo, now an endangered species. It requires year-round access to wading water, or sprinkling water, in order to keep cool. Therefore, the water buffalo is found most commonly in the humid tropics.

They have large hooves and their body weight is well distributed over their feet for efficient traction. They are slow workers and are used for about five hours per day. Therefore, faster animals such as cattle and horses are preferred for dry field work. They are largely used for milk production.

Cattle: The two main categories of domesticated cattle in the world are humped (zebu), shown on the left and non-humped, shown on the right. There are many different breeds of humped and non-humped cattle. Humped cattle are adapted to warm climates and have better resistance to ectoparasites. Note that their hump is mainly formed by muscle; this is different from a camel hump, which is fatty.

The main issues of welfare concern for working water buffalo and cattle are shown here.

Area	Criteria of concern
1. Good feeding	Prolonged hunger
2. Good housing	Ease of movement
	Thermal comfort
3. Good health	Injuries
	Disease
	Pain caused by procedures
4. Appropriate behaviour	Positive emotional state
	Expression of species-typical behaviours
	Good human–animal relationships

Area 1: Good Feeding

Prolonged hunger if they are overworked and not fed high-quality fodder, especially during pregnancy. (Human demand for milk can be so high that it compromises calf survival, as insufficient milk is left for the calf. Related to this, they may have a low BCS and feel weak as a result).

Area 2: Good Housing

Ease of movement: this can be restricted by the harness and cart. For example, sometimes the yoke – which fits across the animal's shoulders – may be tied to the animal's horns. This puts pressure on the horns as the animal pulls the load, and is thought to be painful.

In some countries a common method of handling and tethering animals is by a rope attached to a ring in the animal's nose. This is likely to cause pain if the tether is short.

Environmental temperature: buffalo have relatively few sweat glands, so they are at risk of heat stress if they do not have the opportunity to stay cool by wallowing or being in the shade.

Area 3: Good Health

Here we find problems comparable to draught equids, although there is fewer data available internationally.

- Skin and leg injuries and pain can occur if the harness is not padded and the cart is not well designed.
- Lameness can also be a problem for animals worked on roads.
- Infectious diseases may also occur including those transmitted by biting flies and ticks.
- Castration and nose-piercing both cause pain.
- The disposal of old and sick animals is another concern, especially where the animal has to be transported a long distance for slaughter.

Area 4: Appropriate Behavior

As with working equids, there may be concerns about the animal's emotional state if she or he is harshly treated or overworked. Cattle and water buffalo are social animals, so social interaction with conspecifics is important; often they are kept in pairs for work.

Camelidae: There are two types of domesticated camels in the Old World (Europe, Asia, Africa):

- One-humped dromedary
- Two-humped Bactrian camels found in the highlands of central Asia to Mongolia.

They can tolerate the wide-ranging temperatures of those regions, i.e. up to 30°C in summer and down to –50°C in winter. Bactrian Camels have many adaptations to enable them to ingest and digest the fibrous plants that are typical of arid areas, and to withstand conditions of high temperature and low water intake. For e.g. their humps stores fat which enables them to go for long periods without food. Also, when the fat is metabolized, this produces some water camels can drink 100 litres of water in 10 minutes, and they can survive a loss of up to 25 per cent of their body weight by dehydration – other animals would die at a loss of 12 per cent of their body weight.

Area	Criteria of concern
1. Good feeding	Prolonged hunger
2. Good housing	Ease of movement
3. Good health	Injuries
	Disease
	Pain caused by procedures
4. Appropriate behaviour	Expression of species-typical behaviours
	Good human–animal relationships

The Welfare of Camelidae

The main issues of welfare concern for working camelidae.

Area 1: Good Feeding

In arid countries, if there a drought or lack of supplementary feed, or if the owner cannot afford to buy feed, animals may become very thin and are likely to feel prolonged hunger.

Area 2: Good Housing

Ease of movement: camels are commonly led by means of a rope through the nose, and the owner controls the camel by pulling on the rope or nose ring. This is likely to be painful and to restrict their movement if they are tied or held tightly by the nose.

- Hobbling may also restrict their movement excessively.
- Camels may be overloaded, making it harder for them to move.

Area 3: Good Health

- Harness/saddle wounds: the hump is not well supplied with blood, and healing takes a long time, therefore padding is important.
- The camel's nose may be torn and infected because of the method of leading them.

Area 4: Appropriate Behavior

- More research is needed in all these three areas and on the fourth expression of species-typical behaviours.
- Humane treatment is essential for good human−animal relationships.

Elephants

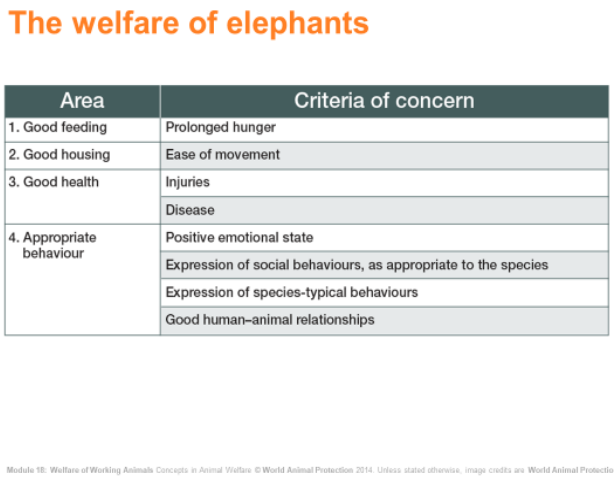
Working elephants are mostly Indian elephants. They are used for ceremonial purposes (e.g. weddings), tourist activities and timber logging, mainly in India, Thailand and Burma. They are trained wild animals. They are not really domesticated because captive breeding is rarely carried out and it is dangerous to keep bulls for breeding. A female elephant is sexually mature in her teens and produces a single calf every 4-5 years, which stays with her for 5 years. Generally speaking, the calf is not used for heavy work before 14 years of age. Therefore, young elephants are captured in the wild or females are released into the wild to mate, and then captured again.

Training (verbal, with food and using the 'elephant stick') is a difficult process and the ethics of training these wild animals in the first place are controversial. In the absence of disease, poaching etc., elephants may live for at least 60 years in the wild. For example:

- In 1966, a retrospective study was done of the jaw bones of 325 wild elephants in eastern Uganda who had died natural deaths. That data indicated that some animals had lived for

60 years, however the author estimated that the mean lifespan of elephants in the areas studied at that time would be less than 15 years.

- Much more recently, researchers compared lifespan data on wild African elephants in a protected park in Kenya, working Asian elephants in Burma, and zoo-born Asian elephants in Europe. They found that rates of mortality amongst zoo-born Asian elephants in Europe were two to three times higher than for those born in the Burmese logging camps. The Burmese animals lived for about 40 years on average compared to ~19 years in zoos. The average lifespan of the wild elephants in Kenya was 56 years.



The Welfare of Working Dogs

All dogs originated from the wolf, a species showing most of the behavioral and social characteristics suitable for domestication. Wolves are social animals with a broadly hierarchical social structure that is expressed by visual cues. They work cooperatively in hunting and are natural herders, as they control the movement of groups of prey animals. The human–dog relationship has always been a complex one and today dogs are used all over the world. Their work includes:

- Herding, e.g. sheep, cattle
- Guarding property, humans, other animals
- Hunting, e.g. deer, fowl
- Draught, especially in Arctic and Antarctic countries in winter
- Other: guide dog, police, rescue, mine detection, sniffing for drugs at borders.

The welfare of working dogs

Area	Criteria of concern
1. Good feeding	Prolonged hunger
	Prolonged thirst
2. Good housing	Ease of movement
3. Good health	Disease
4. Appropriate behaviour	Positive emotional state
	Expression of social behaviours, as appropriate to the species
	Expression of species-typical behaviours
	Good human–animal relationships

The main issues of welfare concern for working dogs are shown here.

Area 1: Good Feeding

Depending on the climate and the cultural attitude to dogs, working dogs may suffer prolonged hunger and thirst.

Area 2: Good Housing

Ease of movement: guard dogs and dogs used for transport in the far north may be kept tethered in kennels. This can greatly restrict their movement.

Depending on the climate, working dogs may not have adequate heat or shade.

Assistance dogs, such as guide dogs for the blind and dogs who pull wheelchairs, may not have adequate free exercise outside when they are not working.

Area 3: Good Health

Diseases such as parasitism, and other infectious diseases may be common in working dogs. (As with working equids and ruminants, old or sick working dogs may not have veterinary treatment or a humane death).

Area 4: Appropriate Behavior

There are several potential concerns here, largely related to how dogs are treated by people. If punishment-based training is used, this may create a negative emotional state such as fear or anxiety. Research on military dogs in England (Rooney et al., 2009) has indicated that the prolonged periods of kennelling, when the dogs were not working, could be very stressful for some dogs, especially if they had originally been family pets and had been taken on for military work in adult life. When working dogs are kept in individual kennels without much social contact, and without environmental enrichment, many of them show signs of stress. They may also find transport very stressful. Around the world, working dogs may be shut up, sometimes in the dark, and on their own, when they are not working. This can be very distressing because dogs are social animals and need to see and interact with other animals.

Solutions for the Welfare of Working Animals

You now have an overview of the many welfare problems that you may find in a wide variety of working animals.

The list of problems is daunting, especially because the animals are often owned by very poor people who overwork their animals in order to make a bit more money just to survive from day to day. However, there are various initiatives to help people to adopt better practices, and to show owners how improving their care of their animals can benefit them too.

We shall finish this lecture by looking briefly at some of these solutions.

Four Main Solutions (Ramaswamy, 1998)

Broadly, there are four main areas that need to be tackled to improve the welfare of working animals. They are:

- Nutrition and health care
- The designs of harnesses, carts, etc.
- Education of owners,
- Improved breeding.

Nutrition and Health Care (Veterinary Treatment)

We may need to recognize that euthanasia is carried out in hopeless cases. However, it may be very difficult to convince people who rely on their animals to allow the animal to be killed, especially because of the direct and indirect costs to them of losing the animal and having to rent or buy another one. In some countries there may also be cultural resistance to the concept of euthanasia.

Training of farriers is also essential. Skilled farriery is technically challenging and poor farriery can potentially do as much, if not more, damage as leaving feet untrimmed or unshod.

In many parts of some countries there is no veterinary service because the population is too dispersed. In such cases, government support for mobile clinics is needed. As noted earlier, part of this requires that a government appreciates the economic value provided by working animals. These mobile clinics can also deal with slaughter/euthanasia. Comprehensive healthcare programs can be developed, including vaccinations and appropriate de-worming of animals.

The animals must be treated and the owners advised about the animal's nutrition and health. For example:

- Owners should allow animals to eat during resting times – the owner can either take food with them, or allow the animal to graze
- Resting the animal is an important part of their recovery, although if the underlying problem with harness, etc. is not addressed, injuries will recur when the animal goes back to work. Furthermore, when one animal is missing, the other animals have to work harder
- To prevent this, it may be an option to borrow another animal while one is resting
- The disadvantage of this is that often the borrowed animal is overworked.
- Other important welfare areas that even the poorest owner can address are:
- Allowing animals periods of rest in the shade
- Allowing frequent watering for equids and ruminants (not camels).

Regulations for the welfare of working animals already exist in India under the PCA Act, 1960 and its Draught & Pack Animals Rules, 1965. These should be referred.

Important Advice

It is important to remember the behavioral aspects of animals' welfare as well as the health and comfort-related ones.:

- All working animals are social species and need contact with other animals, preferably conspecifics. Instead of tethering, keep animals in pens to allow physical contact, especially between mother and offspring.
- Locomotory behavior: especially when they live in cities, animals are rarely able to perform normal locomotory behavior. Animals need exercise out of season as well as during working periods, otherwise they lose condition. Instead of tethering, keep animals loose in pens or outside runs.
- Comfort behavior: this is essential to keep animals healthy and in good condition. It is also important for parasite control and thermoregulation. Different species have different requirements, e.g. elephants and water buffalo rely on wallowing in water holes; equines, cattle and camels groom themselves or each other by licking or scratching, or by dust-bathing.
- Owners should provide animals with facilities such as water, dust-holes or scratching posts as appropriate to the species.
- If animals are restrained, they should be able to groom themselves or each other and, if necessary, the owner should clean/groom his or her animals with a brush or similar instrument.
- Suggestions regarding skin injuries may include the following:

- owners can change the material they use to pad the harness and equipment.
- owners can use string or twine instead of wire to repair harness
- Owners can clean the harness, and the animal, and dry them before they put the harness on. If there is not enough water, they can brush the animal every day, and scrape the sweat and dirt from the harness
- To prevent injuries from motor vehicles, owners can make their own vehicles more visible by attaching reflective material to carts.

When you are treating an individual working animal there are often opportunities to help owners to make small improvements in their equipment. Your advice will have a greater impact if you explain the advantages of making the changes.

Improved Education

Owner education and change of attitude are very important in order to make changes that are long-lasting. This takes time. We saw earlier how donkey owners in Lahore came up with their own way of improving their animals' welfare. However, in Madagascar, the suggested improvements for draught oxen were not acceptable to local people for other important reasons. You will need to know the local community's culture and needs in order to educate owners effectively so that they are motivated to make changes.

The use of incentives and legislation may also be appropriate. For example, the study of 10,000 working equids noted that animals used in tourism were often in poor condition. Educating tourists and animal owners alike might help to improve the welfare of those animals. Government subsidies might play a part in this.

Education in schools is essential to create awareness and understanding of the problems. This can bring about immediate benefits because students will tell their families what they have learned, and they may also work with the animals. It may also bring long-term improvements through a change of attitudes and beliefs of future owners.

Note that education is not only needed for poorer animal owners. In developed countries, too, there is ignorance about the needs of working animals, as has been proved by the work on military dogs in England, mentioned earlier.

Summary

To assess and improve working animal welfare it is important to know the species involved and its special needs and behaviors (e.g. feeding behavior, comfort behavior). However, many problems are common to all species (e.g. ignorance of owners; incorrect harnesses; overwork; malnutrition; parasitic disease). It is important to know the principles in preventing and dealing with them.

While trying to improve the welfare of working animals, poverty, attitudes and knowledge of people play an essential role and need to be considered, along with environmental concerns. The education of local animal-health workers and farriers is essential, as well as education of owners. However, you also need the local government to understand the contribution that healthy working animals can make to the economy, and to the wellbeing of their owners.

Useful websites

Animal traction information and links:
www.animaltraction.com

Animal Traction Network for Eastern and Southern Asia:
www.atnesa.org

Draught Animal News:
www.vet.ed.ac.uk/ctvm/Welcome%20page/Publications/DAN/DANFP.HTM

World Association for Transport Animal Welfare and Studies:
(TAWS): www.taws.org

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Chapter 9

Welfare of Animals used in Education, Research and Testing

Introduction

This use of animals in education, research and testing is very contentious in many societies, and we only have one lecture to consider the topic as a whole. We will start by reviewing the ethical arguments and then we will outline some of the wider psychological and institutional reasons why we use animals for research. Our goal here is to help you to recognize the biases at different levels that can affect both the opponents and the proponents of this animal usage. We will then focus the rest of the lecture on the welfare concerns relating to each type of usage, and the non-animal alternatives that exist.

As with all the other areas covered in this course, the welfare of animals used in research is a large and growing scientific discipline and the legal and policy framework has to evolve alongside. However, if you should take a research or teaching path in your career, today's lecture provides you with a very broad overview of the animal welfare issues involved, and some solutions.

Animals have been used for research and educational purposes in many countries for many centuries. However, the amount of uses has burgeoned since the nineteenth century. Today, there are reportedly over 115 million animals used every year in laboratory experiments worldwide, and rats and mice are the most commonly used species. Some animals are also used in education at schools and universities as well as for military and space research; for example, by the Department of Defense. These usages of animals have caused growing ethical concern for decades. This concern started primarily in European countries, along with North America, Australia and New Zealand. However, it is now global and includes Brazil, India, African countries, China, Turkey and Iran.

In addition, the World Organization for Animal Health (OIE), which represents 178 members, has specific guidelines on the treatment and handling of animals used in research. You can find these online in its Terrestrial Animal Health Code. They represent minimum standards for the care of laboratory animals and are not legally binding but could provide a basis for animal protection legislation in countries that do not yet have legal protection for the animals concerned.

The use of animals for research, testing and education creates moral unease for many people because of concerns that:

- Animals are often subjected to invasive procedures that cause immense harm and suffering.
- The animals' housing and care does not benefit them, and little or no effort is made to mimic their natural environment and allow for natural behaviors such as nest-building in mice, which often causes stress to the animals.
- The benefits to people of doing research on animals is limited.

While animal welfare science and the use of ethics committees are enabling us to address the first two points, the third is less well received by many of the public –especially in the case of research into human diseases – and by most researchers and other stakeholders.

So, before we consider the welfare issues in the procedures and husbandry, we will look briefly at the history of this animal use, and why its alleged benefits are controversial.

Background

~115 million animals reportedly involved worldwide. Mice and rats are most common

International concern, e.g.

- South America, e.g. Brazil (Filipecki et al., 2011)
- Africa (Nyika, 2009)
- China (Kong & Qin, 2010)
- Turkey and Iran (Izmirli et al., 2010) Guidelines: OIE's *Terrestrial Animal Health Code* (OIE, 2011)
- India

Causes of concern / moral unease

- Animals are sentient and are often harmed by procedures and
- The benefits to us of using animals for research, testing and education is limited, or can be achieved using alternative methods

Why Are Animals Used?

The history of animal use arose from Western ideas about science; however, note that other cultures may have approached the acquisition of biological knowledge using different assumptions and more humane frameworks. Briefly, the very early Christian church forbade the use of human bodies for scholarly study, so animals were used instead, for many centuries.

In the nineteenth century, the physiologist Claude Bernard (who developed the concept of homeostasis) emphasized the necessity of using animals in the laboratory in order to advance human medicine. He is quoted as urging researchers not to listen to animals' cries or to regard any haemorrhage as they worked on important questions of human health. His intention, as with researchers generally, was not to deliberately harm animals but rather to solve problems of human health.

The undoubtedly great discoveries that were made, and the thinking of scientists such as Bernard, set the stage for the assumption that research on animals is essential for human medical advances. In those days, such use of animals was the best available tool. It was only during the twentieth century that ancillary developments in pain relief, enriched animal housing, statistics, mathematical modelling, tissue culture and computers made alternatives available. Meanwhile, the original 'path' become entrenched as the primary working method, i.e. that it was acceptable and a necessary evil to use animals for research and education. In other academic disciplines such as

economics and psychology, scholars have examined how such paths become established.

Economists propose the concept of 'lock-in' whereby, if a chosen path of action provides increasing returns, this gives rise to inflexible behaviors and strongly held assumptions about the path chosen, even though a different path might be more beneficial in the long term. Note that, at the outset of new endeavors, no other path for progress may present itself. Also, it is impossible to know that the first path chosen will be more beneficial than any other. If the chosen path provides increasing benefits, it is difficult for people to change it and trust that any other path could be better.

The use of laboratory animals for medical research seems to fit the lock-in model. In the case of drug development, there is a very big risk and initial investment in the development of each potentially useful molecule by pharmaceutical companies – only one in ten potential drugs proves to be successful, and each drug takes around seven years to establish before any return can be gained by the company marketing it.

USFDA stated that 92% of the drugs which are successfully tested on animals fail in human beings.

However, for drugs that are shown to have clinical benefit, there are increasing returns, and companies can recoup the considerable investment they made at the outset. In addition, if a drug has been proven to be useful clinically there will be a huge non-financial benefit to the users, with indirect cost savings from their increased health. The use of animals is part of achieving all these benefits, so that path is therefore set. Continuing our extrapolation from the economics literature, 'lock-in' is associated with collective inertia and reluctance to change the existing path. This inertia exists for several reasons:

- The path now has a large interconnected infrastructure. In the case of the use of laboratory animals, that infrastructure includes companies breeding the animals, the various laboratories, the cosmetics, pharmaceutical and chemical companies which are developing the products, all the personnel concerned, the academic departments, funding agencies, regulatory bodies, professional academic journals, associations and conferences
- To change to other methods involves a cost, for example, what to do with animal housing if animals were not used, and so on.

Psychological Factors

Numerous psychological factors may also contribute to inertia. Note that these factors do not simply apply to those who may be accustomed to using animals for research. Neither have they all been studied in that context; but they are common psychological traits that human beings may develop in various contexts. The factors may apply as much in those who are opposed to the use of animals for research as in those who believe that it is necessary. They may apply in this lecture too, as there is no time to cover the entire field in detail so, we are only looking at some types of bias – which is itself a bias, however unintended! Having acknowledged that, we now look at examples of psychological factors that may contribute to the use of animals in research being entrenched. The first factor is bias. There are many more, including:

- A tendency not to use information that is removed from or very different from one's local experience – some researchers or educators who use animals may tend to resist information about

alternatives in their case.

- Publishing bias is a problem across academic research, in all scientific disciplines: it is the tendency of editors not to accept for publication those papers that fail to find a difference between two treatments.
- The tendency among editors, researchers and journal readership to assume that because a difference is statistically significant, it has any biological/relevant meaning in reality.
- Overall there tend to be more papers published about research using animals that found 'statistically significant differences' than there are papers about research that used animals and found no differences, as this adds little to the field of research. This is also a concern, as it means that scientists cannot share their information and could mean the research is repeated and more animals suffer unnecessarily. This reinforces the impression that using laboratory animals is essential for medical developments.
- Confirmatory bias: this is the psychological tendency to resist evidence that contradicts what we believe to be true, and instead to persevere with our own belief. An example is resistance to the opinion given in critical reviews of clinical research, that research on animals has provided little or no benefit to people, particularly in cancer research. Note that confirmatory bias may be found in opponents of research too, e.g. they may be unable to accept evidence that laboratory animals can have very good lives, in each of the three aspects of welfare.
- Related to confirmatory bias is the idea of 'internal psychological appeal' where aspects of the issue of concern are described in terms of desirable features. In the case of using animals for research, such labels are that the studies are 'objective', 'controlled', 'quantitative' and 'scientific'
- A further point is that, in some countries, the use of animals in research has given rise to some extremist animal liberation groups. They are a minority, and some of their members can be angry, disaffected and violent. But groups receive a lot of media coverage, and because of this those using animals for research may associate any criticism of their work with those violent and vocal minorities, and dismiss it, rather than give it
- Objective consideration.

Cognitive dissonance applies in laboratory animal research too. *Cognitive dissonance theory*, which states that if we hold conflicting or incompatible views, this causes us to experience unpleasant emotions, and we will change our behavior or our attitudes in order to overcome this. This may be reflected in the language that we use. For example:

- When laboratory animals are killed for research purposes, the common term that is used in the literature is that the animals were 'sacrificed' – this terminology connotes value, ritual and respect. (Similarly, when owners or vets discuss euthanasia of their animals, euphemisms may be used such as 'put them to sleep' or 'put them down' (in the UK), or 'euthanize them' but not 'kill them'
- However, when the data from research animals are reported, the animals typically do not have names, only numbers. That impersonality creates distance from the animal as a sentient being with personality, who might have been harmed by the study.
- A final point is that people working with laboratory animals form an emotional bond with them, which is often affectionate. For example:

- Laboratory personnel may single out certain animals so that they are not used in experiments or scheduled for euthanasia. In some cases, staff members may adopt an animal
- Conversely, to avoid the discomfort that a bond creates, some technicians and researchers may avoid visiting or handling the animals
- Either approach may affect the animal's experience of his or her life, including physical functioning and behavior. Some research indicates very clearly that this may skew the results of studies and may even confound them such that an apparent treatment effect may simply be a response to the handlers, or the stress inflicted by the handling or treatment procedures.

These points illustrate the complexity of psychology and other factors that surround the use of animals in research.

Ethical theories

Next, we shall review the ethics of using animals in research, education and testing. We can say that, as well as the various historical and psychological reasons for using animals in this way, the prevailing ethic is largely utilitarian: the usage is justified if the benefits to people (and to other animals) outweigh the costs paid by the animals in the project concerned. Since the 1950s, the concept of the three 'Rs' (referred to as '3Rs') has been used to help minimize that cost. That is:

- **Replace** sentient animals altogether where possible. Meanwhile:
- **Reduce** the number needed to the minimum in order to measure the effect of interest, and
- **Refine** the methods so as to minimize any harm caused to those animals.

These three principles represented a major advance in the more humane treatment of animals in research and education, and we will now look at the 3Rs in more detail.

The 3Rs were defined by two UK scientists, William Russell and Rex Burch, in 1959, in a book about humane animal experimentation called *The principles of humane experimental technique*. Since then, the 3Rs have been embodied in the legislation of some countries and supranational bodies, such as the European Union (EU). Also, the OIE cites them throughout the chapter of its *Terrestrial Animal Health Code* on the use of animals in research education. However, note that the 3Rs apply equally to aquatic animals and all sentient species.

The 3Rs are centred on using alternatives wherever possible, i.e. "any method, technique, proposal or approach" that avoids or minimizes the use of animals. This shows the OIE guidelines on the 3Rs. Their exact wording is as follows:

- "Replacement refers to the use of methods utilizing cells, tissues or organs of animals (relative replacement), as well as those that do not require the use of animals to achieve the scientific aims (absolute replacement);
- Reduction refers to the use of methods that enable researchers to obtain comparable levels of information from fewer animals or to obtain more information from the same number of animals;
- Refinement refers to the use of methods that prevent, alleviate or minimize pain, suffering, distress or lasting harm and/or enhance welfare for the animals used.

Refinement includes the appropriate selection of relevant species with a lesser degree of structural and functional complexity in their nervous systems and a lesser apparent capacity for experiences that derive from this complexity."

Opportunities for refinement should be considered and implemented throughout the lifetime of the animal and include, for example, housing and transportation as well as procedures and euthanasia. Later, we will look at real examples of how the 3Rs are applied.

Criticisms of Utilitarianism

We now return to our discussion of ethics. Note that some scholars do not accept the utilitarian view of

research and therefore the value of the 3Rs, because both are an acceptance that research can benefit people, and that animals do not have intrinsic value (rights). A further difficulty is how exactly we weigh up the burdens carried by the experimental animals (e.g. restricted housing, fear, pain) against the potential benefits to people or to other animals. For example:

- Many new commercial products (household cleaners, cosmetics and drugs) are not essential for human or animal health, as they are no better than the ones that are already on the market. However, the licensing of each one involves toxicity and pharmacokinetic studies on laboratory animals. Moreover, although countries are becoming more accepting of data generated in other jurisdictions, some countries may only license the product if
- The safety and efficacy data have been generated locally. This can mean unnecessary replication of animal use
- Some of the conditions being researched are not life-threatening, e.g. baldness in men
- More importantly, data derived from the laboratory animal may not predict the action of a drug or vaccine in people. One example of this is the polio vaccine.

Case Study: Polio Vaccination

Poliomyelitis is an infectious viral disease that causes paralysis and muscle wastage in children; the paralysis may cause death. Humans are infected orally, by contaminated food and water. Vaccination has eliminated the disease in 99 per cent of the world's population. Research to develop a vaccine took place in the first half of the twentieth century, when tissue culture and other modern techniques were not developed.

The virus can only survive in living primate tissue; therefore, it was grown in monkey kidney tissue, and vaccine safety and efficacy were tested on monkeys. This is thought to have used one million monkeys (mostly rhesus macaques) and may have reduced the Indian macaque population by more than 90 per cent at the height of the trade. Researchers infected monkeys through the nose as this was thought to be a likely route for human infection, despite evidence from human clinical studies that large amounts of the virus were found in the intestines. However, it turned effective vaccines only resulted after the virus was grown in human tissue. A successful oral vaccine was produced in the early 1950s.

In retrospect it was clear that the research on macaques did not bring many benefits. More notable is that the work with them persisted in part because the data from observational studies in human patients was ignored at first, perhaps because the observations were considered less scientific than 'controlled' laboratory-based animal work. This case study illustrates elements of 'lock-in' and welfare issues in the use of wild, non- human primates in research.

Ethical Compromise

In light of all the factors around the use of animals in research, ethicists at the Danish Veterinary School in Copenhagen have suggested that animals should only be used if the following three conditions are met:

1. The research question must be of vital importance (the definition of 'vital' would be controversial for many chemical, cosmetic and pharmaceutical companies and their investors – which include pension funds – as companies which develop 'copycat' products to increase their profits in a free market create a lot of wealth and employment).
2. There is no other way to study the issue except by using animals.
3. The animals do not have to suffer more than the experiment requires; for example, they should have enriched housing unless that would confound the results.

You can see from this very brief introduction that there are many unresolved issues surrounding the utility and acceptability of using animals for research, testing and education. In the meantime, usage continues and you may be employed in a research laboratory. In your daily life, you may use products that have been developed using research animals.

In light of this reality, we shall focus the rest of this lecture mainly on:

- The effect of procedures on the welfare of laboratory animals used in research, education and testing
- The effect of husbandry conditions on their welfare.

Animals Used in Teaching

We start with the welfare of animals used in teaching. Approximately 2–3 per cent of laboratory animals are used in schools and in undergraduate teaching. Traditionally, this usage has been seen as the only way to teach certain skills (e.g. surgery for doctors and for vets; rectal palpation of cattle for pregnancy diagnosis) or convey certain types of knowledge (e.g. to demonstrate the effect of drugs on heart contractility in a live animal; to teach anatomy through dissection).

For example, in some veterinary programs, and in other university-level training, e.g. in psychology, animals repeatedly undergo invasive surgeries, from which they are allowed to recover and which they may not need, for the purposes of teaching students' surgical techniques, anaesthetic monitoring, etc. However, there is growing consensus that the uncritical usage of animals for education creates an unfeeling and utilitarian attitude to living beings, which is especially paradoxical and potentially problematic in veterinary training.

Also, research increasingly indicates that the usage is not necessary for the purpose, in most instances, and that other methods that do not harm animals are just as effective. Moreover, in the case of biology classes at secondary schools, or even in undergraduate classes, it is hard to know

how many students will go on to use the knowledge gained from the class with real animals in their careers, so the argument that the usage will have future benefits to society cannot be substantiated. There is a lack of data on the scale of usage or on the effectiveness of animal usage on learning outcomes, when compared with non-animal alternatives.

For example:

- Animals who are killed prior to the class, e.g. for dissection, are not included in most countries' calculations
- At school-level, in particular, there are concerns that species such as frogs and fish, which are used in dissection, may not be killed humanely
- A literature review of controlled studies comparing methods that require the terminal use of animals with alternative teaching methods (Patronek & Rauch, 2007) only found 17 controlled studies between 1996 and 2004. All those studies indicated that non-animal alternative methods of teaching were not significantly superior to the traditional ones but were equally good.

We now move on to the welfare concerns. Animals used for education may be kept in barren housing and may not be given adequate pain relief following surgeries.

Animals Used in Education

As with animals used for research, usage of animals in the educational curriculum has probably been subject to some of the inertia and psychological complications that were described in the introduction to this lecture. This has historically created problems for students who have to train without harming animals. Those students might be said to be 'conscientious objectors'. Practical points in such disputes included:

- In a class where the teacher is unaware of alternatives, and where the university has a very limited budget for teaching resources, it is difficult to accommodate a student who has ethical objections to the training method
- The teacher has the obligation to ensure students are trained, and may not be equipped to convey the information required using new techniques at short notice
- In turn, the student has a requirement to acquire the skills needed to fulfil the public's trust in his or her professional competence.

Keeping these points in mind and noting the risks of 'lock-in', when students raise concerns about using animals in their education, the situations can become a constructive opportunity for raising standards in the long run.

This brings us to applying the 3Rs in education.

First, many universities have a dedicated committee with faculty members and sometimes members of the public too, who have to approve any use of animals for teaching and would typically use the 3Rs as a framework. The teacher would have to demonstrate what usage was necessary and how the 3Rs were being followed.

Second, educators are increasingly aware of the 3Rs, and there are many innovative alternatives available to help meet the 3Rs.

There are various international educational conferences on the subject of alternatives to animal use. One of the biggest is organised by an educational company called InterNiche, which produces many innovative educational tools that are alternatives to using live animals. This implementation is specifically illustrated using some examples of each of the 3Rs in veterinary education listed below.

Examples for the First R (Replacement)

Example 1: Researchers at the vet school in London have developed a haptic cow to teach abdominal anatomy and rectal palpation. '*Haptikos*' is a Greek word for the sense of touch, and the haptic cow is a computer simulator whereby the user can touch and visualise a cow's internal organs, virtually, in 3D. In initial research, it was used to teach abdominal anatomy to vet students in groups of five to seven students, over just 20 minutes. The students enjoyed it, and felt they learned exactly where structures were, despite the short time available. The haptic cow is now used at several veterinary schools, and it has been validated as a way to teach the clinical skill of rectal palpation as well. Other simulators have been developed and are being developed for other species.

Example 2: A second example of absolute replacement in veterinary education is a multimedia tool to teach equine obstetrics. This is a DVD called *Foal in Mare*, developed at the Ghent Veterinary School, Belgium. It uses auditory, textual and visual representations to provide a 3D film that enables you to see inside the mare through translucent organs. Preliminary research indicates that students who use the DVD prior to the lectures on obstetrics demonstrated significantly more confidence in their understanding, based on written tests, and needed less mental effort to answer the questions.

Example 3: Now we move on to (relative) replacement in veterinary education. A widespread example is the use of preserved body parts to teach anatomy. New plastination techniques to preserve or create models of the structures mean that they can be reused repeatedly rather than needing new specimens all the time. Note that the animals should be sourced ethically, and humanely killed. The use of street animals would not normally be acceptable here, although – depending on the local context and carefully considered ethical position – the use of animals who had been euthanized at shelters might be preferable to animals that were kept in barren conditions at the university for the purpose.

Examples for the Second R (Reduction)

The next 'R' is reduction in numbers of live animals used. Examples include:

Example 1: 'Educational memorial programmes': when an animal dies, the owner donates the body to the vet school and students can practise intubation and surgery on the body

Example 2: Newer preservatives that keep dead tissue flexible so that ethically sourced cadavers can be used for surgical practice, rather than purpose-bred live animals

Example 3: Cows who are going to be slaughtered at the abattoir have been used to teach rectal palpation. That has proved useful educationally, and it avoids the need to keep cows just for that teaching purpose.

Example 4: Extramural studies are a very important form of reduction, whereby vet students 'see

practice' and are mentored by an experienced vet. Attending client animals under supervision and with the client's consent has long been a way to teach students surgical and other skills. It removes the need for students to carry out survival surgeries on animals kept at the university.

Examples for the Third R (Refinement)

The third 'R', refinement, applies to all live animals on whom students practice their skills and otherwise gain knowledge. As noted in the OIE's guidelines, refinement refers to every aspect of the animal's life, so it would also include the animal's housing and handling, diet, transport and euthanasia. Examples of refinement during the teaching session are:

Example 1: the use of pain monitoring and analgesia

Example 2: gentle handling

Example 3: restricted number of uses per teaching session, so that the animal's welfare is always paramount.

Note that in many veterinary schools, the use of animals for recovery surgeries or for surgeries that the animal does not need is prohibited. However, where it is still practiced, the principles above help refine the usage.

Animals Used in Research

We now move on to the welfare of animals used in research and testing. This accounts for the vast majority of laboratory animal usage, and it encompasses many types. Broadly, medical research on animals is centered around three models of research.

- Exploratory Models: These generate information, the application of which is not immediate. If the information should have application in future, this may not yet be obvious. This type of research raises the concern of utilitarianism as an ethic of animal use, since it is impossible to calculate if exploratory research on animals will ultimately have any benefit to humans or other animals. However, the compromise ethic that we noted earlier may allow some of this research if it is vital for human beings.
- Explanatory Models: These are designed to discover mechanisms, such as the mechanisms of cancer development, aging, drug activity, anxiety, etc. This is an area where genetically modified animals may be used, e.g. mice with a gene that predisposes them to develop a specific cancer.
- Predictive Models: These are practical and allow us to solve problems and make practical decisions concerning the efficacy, potency and safety of products such as drugs, vaccines, household chemicals and even food, e.g. mice are used to test for toxic substances that shellfish may produce.

We shall now look at some examples of the welfare challenges and the use of the 3Rs in some of these types of research.

Vaccines

In medical (including veterinary) practice, much of the work is preventative and includes vaccination. The production of these vaccines creates various animal welfare concerns because each batch of vaccines has to be tested for each of the following:

- Safety – the vaccine should not cause adverse effects, e.g. a modified live vaccine should not revert to virulence; with a killed vaccine, the adjuvant should not cause a local reaction
- Purity – no additional substances that might cause adverse effects, e.g. few or no residual proteins from the cells in which the vaccine virus was grown, and which might cause an anaphylactic reaction in your patient
- Potency – enough of the antigen in question, sufficient to create an immune response
- Efficacy – adequate protective immune response.

If the batch is not tested in all these ways, the risk is that the vaccine used will either not develop a satisfactory immune response or may suffer adverse effects. Some of that testing can be achieved using in vitro testing, not live animals. While more alternatives to animal models are being developed, presently live animals are still in use and continue to suffer a great deal. Researchers, regulatory authorities and the vaccine companies are quite aware of this and along with other stakeholders attempt to apply the 3Rs more widely in vaccine production.

The 3Rs and Veterinary Vaccines

These are a few considerations regarding how to apply the 3Rs effectively in veterinary vaccine production.

1. **Potency testing**
    - Serial dilutions of vaccine given to groups of animals + one unvaccinated control
    - Challenged with pathogen – if vaccinated animals become sick and die, potency at that dilution is inadequate
    - Welfare concern: inhumane endpoint
2. **Humane endpoint (OIE, 2011)**
    - Point when experimental animals suffering is terminated by, e.g. analgesia, euthanasia, removing from the study
3. **Refinement of potency testing**
    - Research to identify clinical signs that predict death
    - Training personnel to recognize this
    - In vitro alternatives not all regulatory authorities have accepted them
4. **Reduction of potency testing**
    - Minimum numbers per group
    - Combination testing

The example we will look at is potency testing of veterinary vaccines following the considerations mentioned above. The procedure traditionally goes like this,

1. "Serial dilutions of the vaccine are administered to several groups of animals. A group of control animals is included that do not receive the vaccine. All animals are then challenged with a dose of live pathogens sufficient to cause clinical disease in unprotected animals in order to determine the quantity of vaccine that provides protection. Inadequately protected and unprotected control animals typically develop clinical disease or die" (Stokes et al., 2011, p.6).

2. The welfare concern here is the choice of end-point. A humane end-point is the moment in the study when an experimental animal's suffering is terminated by, e.g. analgesia, euthanasia, removing from the study. With vaccine potency tests, the end-points have often *not* been humane, with animals allowed, for example, to have pyrexia and anorexia until they eventually die.

3. Here we should apply the principle of refinement which, you will recall, is about minimizing any distress to the animals. We need more research on each disease of interest so as to identify the earliest clinical signs that predict death in protected animals during the challenge test, e.g. it might be once an animal's temperature exceeds a certain figure for a certain minimum time. Training is needed so that personnel recognise those signs correctly and so can safeguard the welfare of the animals in the challenge test, on the one hand, and the welfare of animals in the field who will be vaccinated using the batch concerned.

   The goal would be for personnel to:

   - Remove those animals in the challenge test that are about to become mortally ill at the earliest opportunity, so that the animals may either be euthanised or treated and, in either case, may avoid unnecessary suffering. This is essential for the welfare of the laboratory animal.

   - Not remove the animals prematurely from the test such that their immunity – and thus the efficacy of the batch of vaccines under test – is not properly assessed. Proving the efficacy of the batch is essential to ensure that animals who will be vaccinated in the field are adequately protected.

   A further refinement is that, for some veterinary vaccines such as tetanus, swine erysipelas and clostridial diseases, there are now in vitro tests of potency, so that live animals do not need to be challenged. However, although some countries have reviewed these tests and accepted them instead of live animal testing, other countries have not considered them.

4. Reduction of animal use for potency testing includes:

   - Only using the minimum number of animals per group

   - In combination vaccines, carry out the potency test on the combined vaccine, rather than having separate groups of animals to test each component.

Similar issues with the 3Rs are also recognized with fish vaccines.

Other Product Testing Safety

We shall now move on to the wider use of animals for toxicology tests. About 10 per cent of all

laboratory animals are used for toxicological and other safety evaluation of household chemicals, veterinary and human pharmaceuticals, cosmetics and some food. Many of these tests are, by convention, animal tests and

might include:

- Acute toxicity tests (effects of large doses of products) and chronic toxicity tests (effects of smaller doses over long periods)
- Eye and skin irritation tests, for example, the Draize test, which involves dripping substances into rabbits' eyes. The picture shows a typical system that was used historically
- The Draize test has been banned in most countries, including in India, but is still used to test some non- cosmetic chemicals that might come into contact with the human eye
- Carcinogenicity tests are done to see if the product will cause cancer
- Developmental and reproductive toxicity tests are carried out to identify harmful effects on reproductive systems or foetuses – these are done with human and veterinary drugs
- Mutagenicity tests are carried out to assess whether products can cause genetic mutations.

A further safety test may be done for some foods. A particular example is a mouse bioassay that is used to detect toxins that cause paralytic shellfish poisoning (PSP) in people. Shellfish are a big export for some countries and it is important, both economically and for human safety, that they do not poison the consumer. The traditional assay uses a large number of mice and requires death as an endpoint. Canadian researchers have developed a High-Performance Liquid Chromatography (HPLC) method that is more sensitive and more reliable than the mouse bioassay that has been accepted and adopted by some international bodies.

This example illustrates elements of inertia, discussed earlier, that can result in the 3Rs not being implemented.

The 3Rs and Explanatory Research: Parkinson's Disease

So far, we have looked at the welfare effects of testing procedures – in veterinary vaccine testing and in a variety of toxicology testing. We have also seen how the 3Rs have been implemented in some of these examples. Those have all been cases of predictive research – using animal data to help us plan and make decisions. Next, we shall see how the 3Rs can be implemented in explanatory research, using the example of Parkinson's disease.

Credit: R.Beggs / ADI

This disease "is a devastating neuropathological condition, characterized by progressive neurodegeneration of dopamine (DA) neurons" (Manciocco et al., 2009) in the brain. It affects approximately 1 per cent of the world's population over the age of 55, and causes them to suffer tremors, weakness and depression. The cause is unknown but involves some interaction between one's genetics and the environment, rather than an infective agent.

Rats and mice have been used as explanatory research models to examine the effect on dopaminergic brain structures of pesticides and other chemicals. Transgenic mice are also used. However, animal usage has been reduced and improved according to the 3Rs and could be further improved in several ways. Some of those are:

- Replacement: There are now many in vitro studies with cell cultures; invertebrates could also be used to study the molecular genetics, e.g. fruit fly, flatworm. However, it must be noted that direct replacement of vertebrate species with invertebrate species does not necessarily meet the replacement criterion: as our knowledge of sentience in animals continues to increase, many invertebrate animals are being found to be sentient and able to suffer (for example, cephalopods used in experiments are protected by the UK and NZ governments)
- Reduction: Here, the main points concern good study design and appropriate statistical methodologies
- Refinement: Using transgenic mice containing the human gene associated with the disease may be preferable to creating the disease by painful or invasive procedures, e.g. injecting putative toxins into the brain. Other refinements, as we have seen, include the researcher's knowledge and awareness of animal suffering, and the choice of humane endpoints. Also enriched living conditions and other types of good husbandry.

These applications all hold promise. However, note that the 3Rs may be at conflict. For example:

- When researching Parkinson's disease, the reduction and refinement principles conflict if the person carrying out the experiment is injecting toxins to induce the disease in rodents. In line with refinement, the scientist could use lower doses of toxin so that fewer animals die, and fewer develop motor signs compared to if he or she used a higher dose.

However, this means that a larger number of animals might be needed to detect an effect, if one existed

- In the case of using transgenic mice as a type of refinement: not all those mice might demonstrate key features of the disease, so you may need to create many transgenic mice, and you then have to care for and use the unaffected ones – or euthanize them.

Genetically Modified Animals

This brings us to the use of *genetically modified* (GM) animals in research – and, potentially, for food, companionship, etc. This involves the manipulation of genes – either within a species or between species. Genes are either 'knocked in' or 'knocked out'. A 'knock-out' animal has a deleted or damaged gene that no longer works. There is a high failure rate in genetic modification procedures. Most animals fail to take up the desired gene and they are killed: only 1–10 per cent of the offspring will incorporate the desired gene, giving an estimated 90 per cent wastage. Apart from moral disquiet about this approach, there are specific animal welfare implications.

- First, as we saw just now, the animals develop the disease of interest.
- Second, animals may experience problems during their development or unexpected problems. For example,
    - Some transgenic farm animals have an accelerated growth rate, creating various pathologies; however, further gene manipulation can control this
    - Some animals may suffer severe, even lethal, unexpected effects, such as the development of tumours, brain defects, limb and skull deformities, infertility, arthritis, diabetes and other metabolic disorders.
- Third, there is a general problem of 'wastage', as we saw earlier.

Uses of Genetically Modified Animals

Examples of applications of genetically modified animals are:

- The production of therapeutic proteins in the milk of sheep, goats and cattle has been done by introducing genes of human origin into the animals. The technique to produce an animal capable of doing this involves surgery on several donor and recipient animals, although the transgenic sheep, once produced, appear healthy.
- Livestock/agriculture: animals have been genetically modified in attempts to make them grow faster, produce more and leaner meat, more eggs, more milk, or more and better wool. Sometimes the aim is to try and improve their resistance to disease, as is often emphasized with GM crops.
- Transgenic animals as models of diseases such as Parkinson's or cancer.
- Xenotransplantation: this includes the production of transgenic pigs to produce organs which are not rejected by human recipients. These are not human organs, but rather animal organs with a human gene which enable the human immune system to accept the foreign tissue.
- In addition to the general welfare concerns of GM animals, pigs reared for

xenotransplantation need a disease-free environment, which can reduce their welfare by, e.g. denying them suitable rooting substrates because of the risk of introducing disease.

- To obtain 'disease-free' piglets for organs for transplants, the animals are delivered by Caesarean section, placed in isolators, and then reared in sterile environments; the offspring are also subjected to repeated procedures where blood and tissue are taken.

- Arguably, there are still many 'unknowns' in our use of genetic biotechnology, and while more research is being gathered on these issues, there is good reason to opt for a precautionary practice that gives the animal the benefit of the doubt.

Greater Use of the 3Rs

We have now looked at a selection of examples of welfare issues arising from the procedures undergone by research animals, and we have seen how the 3Rs may be applied. However, anecdotal evidence suggests that few journals require explicit discussion of the 3Rs. Some journals provide guidelines about them, but they do not seem to require discussion of their implementation within the text for a paper to be considered for publication.

Some research has been done on that point. For example, animal welfare scientists have examined reports published in peer-reviewed journals between 2003 and 2004 describing experiments employing animal models to study the neurodegenerative disorder Huntington's disease. They found 51 references to studies where animals were expected to develop motor deficits so severe that they would have difficulty eating and drinking normally. However, only three of those papers referred to making housing adaptations to facilitate food and water intake. In addition, experiments including end-stages of the disease were reported in 14 papers yet, of these, only six referred to the euthanasia of moribund animals.

Many funding bodies and university ethics committees, or national licensing bodies, require clarification of the 3Rs in the applications to carry out research. However, the authors of the review of the Huntingdon's disease papers concluded that many researchers may not be applying the 3Rs. Interestingly, the reduction principle can be applied effectively in practice by involving veterinary client animals in more types of research, e.g. providing samples, so as to reduce the need to keep laboratory dogs and cats and induce diseases in them. Also, there is the possibility for some translational research, i.e. clinical research on client-owned animals who have diseases of interest in human medicine. An example of such a disease is canine spontaneous osteoarthritis, which could serve as a model that would more closely mimic the condition in humans than would a laboratory animal model.

Summary

Here we sum up what we have covered so far in this lecture:

- We started by reviewing why using animals for research and education is so widespread, and we considered the concept of 'lock-in' and inertia. We also looked at the main ethical points. This introduced the role of the 3Rs in minimizing harm to the animals concerned.

- Next, we looked at the welfare of animals used in veterinary education, primarily, and some of the alternatives to that

- We have looked at several different examples of animal use for testing and research. We considered the use of animals in veterinary vaccine testing, and what some alternatives might be. This introduced the concept of humane end-points.
- Next, we reviewed animals used to test the safety of products, including shellfish for human consumption. With the Draize test and the shellfish toxicity assay in mice, we saw that animals were still being used even when non-animal options were available, largely because of logistical barriers and inertia.
- Then we saw how the 3Rs might apply in explanatory research, using the example of studies of the cause of Parkinson's disease.
- That led us into a review of the use of genetically modified animals, and the welfare concerns for them.
- We finished by considering the role of journals in ensuring that researchers thought more about the 3Rs.

We will end this segment by looking more widely at the question of refinement as a way to improve the welfare of animals in their housing, etc., and then at how regulations can help to protect laboratory animals.

Refinement: Housing and Environmental Enrichment (EE)

Although much of the debate about the use of animals in research and testing concerns the procedures which animals undergo, most animals spend more time in their housing than undergoing procedures. This is true of farm animals too and, as with them, laboratory housing should meet the animals' physical needs: sufficient food, water, space, hygiene, adequate temperature and veterinary care. Most housing conditions do not go beyond that and are confining and barren. Briefly, animals in those conditions can suffer boredom and stress. Moreover, rats and mice, the most common laboratory species, are social but are often housed in isolation for ease of the researcher, which prevents the animals from expressing natural behavior such as play, grooming and social interactions.

'Environmental enrichment' is used to prevent these welfare problems. This is the alteration of the environment of captive animals in order to increase their behavioral diversity and so improve their welfare. Typically, it involves making the structure of their environment more complex. Examples of effective enrichment for rats that studies show them to value include shelters and tunnels, bedding and nesting materials, and group housing. Similar enrichments are also valuable to other rodents, and recent textbooks on the welfare of laboratory rodents provide more details. Note that the OIE guidelines recognize environmental enrichment as being a minimum standard of care.

Enabling laboratory animals such as rodents to perform a full range of behavior, including exploration, socialization and play, maximises their opportunities for pleasure, while reducing the likelihood of them suffering stress. The benefits also extend to the validity of the data that they provide to their researcher. There is a growing body of evidence that traditional barren housing and stressful routine handling can affect laboratory animals' behavior and physiology, to the point where it interferes with the researchers' data.

This is becoming increasingly clear in the case of behavioral research, where rodents are used as models of anxiety and the effect of drugs with potential to treat depression and anxiety in

humans. Being raised in a barren environment by mothers who were not handled much can affect the animals' cognitive processes. Moreover, being reared in barren cages may not allow the adequate development of vision, which may affect rodents' ability to perform some of those tests – examples of tests that require visual acuity are a swimming test, and a test using a maze.

Studies of standard handling as opposed to additional playful and gentle handling also support the likelihood that all these factors strongly affect rodents' ability to perform specific behavioral tests that researchers use to assess anxiety, etc. This therefore calls into question the validity of a lot of exploratory, explanatory and predictive research.

Refinement: Social Effects

Social aspects of housing are also very important for the welfare of social species – notably rodents and primates – and for the validity of the data they provide in research. In particular:

- Pre-weaning social experiences affect the development of social skills and capacity to cope with stressful situations, so compatible and stable groups are crucial
- Kinship is important for the compatibility of both rodent and primate groups
- Animals react differently in behavior tests when tested in a group than when tested individually.

Overall, therefore, social factors are important for laboratory animals' welfare and when planning and interpreting research that uses them.

Refinement: Feeding Regimens

Briefly, the feeding regimen may be *ad libitum* feeding or dietary restriction. *Ad libitum* feeding is unlimited access to food. This allows animals to follow their natural pattern of eating in bouts. *Ad libitum* feeding is standard for laboratory rodents because it is a labour-efficient system that can be mechanised. However, the regiment predisposes the animals to obesity. Obesity is associated with reduced longevity, as well increasing the risk of musculoskeletal disorders and diabetes mellitus. Obesity is deliberately created in some laboratory rodents in order to study the mechanisms involved.

The second type of feeding regimen, dietary restriction, is intended to prevent obesity. The restriction may be in the amount fed – which tends to leave animals feeling hungry – or in the quality of the diet – adding fibre to reduce nutritional content while allowing animals to feel full. Rodents used for studies of dietary restriction may be housed singly in order to ensure they receive the exact amount of food required for the experiment. However, rats and mice are social animals and housing them singly can be distressing. However, if rats are group-housed but on quantitative dietary restriction they may show high levels of aggression to other rats.

Refinement: Pain Management

Historically, there has been poor recognition of pain in laboratory animals. This is partly because it is difficult to recognise pain in different species, as each one shows different behaviours. For example, a UK researcher showed videos of rabbits before and after having been spayed, to 151 viewers (Leach, 2010). The viewers included veterinarians, scientists, lay people and animal health technologists. Approximately half had experience of caring for

rabbits. The viewers looked mainly at the rabbits' faces to assess if the animal had abdominal

pain. However, the ability to score pain correctly (according to experts) was correlated with observation of the animals' posterior end, not with observations of their faces.

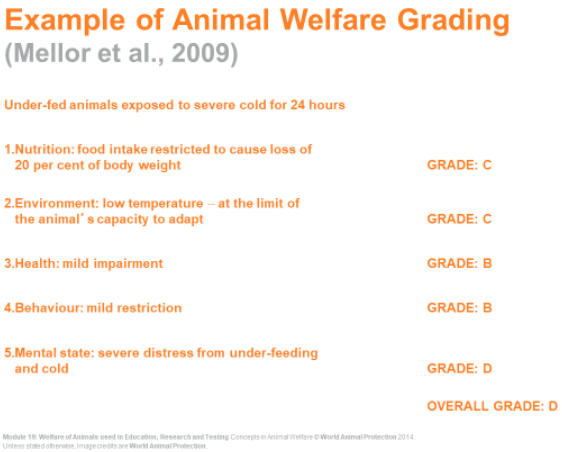
The researcher noted that, in mice, facial expressions have been shown to be a valid sign of their level of pain. The researcher suggested that this may not be true of rabbits, hence many observers did not assess the rabbits' pain correctly. Alternatively, it may be that rabbits do show relevant facial signs of pain, and we have not yet identified them clearly. Attempts to quantify the pain being experienced by an animal can be made by 'pain scoring'. This will often give separate scores to the overall appearance of the animal, the animal's food and water intake, the animal's behaviour when undisturbed and when provoked (e.g. site of pain touched) as well as clinical examination (e.g. the nature of the lesion). The use of such scores encourages regular close examination of the animals and can help to assess how well analgesia is working. As we saw just now, scales need to be developed and personnel taught how to use them.

Refinement: Assessment of Welfare

Another aspect of minimizing distress in animals used in research, i.e. refinement, is to assess their welfare. This takes two forms.

- One is to assess the welfare impact of the proposed experiment.
- The other is to assess the animal's overall welfare outside the experiment, as you would with farm animals using the Welfare Quality® project framework.

Assessing the likely impact of a research protocol is challenging because the study itself may be a new procedure or approach, and the assessment has to be made in advance. However, researchers in New Zealand have developed an Animal Welfare Grading tool to assess the impact of research on animals' welfare. The approach is based on the Five Freedoms, and estimates how long animals might experience any compromise in the freedom concerned, and how severe that compromise would be. There are five domains and each is graded from A to E (where A represents no welfare compromise in that area, B represents moderate compromise, and E represents very severe suffering).



Mellor et al. (2009) give an example of using this grading system to assess the welfare impact of

a study on the effect on under-fed animals of exposure to severe cold. You can see from the first four domains of welfare, concerning the animals' physical functioning, were thought to be affected moderately by this relatively short experiment. However, 'mental state' has a lower grade than all the others because marked suffering is anticipated based on the extreme cold and under-nutrition, and the length of exposure to this. Consequently, the overall grade for the anticipated welfare disruption caused by the study is D. It then becomes a matter of ethics and judgement whether the experiment would be allowed.

Regarding more routine assessments of animals in their housing, these have not been universally established for laboratory animals, but might follow the structure of the Welfare Quality® project framework developed for farm animals. Particular issues of concern include the need to adjust housing and conditions for the welfare of animals with debilitating diseases or who are disabled in consequence of their experimental use. The earlier example of animals used in research on Huntingdon's disease illustrated that.

Protection of Animals Used in Research, Testing and Education

We finish with a note about how to protect the welfare of animals used in research, testing and education. Broadly, the regulatory approaches involve a competent authority who licenses the research premises and sets standards for the institution and the usage of animals within projects. Normally this means that there is also some legal protection, usually national; however, EU countries, for example, also have common international legal standards to follow.

Compliance with the standards and law set by the authority is then overseen by a national or local review committee or individuals. Different countries apply this approach in three different ways, broadly. One is centralized inspection. For example, in the UK, licenses are dispensed by a government department at three levels:

- To the person conducting the research, allowing them to use animals for a specific purpose
- The second level is approval of the project itself
- The third license is given to the institution if it meets necessary standards. Inspectors can visit institutions unannounced as well as by appointment.

In addition, UK institutions must have local ethical review committees containing participants from outside the institution as well as scientific and ethics experts. Similar Animal Care Committees are used at universities in Canada and the USA but without the additional approval or licenses directly from the government.

Brazil is another country that has centralized inspection. In 2008, the country enacted a law to protect laboratory animals used for research, and Ministry of Agriculture inspectors visit institutions. However, there was already a national animal care and use committee (CONCEA) in place, and those members have expressed concerns that the law is not strong enough and might limit their ability to do more. For example, the law does not refer to the 3Rs or specify permitted methods of euthanasia. There are criminal sanctions available to punish those who break the law, although these are rarely, if ever, used.

The third type of protection is self-regulation, such as that found in the USA, where there is federal law to protect some laboratory species, and local committees within the research

institutions implement the regulations. They ensure that guidelines on animal care are followed, and they have the power to suspend research. Self-regulation is another form of protection. For example, in Australia, there is no centralised government administration or federal law, but there are codes of conduct. Meanwhile, each state has enforced self-regulation using local committees, under local state law. The committees have experts from within institutions and members from outside with interests in promoting animal welfare. The state laws usually incorporate some reference to a national code of conduct on care and use of animals in experiments. These codes incorporate the 3Rs. Turkey has a similar system: a law was passed in 2004 and 2006 mandating ethical review committees – there is one central committee and 73 local committees.

Overall, core concerns about animal experimentation, such as preventing repetition, establishing the clear necessity of any research, or comprehensive promotion of the 3Rs, can only really be addressed centrally and with a culture of transparency. Variations in this approach are becoming the norm internationally, and the OIE guidelines provide minimum standards for countries that are just getting started in this area.

Concluding Remarks

This concludes the chapter. Note that there is much we have not covered, such as the use of primates and details of how you might assess welfare in different species. However, you now have an overview of why we use laboratory animals, of the welfare concerns, including the role of the 3Rs and humane endpoints, and how to improve animals' welfare in the laboratory and through the use of ethics review committees.

You may work in a laboratory as a veterinarian or an animal handler, or you may be an external member of an institution's animal ethics committee. While you would need more specialized training to oversee animals in a laboratory, and more experience and knowledge of the ethical and welfare issues involved, you now have the basic tools and guidelines to help you if you work with a laboratory or serve on an ethics committee.

Websites about the 3Rs

www.nc3rs.org.uk

www.frame.org.uk

http://caat.jhsph.edu

http://ecvam.jrc.it/index.htm

http://iccvam.niehs.nih.gov

www.ardf-online.org

Chapter 10

The Welfare of Animals Used in Entertainment

Introduction

This Chapter will cover:

- The most common uses of animals in entertainment
- The main sources of ethical concern
- Some of the most common causes of reduced animal welfare in different types of entertainment.

Background

Entertainment may be defined as something diverting or engaging. Entertainment is not essential to human life, but it may increase our quality of life through an increase in positive emotions, income and other factors. Probably the primary reason why animals are used in entertainment is for financial gain. The use of animals generates income for different stakeholders:

- Individuals who attend the entertainment or watch it remotely often gamble on the results, which may increase their income
- Governments that levy taxes on those individuals or the betting agencies, which increases public funds
- Owners of the facilities concerned charge admission fees to make their living
- Animal owners, who benefit financially from cash prizes for the fastest or otherwise most successful animal.

The main uses of animals for entertainment are, broadly:

- Killing, which may be ritualized, e.g. bullfighting, dog fighting, cock fighting, hunting
- Performing, e.g. circuses, dressage (horses), racing, amusement parks tv/movie?
- Zoos, petting zoos
- Tourism – this includes the use of animals, e.g. for rides or photographs, as well as tourists' attendance at existing events such as bullfights, racing and performing.

Animals as Entertainment

Some of the species which are most commonly used for entertainment. The use of each depends on where you live in the world and on the ethical and cultural norms in your country, and thus the legislation. Some of the uses you see on and may be quite closely controlled in the country where you live and work. Others may be unfamiliar or may be illegal. For example, second from the bottom is fighting between dogs, bears and roosters. Such practices are illegal in some countries (but may still occur) and may be commonplace and legal in others.

Today, we will concentrate mainly on the scientific evidence and observations about the potential for harm to animals used in entertainment. However, we will first briefly review the reasons why using animals in entertainment can cause arguments and moral unease.

Review of Ethical Concerns

As with all other uses of animals – in farming, as companions, in laboratories, etc. – the concern in using

animals for entertainment is whether or not they are harmed by it. The concerns are:

- Obligation-based or deontological frameworks concern our obligations to animals either by virtue of them having intrinsic value, which in turn confers rights, or by virtue of animals' dependence on us.
- Consequentialist frameworks are concerned with the effects of our actions on us and other human beings, on animals, and on the species or ecosystem as a whole.

Many people may combine elements of these frameworks in forming a position on whether a particular use of animals is right or wrong. Consequentialist arguments are probably the most common. Cultures of different countries may differ as to what adverse consequences are permissible when using animals for entertainment, e.g. certain injury and death in dog fighting has led to the practice becoming illegal in many countries, whereas those countries permit horse-racing because the entertainment it offers does not centre on injury or death, and only carries a low risk of injury and an even lower risk of death.

In all countries, the benefits to humans of using animals for entertainment are often cited as reasons for allowing it, and are relevant considerations. We will summarize the main positive and negative consequences to humans and animals of using them in entertainment. We will then focus on animal welfare concerns in particular types of entertainment.

Credit: Wildlife Trust of India

Benefits and Harm to People

Using animals for entertainment are sought for differing perspectives or practices. Some uses are viewed as an expression of culture or tradition. Examples of this are rodeos in North and Latin American countries; dancing bears in India; and bullfighting in Spain and some Latin American countries. The expression of culture is a sensitive issue for legislators, and a source of misunderstanding with countries and activists who do not share that culture or believe that it is time to evolve beyond the dated traditions. Some of the benefits and harms have been enumerated here:

- The animals' handlers may develop strong, bonds or depend heavily upon the animals for their livelihood.
- Often the entertainment provides strong social benefits such as increase the person's social status.
- In various ways, these practices are severely detrimental for the society.
- Gambling, an intrinsic part of any animal fighting/racing practice, is addictive and can cause great misery and poverty for the person concerned and their family. Gambling may also be

associated with other problems, such as violence.

- Some uses of animals that involve the animals fighting and killing each other may reinforce the public perception of such species as being 'aggressive' and requiring harsh treatment.
- Often those species are not viewed performing their full range of natural behaviours, but only the fighting behaviour, in an unnatural environment. This prevents viewers from appreciating the unique adaptations of the animal and, arguably, the value of the species.
- Related to both those points is the argument that was formulated by the ancient Greeks and is maintained today, that treating animals cruelly, for whatever reason, harms us by weakening our intellect; e.g. the view that animals are threats that deserve harsh treatment from people, rather than us understanding their needs and sentience.
- Using animals for entertainment can cause injury to the people concerned through accidents or because an animal is frightened and attacks the handler and/or spectators.

Impact on Animals

The impacts spread across a wide range:

- They may have been caught from the wild, e.g. young primates used as tourist attractions for photographic opportunities. Capture may cause injury, with death to some members of the social group and disruption to the group.
- They may not have adequate husbandry, especially if they are wild-caught. This means they may spend their lives in a restricted space, with limited scope to perform natural hunting, social and reproductive behaviors. In general, captivity is known to be stressful for all animals, and non-domesticated species may find it particularly difficult to adapt.
- The methods of control and training may be punishment-based, especially in the case of dangerous, wild-caught animals such as bears, elephants and large felids (cats).
    - The entertainment may require the animals to be killed or injured, or there may be a significant risk of that. This means there is a high probability or certainty of fear, pain and distress for the animal.
    - The animals may be said to be harmed because their use for entertainment is seen to be artificial or unnatural, and therefore harms their *telos*, or inherent nature. This perception varies between cultures. For example, in many countries, circuses are

deeply rooted in cultural and social norms and the use of animals in circuses is seen as a traditional part of life. However, in other societies, the artificial training and performance, particularly of animals such as big cats and elephants, is seen as very artificial.

Overview of Training Methods

Animals used to entertain humans all have to undergo some training, which may involve behaviors that are unnatural to the animal. Because aversive methods of training are often used, we will review the welfare aspects in some more detail here before moving on the welfare concerns in different categories of entertainment.

With training, animals learn to associate a command or signal with the immediate performance by them of a behavioral sequence, as a result of which the animal is rewarded: we either give the animal something pleasant, e.g. food, a toy, touch – this is a *positive reward*; or we remove something unpleasant – this is a *negative reward* ('negative' because something has been removed).

An example of a negative reward is the removal of an electric shock. If we are using it to train an elephant to place his foot on a tub, and nowhere else, we might administer a constant, steady shock as soon as the elephant moves in the wrong direction. When he moves his foot in the right direction and places it on the tub, the shock stops. So, he learns that placing his foot on the tub directly averts the risk of pain from an electric shock.

'Punishment-based' training means that when the animal does something we do not want, we do something unpleasant to him/her, e.g. we give an electric shock, which is positive punishment, or we remove something pleasant such as food treats – this is negative punishment.

Traditionally, the methods for training domesticated and wild animals have centered on applying negative rewards or positive punishments, often involving pain. Such methods tend to create high levels of stress and the animal becomes 'trained' out of fear rather than because of the anticipation of something positive being administered to him/her.

Rewards and punishments

	Reward	Punishment
Positive	Add something pleasant, e.g. give food	Add something unpleasant, e.g. hit the animal
Negative	Remove something unpleasant, e.g. stop giving an electric shock	Remove something pleasant, e.g. stop playing

Problems with Pain- based Training Methods

- Prevents learning: fear and pain cause high levels of emotional arousal: under those conditions' animals cannot easily learn and make associations between their behaviour and your command. Consequently, trainers may consider their animals to be 'stupid' and may not treat them kindly.

- Physical damage: training animals for entertainment using pain can cause damage and lead to infection and illness so the animal cannot work well.
- Owner–animal relationship: pain-based methods of training are a negative approach to training, which may reduce the owner's attachment to the animal. Making the animal fearful.

Types of Entertainment

We shall now consider the particular welfare concerns for animals used in the entertainments listed here.

- Category 1: Animals used in fighting or killing
- Category 2: Animals used in killing
- Category 3: Zoos and
- Category 4: Tourism may also raise welfare concerns.

Fighting and Killing

In the category of fighting and killing, dog fighting and cock fighting are probably the most common. They are illegal in many countries but are permissible in others. Because birds are relatively cheap to keep and to replace, cock fighting is a common pastime in some parts of the world where people have low incomes. Related to dog fighting is bear baiting, which is thought to occur only in Pakistan. Bears are typically wild caught, raising welfare concerns regarding the remaining social group in the wild (as noted earlier), and for the captive bear due to his or her lack of domestication.

Courtesy: Humane Society International

In all cases, gambling is probably the main impetus for the activity, although the sight of a bear fighting a dog and each animal being injured is part of that particular spectacle. Fear is perhaps the main welfare concern in all cases. In the case of dogs, aggression is unusual for domesticated dogs and one of the first steps in domestication is likely to have been removal of very aggressive or overtly territorial dogs so that they may co-exist happily with humans and with other dogs. To make fighting between dogs a spectator activity requires selection, over time, of animals who show aggression, and this in turn is most likely to be motivated by inherent fear, which the handlers may reinforce in the dogs' early experience.

Examples of breeds within which there has been selective breeding for aggression are:

- Pit-bull terrier
- Japanese Tosa
- Dogo Argentino
- Fila Brasileiro.

Dogs are often made to fight to the death and can cause each other severe injuries. However, the fighting breeds listed here seem to have a very high pain threshold so they may not suffer much discomfort from skin wounds or, possibly even deeper bite wounds. However, the build-up of inflammatory substances and development of infection in wounds following a fight are likely to cause some degree of sensitization of the pain pathway if the injuries are not treated and analgesics given.

Similar principles of selection for aggression and associated fear, injury and pain apply in the case of cock fighting. Even when fights are illegal, legislation may be difficult to enforce if the

local authorities lack resources or have political links to the organizers. Moreover, since the activity is illegal, this may make handlers reluctant to seek veterinary attention for their injured animals.

Bullfighting

In contrast to dog and cock fights, bullfighting is a highly ritualized fight to the death between a bull and a human, called a *matador*. There are two types, one where there is a matador (human) in Jallikattu in Tamil Nadu and Andhra Pradesh and the other one is called Dhirio which is an activity popular in Goa which is bull against bull. Bullfighting involves great human skill, training and risk, and is a deeply rooted part of Hispanic culture. The fight typically lasts 15–20 minutes.

The welfare concerns are that the bull is subjected to pain and distress, as listed here. That is:

- Bulls may be prepared by having irritants applied to their eyes to distort their vision
- During the fight, which is highly ritualized, the matador goads the bull to increase his aggression and the risk. Goading may include using hand-held harpoons decorated with brightly coloured, weighted banners to enrage the bull. The harpoons usually stay embedded in the bull's back, causing the bull to lose more blood and open the wounds further

Once the bull is disabled by injuries, which include loss of blood and pain, the matador kills the bull using a long sword that is forced downwards between the shoulders to penetrate the heart. However, this is not completely reliable, and it is not an approach to the heart that would be permitted in any regulated slaughterhouse. Consequently, the bull may be conscious during the subsequent rituals which are:

- An assistant stabs the downed bull with a short, broad knife to sever his spinal cord
- The bull's ears or tail are cut off to be given to the matador as a trophy
- The bull is tied by the horns and dragged out of the ring.

Also, horses are used to steer and marshal the bull during the fight. Despite wearing armour, horses are sometimes injured.

The deep social roots of bullfighting mean that many people in many societies do not perceive these activities as anything other than part of their social fabric. Also, in many of the countries where bullfighting takes place, it is often the interest of tourists that keep the practice going. After Spain, the countries where the entertainment is most common are Colombia and Mexico. In Spain, the region of Catalonia banned bullfighting in 2012. In Colombia and Mexico too, some jurisdictions have been debating a ban on the practice.

As noted earlier, people from different ethical standpoints may draw different conclusions about the practice. Broadly the main arguments supporting the practice concern its cultural roots and tradition, the fact that the matador risks their own life too, and the benefits of making money from it. Arguments against the practice concern the bull suffering unnecessarily, and the contractarian argument that bullfighting is cruel behavior that weakens the intellect, such that it makes one less able to appreciate arguments against its conduct. Some ethicists would also regard the cultural argument as an anthropocentric fallacy because it entails suffering.

Performance Animals

We shall now move on to discuss the welfare concerns for performance animals in the following categories:

- Dancing bears

- Marine animals
- Circuses
- fiestas/rodeos
- Horses: racing, jumping and dressage.
- Dog racing.

Dancing bears in India

The first example concerns the use of dancing bears in India. Briefly:

- Sloth bear cubs are taken from the wild and their mothers are usually killed. The removal or death of the bears has implications for wild populations of sloth bears, which are threatened in some regions of India
- The captured animals are controlled by means of a tether through the muzzle (which often penetrates the roof of the mouth, as you can see in the picture). The tether is inserted without anaesthetic, which is painful, and it creates a chronic unhealed wound which causes ongoing pain and distress.
- The husbandry of these wild-caught animals is also a concern because they are not domesticated and are typically kept tethered
- Training the animals to ‘dance’ may involve punishment-based interactions that cause fear and pain.

Circus Animals

Another use of wild-caught animals for entertainment is in circuses; such animals include bears, big cats and elephants. In some countries circus animals have been bred in captivity. However, the prevailing view is that such animals are not truly domesticated and so not well suited to the constraints of circus life. In other countries, many animals used in circuses may have been wild-caught, with associated trauma and mortality in the selection of young animals. Additional welfare concerns in circus life includes the following.

- 'Life on the road': as the circus travels to different places to perform, this means repeated transport in confinement for these animals. As the numbers of each species within a given circus are small, and there has been relatively little research reported on the effect of transport, it is difficult to ascertain the effect of this on circus animals.

- Lack of space and freedom to perform natural behaviors often results often in abnormal behaviors, such as head-bobbing in picketed elephants and pacing in caged tigers. Small studies (Friend & Parker, 1999; Nevill & Friend, 2006) have indicated that, in both these cases, providing the animals with even small exercise pens with electric fencing to contain them may be a welfare benefit. However, in general, circuses cannot provide the enriched environment that zoo facilities can, so they are limited in their options to allow animals to perform behaviors that are important for them.

- The lack of behavioral opportunity is probably made worse by the fact that, according to reported estimates, circus animals only perform or undergo training for less than 10 per cent of their day

- Training methods: these can be strongly punishment-based and applied without knowledge of the psychology of learning. They can induce fear and resulting aggression in the animals, as well as pain, especially when wild-caught animals are being subdued.

- Some domesticated animals are also used in circuses, such as dogs and horses are caged and kept tied constantly. In addition, there is a lot of in-breeding that takes place.

An indirect welfare problem for many circuses is that they are small and have limited financial resources. This contrasts with larger well-known circuses where, typically, any existing research has been done. The conditions are likely to be worse in smaller circuses for financial reasons. Taking all of these factors together, a review published in 2009 (Iossa et al., 2009) concluded that "Data collated from other studies suggest that species commonly kept in circuses appear the least suited to a circus life."

Performing Marine Animals

Dolphinaria are places where dolphins are kept in captivity and are usually trained to perform for human spectators. Such facilities may also involve other marine animals such as seals, turtles and sirenians – manatees and dugongs. Welfare concerns include the following:

- Capture of the species from the wild has had an impact on wild populations and risks endangering certain species.

- The high mortality level between capture and placement in the exhibition, and the methods used for wild capture (netting and driving animals to nets or to shore). In Japan,

the capture may be secondary to annual capture of the animals for slaughter for human consumption.

- There, animals are driven into shallow water and, over some time, killed by harpoons or trapped in nets. The annual hunt is thought to cause considerable fear and distress, especially because of dolphins' high degree of cognitive development and it is widely opposed by conservation and animal welfare groups.
- Wild-caught marine animals also have a shortened lifespan once in captivity.
- Training methods have been of concern too, including the need to use remote stimuli (and remote reinforcement) to encourage the desired behavioral display in dolphins, sea lions and others. However, for practical reasons and perhaps also because performances are for the public, training methods are mainly positive, i.e. based on the principles of learning and involve reward, not punishment.
- Although captive animals are protected from predation and environmental extremes, many people would argue that these hazards are 'natural' risks for which the animals have been equipped by evolution. Removal of natural hazards is unlikely to compensate for the severe behavioral and spatial restrictions placed on free-ranging marine mammals in captivity.

Fiestas and Rodeos

As with circuses and bullfights, rodeos are deeply rooted culturally. Welfare concerns are that animals in fiestas and rodeos are subjected to unnecessary distress, including goading of the animals to maintain their 'wild' interactions with humans. Rodeos can consist of various events, including calf- or steer-roping, steer-wrestling and bucking events where the contestant tries to stay on a bucking horse or bull. All of these events can cause severe injuries to the animals and can involve practices, such as prior injury or harm, to make the animal appear wilder.

Note that the performing animals may be very valuable and, therefore, they may be well cared for. However, animals who are used for training may not be well looked after. For example, some rodeo horses are worth tens or even hundreds of thousands of dollars – they are too valuable to be mistreated. Consequently, animals of lesser value are used for the rider to practise on, and they

may not be well treated. Alternatives to animals for practising on may include bucking machines. However, they do not permit the rider to practise other rodeo activities, such as roping or wrestling cattle.

Credit: IStock.

Horses and Performance

We shall now consider the welfare of horses who are used in performance sports for entertainment, e.g. dressage, show-jumping, cross-country eventing, polo, racing with jockeys (thoroughbred racing) and racing in harness (standardbred racing or 'trotting'). The main welfare concerns in these sports are listed here. Many have not been thoroughly studied yet as they have been part of the traditional care and use of horses for many decades or centuries. However, more research is now being done on them.

First, public concern is usually about injuries or deaths that are seen during the competition. For example, in the UK an annual race over fences, the Grand National, is associated with deaths and injuries every year because of factors such as the size of the fences, the angle of the course, the distance of the race (approximately 6 km), and the number of horses taking part. However, other welfare concerns that the public may not be aware of in equestrian sports include the following:

- Use of invasive interventions that affect cosmetic appearance e.g. tail-docking or tail-blocking. The latter involves injecting alcohol into the base of the tail where it degrades myelin, resulting in the horse having very limited local innervation which means a low, flat tail carriage and reduced swishing of the tail.

- Training and riding techniques that involve punishment or extreme control: dressage is a particular instance, and the International Federation concerned has required the use of double bridles and spurs in all horses competing. Tight nosebands are also permitted, as these prevent the horse from holding his or her mouth open during competition but seem likely to cause some degree of discomfort.

- Training methods for dressage include using sustained pressure on the reins to cause the horse to hyperflex the neck, so that the muzzle almost touches the horse's chest. This is a desirable position of the head for competition and is called the *Rollkur posture*. It is controversial as, in addition to limiting the horse's vision and causing wear of the cervical vertebrae involved, the training and posture are thought to cause pain and fear, and to

result in physical and behavioral limitations that may contribute to 'wastage' of horses who are not ultimately successful in competition. A study of 15 horses who had not previously been exposed to Rollkur positioning indicated that they preferred a natural position to hyperflexion.

- General riding style: an epidemiological study of 447 horses in Switzerland (Normando et al., 2011) suggested that horses ridden in the English style (i.e. with relatively high stirrups and less ability for the rider to use his or her thighs to maintain balance and control the horse) were more likely to have stereotypic behaviours than horses ridden in the Western style. This association also depended on breed, and was most marked in horses who did not have free access to a paddock for at least six hours a day

- Riding techniques in racing: the use of spurs and the whip to control horses and make them run faster. Many horse-racing bodies are self-regulating and have rules about what constitutes the over-use of whip or spurs, but the concern remains.

- Extreme challenge in equestrian sports: The Grand National race is one example. Another is endurance riding, where horses cover many kilometres each day. The speed and agility required of polo ponies can also challenge the metabolism and musculoskeletal system. In all such cases, horses' risk acute or chronic injury and metabolic stress.

- Other horse-related welfare concerns are listed here. They include the following.

- Transport to the competition venues is another potential welfare concern, especially if the vehicles are not suited to the climate or road surface.

  - Some horses are reluctant to get into and out of horseboxes. Some reasons for this may include the angle of the ramp, shadows, etc. – the same principles as outlined for the transport of livestock. However, more research is needed in the case of horses. One study (Kay & Hall, 2009) of horses transported on narrow winding roads, for 10 km, indicated that transport in isolation was stressful and suppressed feeding behaviour, but that providing an acrylic mirror opposite the horse's head reduced signs of stress.

  - Housing is a further concern. Typically, horses are housed individually, either tied in relatively narrow but often open-sided stalls, or in loose boxes typically with solid walls. The first kind limits movement, but permits some visual and physical contact if other horses are in the same stable-block. The second type permits more movement but can limit social contact.

  - The study from Switzerland noted earlier, and other studies, have found that prolonged stabling in isolation and lack of access to pasture are associated with an increased risk of stereotypic behaviours such as weaving. Locomotory stereotypies such as weaving and box-kicking are more likely to reflect frustration at confinement.

  - Methods to stop crib-biting are also a welfare concern, as the behaviours are typically highly motivated and the inability to express them may cause suffering which was not present when the behaviour was allowed. For example: a study of eight crib-biting horses indicated that the average force that they exerted during crib-biting was enough to lift approximately 30 kg. However, because crib-biting can cause overdevelopment of the neck muscles and is seen as bad for horses, special collars or muzzles may be used to prevent it, as well as the surgical removal of certain neck muscles (this is known as a *modified Forsell's procedure*) or electrifying the surfaces the horse bites on. All of these methods can cause suffering and, in the latter two cases, pain.

  - Feeding may also be inappropriate and affect welfare. For example, an excessive amount of

concentrate food tends to produce a low gastric pH and predispose animals to ulceration. Crib-biting is associated with salivation, and may help to relieve discomfort from such ulceration. A further, more general, problem with performance horses is that the lack of opportunity to express foraging behaviour and lack of a variety of forage may together predispose horses to locomotory stereotypies and wood-chewing.

- A final welfare concern is that horses may be repeatedly sold on, with no one trainer or owner taking responsibility for the care of the horse if that animal's breeding, training and husbandry do not ultimately result in success in competitions.

Racing Animals

The racing of horses and other species such as dogs and camels have cultural roots, e.g. in countries such as Ireland and Saudi Arabia. Today, the standard of care that animals receive may be relatively high for some animals. For example, in many countries, thoroughbred racehorses have relatively high standards of care that are closely regulated. However, the standards for standard bred racehorses ('trotters') and greyhounds are not so high.

This difference reflects the economic class of the spectators. However, in many countries, racing of all species used has huge economic value, and is sustained by gambling, both at the track and in betting shops. Despite regulation, many racehorses endure injuries (mainly fractures and tendon/muscle damage) either during races or during high-intensity training (e.g. 'bucked shins' in young horses who are trained intensively: the periosteum of the third metacarpal tears away from the bone). Selective breeding may also predispose animals to injury, as some injured horses who have won big races and then become injured are 'retired' and used for breeding, which perpetuates any genetic predisposition to certain kinds of injuries.

A further concern is that thousands of horses are euthanized or slaughtered when they no longer perform well enough; while this is not in some ways different from our use of farm animals, it causes moral unease as slaughter is used to dispose of animals when they cease to have value to us, rather than when their value is maximal. In some countries, there are very few abattoirs that will accommodate horses, and they must be transported for long hours or sometimes days before reaching the slaughterhouse. Greyhounds can also suffer severe musculoskeletal injuries and, as many do not have high economic value, their owners may not always be able to provide them with optimal veterinary care, rest and physiotherapy. The care and welfare of unsuccessful dogs is another concern, and many may be killed inhumanely. However, adoption programs are also used in some countries. Clearly, the adoption of former racehorses is less easy because of their size and high need for specialized care. A further point with dog racing is that, depending on the type of racing, prey species may be used to train the dogs, and used in the race itself, which is frightening for them and may result in a distressing death.

Credit: Colin Seddon

Summary So Far

To sum up, in this Chapter we are looking at an overview of the main welfare concerns related to the common use of animals in entertainment. We started by recognizing that such uses can cause ethical unease, and we briefly reviewed the main ethical positions that might be applied to this use of animals. We then reviewed the main problems and benefits of using animals for entertainment, both for the people involved and the animals. Since then, we have been focusing on the main animal welfare concerns for animals used in entertainment.

We started by focusing on issues in dog fighting, cock fighting and bear baiting. Then we looked at using animals for performance – dancing bears, marine animals, circuses, rodeos and, finally, spending some time on the many uses of horses for performance-based entertainment. Although such use of horses is widespread around the world, we noted that there has been relatively little research carried out into much of it and that there is a range of concerns including on well-established methods of training, styles of riding and housing. We shall move on to look at the third and fourth categories of animals used for entertainment: animals in zoos and animals used in tourism.

Zoos and Animal Parks

Zoos, animal parks and animal collections are a global feature of the interaction between the public and exotic, wild, rare or dangerous animals. The conditions in which these animals are kept:

- Influence the public view of the ‘value’ of these animals. Increasingly, zoos promote teaching about natural history and conservation, as well as breeding. However, some promote the view of animals as non-sentient and a spectacle
- Reflect the social and economic ‘value’ placed on the animals, and the degree of public concern for good animal welfare.
- Welfare concerns for animals kept in zoos include:
- Mortality and morbidity associated with wild capture.
- Confinement – potentially stressful for any species, whether domesticated or not. However, as most zoo species are either wild-caught or not fully domesticated or naturally adapted to zoo conditions, there is a high probability that they may suffer from particular stress caused by factors listed on the slide

- Lack of relevant sensory stimuli (light, sound, smell, substrates)
- Restricted movement, feeding and other behavioral opportunities
- Lack of area to retreat to/hide in
- Forced proximity to humans
- Too much predictability
- Too little environmental control.

The effect of these stressors may manifest itself as abnormal repetitive behaviors or a very restricted range of behaviors, as well as a reduced lifespan and low reproductive success in some species. Such developments undermine the purpose of zoos, as an animal showing abnormal behaviors is of little educational value to the public, and reproductive failure does not benefit the species as a whole. Environmental enrichment has been developed as an approach to help reduce the occurrence of such behaviors and to enhance the ability of zoo animals to cope with confinement.

Note that the ethology of some species includes aspects that exceed the capacity to provide for them in captivity. For example, a critical ethological review and research suggests that large carnivores have such a large hunting range that they cannot adapt adequately to the limited range that even the best zoos can provide. This was highlighted in a classic paper about the welfare of bears in zoos (Clubb & Mason, 2003).

A further concern is that the ability to provide truly enriched environments for wild animals in zoos is limited. However, some zoos, with sufficient resources, have made progress in providing for the diverse needs of wild species, and some zoos do contribute to knowledge, research and breeding programs for some species. On the other hand, it is thought that relatively few captive breeding programs may be effective – therefore, any suffering undergone by zoo animals may not benefit the species either (with regard to the 'respect for nature' ethical position). However, research on successful captive breeding continues in order to overcome that, e.g. looking at factors such as the risk of breeding programs tending to select genotypes that may be less well

adapted to life in the wild, following eventual reintroduction.

However, there are many zoos around the world where the conditions in which animals are kept have not altered significantly for the last two hundred years when 'bestiaries' and caged collections (e.g. royal collections) put wild animals on display as curiosities, and as public displays of wealth and of the exotic.

Tourism: Photographic Models

In some countries, immature animals of wild species are used as photographic models, so tourists can have their pictures taken with, for example, a chimpanzee. Immature animals are used because they are less likely to be aggressive, and they are not as strong as adults.

Welfare Concerns in Tourist Photography

The welfare concerns noted under zoo animals and circus animals also apply here:

- Wild capture
- Inadequate husbandry
- Lack of domestication limits adaptability
- Life 'on the road' means that housing is likely to be poor
- Normal behaviors are suppressed
- Confinement, often alone, may lead to signs of depression and to stereotypic behaviors.

Other concerns include:

- The seasonality of the tourist trade, such that animals may not be treated well or given even more freedom during weeks or months when there are few tourists – their owner may need to do other work in order to earn a living
- As the animals get older, and with the ongoing stress of captivity, they may become aggressive. This may lead the owner to sedate them or abandon them
- There is a high risk of disease in the animals, as owners may often be relatively poor, and local or international veterinary knowledge for many species is inadequate for proper health management.

Tourist Entertainment: Rides

Another use of animals in tourism is for rides. Donkeys, in particular, may have to bear much more weight than they can safely handle. More generally, a survey of 10,000 working equids in nine different countries (e.g. Guatemala, India, Ethiopia) noted that animals used in tourism were often in poor condition due to, e.g. lameness, low body condition score (BCS), dehydration and lack of shade. They also showed signs of fear of people, being aggressive when approached by the researchers.

Similar is the situation of elephants used for tourism in India in places such as Amer Fort, Jaipur. Out of the 103 elephants found at the fort several were found blind, some tested positive for Tuberculosis (TB) and all the elephants were found to have foot problems and deformation due to improper care and attention. These issues besides being an obvious violation of animal welfare also pose a major risk factor for the humans interacting with these elephants. Educating tourists and animal owners alike might help to improve the welfare of those animals, and government subsidies might help with this. It is notable, that anecdotally, many of the same tourists would not consider riding a donkey down the road in their own country.

Credit: Minna Tallberg

How to Improve the Welfare of Animals used in Entertainment

We shall finish this lecture by considering how to improve the welfare of animals used in entertainment. Legislation seems essential:

- To license premises where animals are housed and performed. Such licensing is in place in many jurisdictions in regard to wild animals, but is often not used for more long-standing use of domesticated animals – such as racehorse stables
- To regulate training, regulate performances (for example, the Performing Animals Rules provide that an animal cannot be made to perform tricks that are not in nature of the animal, no fire hoop jumping, anything that might cause pain or distress etc) prohibit some practices such as killing and – depending on the public ethic – use of animals in circuses. For example, Pakistan's Prevention of Cruelty to Animals Act (1890) in principle prohibits bear baiting.

However, effective legislation requires many factors to be correct, from the wording to the resources in place for enforcement, to independence of the enforcement body, to penalties that are strong enough to deter people from breaking the law. Bear baiting is still practised in Pakistan despite a long-standing piece of legislation.

Influence of NGOs on the Welfare of Animals in Entertainment

Non-governmental organizations (NGOs) can also help to improve the care of animals used in entertainment in the following ways:

- They can support or start boycotts of circuses or zoos (although these are often ineffective)
- They can campaign to raise public and political awareness of issues
- Through education, NGOs can allow people to make informed judgments on issues, and relate their local experience to global standards
- They can promote the allocation of resources to maintain effective policing of existing legislation, and the creation of new laws.

Conclusion

You now have an overview of the ethical and other animal welfare concerns in the use of animals for different types of entertainment, and some understanding of why those concerns may or may not be widely shared. The main points are:

- That our use of animals for entertainment often denies or restricts fulfilment of their basic needs
- Some uses are predicated on killing the animals
- Some wild species are not suited to life in captivity or in entertainment, e.g. none are suited to circuses, and many are not suited to zoos
- The entertainment industry varies from large to small enterprises, and gambling typically drives many of them
- Much more research is needed on many aspects of animal use, which may be so well established that related problems may not be noticed, by veterinarians or the public

- This is particularly the case with competition horses, and issues such as riding styles and training methods. It also applies to zoo species.

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Chapter 11

Companion Animal Welfare

Introduction

Animal protection societies know that a long-term solution is needed to reduce the numbers of animals they have to deal with. However, their immediate problem is: what should they do with all the dogs and cats that they have? Some shelters want a 'no kill' policy. Others prefer selective culling of the resident animals. In this Chapter we will look at both approaches and then at the importance of policy. We will also look at the main work that shelters do in neutering and re-homing animals. We begin with what animal shelters do.

● Background

In general, animal protection societies put most of their effort and resources into saving as many animals as possible, leaving little time and money to develop long-term strategies. In some developed countries, large, well-organized and relatively rich charities may succeed in performing both functions, i.e. rescuing animals as well as involvement in long-term campaigns and education programs. However, in poorer countries, most charities and animal protection groups have limited funds and resources. They are overwhelmed by coping with the animals that come to them; therefore, they cannot plan or implement any long-term strategy to tackle the root cause of the problem – the sheer number of street animals.

In general, animal protection societies are small and run by a few, highly motivated, volunteers. Their aim is generally to save as many animals as possible and all their resources are spent on trying to take care of the animals. Selective culling is difficult for them to accept, and would generally not be well accepted by their volunteer workers. There is often little money to pay for veterinary and other professional help. Some local veterinarians may become involved (as volunteers) but there is clearly a limit to the amount of time that professionals can give.

● Rehoming

In countries where there is a significant problem with street animals' overpopulation and also a relatively poor economy, the scope for long-term re-homing is reduced. This limits the financial support these groups have because, normally, a shelter would charge a re-homing fee. The type of

dog or cat, such as feral, community or abandoned animal is, could also influence his/her potential for re-homing.

Shelter Policy

Before opening an animal shelter, the management should decide on the shelter's policy. A vet can help them to make informed decisions, so that their work will benefit animals and not, ultimately, make their welfare worse. Important questions are:

- What is the realistic capacity of the shelter? This relates to the physical size; physical construction and protection from the environment; the resources for food, water and medication; the availability of staff; provisions for sanitation and hygiene.
- If the capacity is 30 dogs (or cats), what happens when number 31 comes along? Is the animal turned away for someone else to deal with? Is the animal killed? Is another animal killed to make room? Is the street animal taken into the shelter anyway? (If the latter, what about when numbers 32, 33, 34 … 60 come along?)
- Are there criteria for selective culling so that the shelter does not become overcrowded? This can be a very sensitive and difficult issue for management to agree on, and it must be agreed by all staff. This issue of culling relates to the fundamental question: what is the role of the shelter?

- **The Role of Animal Shelters**

People may have very idealistic views of the role of a shelter. In reality, the three main functions of a shelter are:

- **Keeping lost pets to be collected by their owners:** It is common that street animals are kept for a period of time, which can vary from around three to ten days, to allow time for an owner to come forward. More rapid identification of the owner will speed up the process and free up kennel space to allow more animals to be processed through the facility. Charging the owner, a realistic fee also provides an income.

- **Re-homing street animals:** This is a major function of many shelters. The long-term aim is to place a well-behaved and socialized dog or cat into a caring and responsible family. Failure to do this will probably lead to future abandonment. If re-homing is the primary aim of the shelter, and yet the practical performance is a relatively low re-homing rate, it might be better to consider keeping fewer animals in a central location and situation more likely to generate interest than large out-of-town compounds.

- **Neutering:** All dogs entering the shelter should be neutered before re-homing, or before being released in the case of neuter. The kennel facility is often the limiting factor of the number of animals that can be managed.

Other possible aims of a shelter may include:

- Neutering/spaying all the dogs or cats in a particular city

- Keeping animals in a 'protected environment' for the rest of their lives. Many shelters have their own 'long-term inhabitants', which may be good for staff morale and for some of the individual animals. However, this 'no kill' policy should be the exception rather than the rule. If the primary function of the shelter is to successfully re-home animals, the shelter's main efforts should be to this end.

This brings us to the question of how shelters can cope with large numbers of animals. A 'no kill' policy is usually not feasible or humane, but selective culling of animals is also hard for staff to accept. This is a very emotional question for many who work in animal rescue and is important that we understand it. So, we will now spend some time on this.

- **'No Kill' Policy**

Some large charities in certain countries can promote a 'no kill' policy, in which no animals entering their shelters are killed. This is only realistic if there is unlimited space, manpower and money so that the animals can have a good life in the shelter even if they are never re-homed.

In most of the world, however, shelters have limited space, money and workers, so a 'no kill' policy is unrealistic and can result in more suffering for the animals. For example, the picture shows dogs in a shelter in the Ukraine where there is severe overcrowding; if that shelter operates a 'no kill' policy, under those conditions, the dogs may live for a long time, but in very poor conditions that do not satisfy the guidelines of the Five Freedoms. Even in a very well-run 'no kill' shelters, dogs can still suffer from some form of kennel stress.

- **The Realities of 'No Kill' and Limited Finance**

Consider an animal shelter that has adequate facilities and money to look after 30 dogs. At this capacity, there are sufficient funds to provide a balanced diet and routine medication (such as vaccinations, de-worming and parasite control). The low stocking density allows adequate cleaning and sanitation. Now consider if the shelter's income is halved, or if the number of dogs is doubled to 60 or trebled to 90 or beyond. In either case, the shelter would have less money to spend on maintaining the facility and looking after the dogs.

In many shelters, there have always been limited funds, which has meant that the facilities were poorly constructed at the start. This makes good cleaning and sanitation difficult. In our example, if funds are reduced, it is likely that prophylactic medication will be the first resource that the shelter cannot provide, and then food. Many groups rely on the donation of waste food from bakeries, etc. which does not provide the animals with an appropriate or balanced diet.

Factors Predisposing Shelters to Outbreaks of Infectious Disease

We shall now consider the implications of infectious disease to the animals in this shelter. Infectious disease can be caused by a range of agents including bacteria, viruses and parasites. Many of these organisms cause fatal diseases (e.g. parvovirus, canine distemper virus), especially in animals who are already in poor condition because of having been street animals.

The infectious organisms can spread via a variety of routes (airborne, orally, bites, etc.). For the sake of this argument we will consider enteric disease caused by a virus. This will cause vomiting and diarrhoea and will be spread when the virus is shed, and then taken in orally by susceptible animals. The severity of the outbreak will be increased by these factors in a shelter:

- Overcrowding: increases the density of susceptible animals and hence the likelihood of the spread of disease.
- Poor hygiene and sanitation: this is a result of overcrowding. Many shelters house large numbers of dogs and cleaning is achieved by hosing the floor with the dogs in place. This sprays faeces over the coats of the dogs, hence increasing the risk of ingestion. Because viruses can survive for long or short periods in cracks in concrete and in crevices in fencing, poorly constructed facilities are impossible to disinfect adequately. The build-up of the infectious agent will increase the risk of an epidemic.
- The number of susceptible animals: this can be reduced in some specific cases by prior vaccination. However, costs may make this impractical.
- Poor nutrition and intercurrent disease: animals are weakened by poor nutrition or other diseases they are suffering from, such as parasitism. Those clinical factors suppress their immune systems, which makes them more susceptible to infection.

The conditions that can result from trying to ‘save’ too many dogs in a shelter will be the very

same conditions that predispose shelters to the outbreak of infectious diseases.

‘No Kill’: Is This Practical in All Countries?

Remember, from the previous chapters, that we have sufficient resources to adequately look after 30 dogs, and we have only been able to re-home 5 percent of these. Because we cannot accept a policy of selective culling, the number of dogs has risen to 300 (i.e. 10 times the optimum level). Due to the causes already mentioned, the incidence of disease is high, and several dogs die of starvation and disease on a daily basis.

This shelter does not provide any of the Five Freedoms:

- The animals are poorly fed.
- They suffer from injuries and stress from bite wounds as a result of the overcrowding.
- They suffer from disease.
- They suffer discomfort as a result of overcrowding and as a result, they cannot exhibit their normal behavior.

<u>How Can the Situation be Improved?</u>

- Improve the financial support and facilities so that 300 dogs can be kept with good welfare

Support systematic neutering and spaying programs and encourage adoption


Credit: Ray Butcher


Credit: Ray Butcher

The animals should be killed by euthanasia (which means 'good death') which is as an act of mercy, to relieve suffering in the individual animal. For example, the photograph shows a dog that has suffered damage to his spine following a road traffic accident. The X-ray below shows that the damage is severe. Because the dog has minimal chance of making a satisfactory recovery, he is euthanized, as an act of mercy.

- **Deciding Whether to Kill, Euthanize or the Keep the Newly Rescued**

If we accept that euthanasia is important for ending suffering, in some circumstances, we now need to explore which individual dogs in our hypothetical shelter of 30 dogs might need to be euthanized. We need to consult a veterinarian and make informed decisions.

Risk Analysis – 'Euthanize' an Animal

Here it shows the top three reasons for euthanizing animals. At our hypothetical shelter, incoming dogs that fall into any of these three categories should be killed:

- Those dangerous to human health (e.g. suffering from rabies, or extremely aggressive to people): it is likely that such a dog would be humanely killed immediately.
- Those dangerous to the health of the other dogs in the shelter: if there are adequate quarantine facilities and appropriate medication available, perhaps these dogs can be cared for. In reality, however, quarantine may not be available and is a big drain on limited resources, so perhaps this category of dog should also be killed.
- Those with severe injuries or disease that cannot be treated: such animals should probably be considered for euthanasia. If not, it is unlikely that they will be re-homed, so they may remain at the shelter for life. This will be an ongoing cost and may use resources that could be better used to re-home a healthy dog.

Risk Analysis– If resources permit, keep an Animal

The reasons for the same are as follows:

- Animals with a severe injury that can be treated at high cost: multiple fractures and injuries can be treated, and it is easy to become emotionally attached to injured animals. If resources are limited, is it better to treat such injuries in one dog or vaccinate the rest of the animals in the

shelter?

- Those with minor injuries or diseases: treatment is still a drain on resources, though most shelters would try to cope with this.
- Those with behavior problems: this is a more difficult problem, as many of the 'problems' are the result of poor socialization in the past. While 'dog psychologists' and behaviorists may give useful advice on adapting and improving behavior traits, such advisors are not readily available to many shelters in poorer areas. If the aim of the shelter is to successfully re-home animals, this is less likely if the animal has a known behavior problem. For example, a study of ~4500 owners who adopted dogs in the UK indicated that owners were much more likely to return the dog if the dog showed aggression to someone and the adoptive owner had not sought help or attended dog-training classes. However, owners who attended training classes were less likely to return their dog to the shelter (Diesel et al. 2008).
- Those who are healthy with no apparent problems: even this category is not without risk because some dogs may be incubating an infectious disease and may develop symptoms later (e.g. parvovirus, rabies). Some diseases may only be diagnosed using laboratory tests that may be impractical in many shelter situations. Similarly, some behavior problems may not be apparent initially.

The point of this example is not to dictate which animals should be killed and which ones saved. That decision should be made by the management team of the shelter.

The Role of Animal Shelters

We now look at the main functions of a shelter:

- Treatment for sick, injured or diseased street animals
- Keeping lost pets to be collected by their owners
- Re-homing
- Neutering of all animals (neuter and release of some street animals).

- **The Role of Shelters: Identification and Rehoming**

If any pets or animals runs away or ends up in a shelter, it is very important that the shelter can return the animal to his/her owner because this avoids unnecessary kennelling. Also, where pets have permanent identification, owners who repeatedly lose their pets can be identified and perhaps penalised.

In the case of dogs and cats in a shelter who are street animals and do not have identification, the shelter will want to identify them prior to re-homing. This will allow monitoring of the success of re-homing programs; the rate of future abandonment, etc. Microchips are the best forms of permanent identification, although not perfect. These microchips are now available at an extremely economical rate.

- **The Role of Shelters: Neutering**

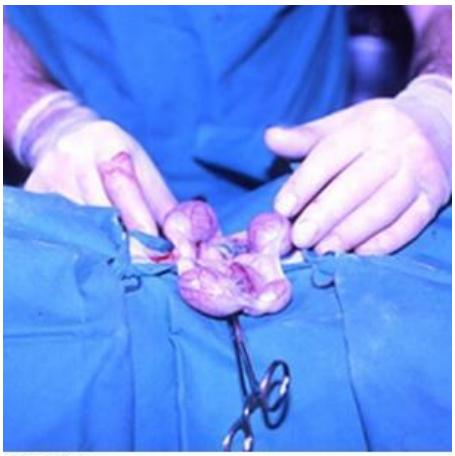
In addition to the identification and re-homing of animals, the other big task of shelters is neutering, to help curb overpopulation. Neutering is generally accepted to be an important part of responsible pet ownership because its advantages far outweigh the disadvantages. In addition, un-neutered animals can be more prone to some health problems, such as pyometra (womb infections) and prostate infection or enlargements in dogs, and uterine cancers in rabbits. However, neutering is not risk-free and it has the potential to cause harm to animals if it is not managed correctly, especially in busy neutering programs at animal shelters.

This shows the main potential problems with neutering. The first point, preventing the animals from showing natural behavior, is an ethical one. Most people take a consequentialist view of it; that is, it is necessary for animals to lose this natural behavior, for their own benefit and for the

greater good of other animals and people. If you are a vet volunteering with a shelter or are employed by one, you will play a big role in helping it to provide appropriate peri-operative care and surgery, in its neutering program.

This summarises the areas of concern for the animals operated upon in a neutering programme. We will see that this concern is not limited to the surgery. Post-operative care is important to ensure successful rehabilitation. This should include some form of monitoring if the animal is released onto the streets. This is easier where there is community involvement and some degree of responsibility of care.


Credit: Ray Butcher


Credit: Ray Butcher

● Minimum Surgical Standards

There is a critical standard below which routine neutering should not be performed, because the procedure will result in unnecessary suffering for the animal. The main standards are asepsis, analgesia as well as anesthesia, and good technique. These are essential for the success of any neutering program.

- Most infections are introduced at the time of surgery, hence the importance of employing adequate aseptic technique. The photo on the left shows the neutering of a bitch without proper asepsis (e.g. no drapes, no gloves). The photo on the right shows an ideal surgery, with drapes, gloves and surgical gown. Clearly, expensive surgical facilities may not be practical in many situations in which neutering programmes are performed. However, with attention to detail and technique, it is often possible to achieve an acceptable level of asepsis.

- Note that anesthesia is not the same as analgesia (pain relief) and many anesthetic drugs do not provide any pain relief so, once the animal regains consciousness after surgery, he/she will be in pain. The availability of analgesic drugs varies in different countries, and expense may sometimes be a factor. However, it is important that the drugs you use provide adequate anesthesia *and* analgesia.

- Looking finally at surgical technique: with some neutering programs there may be pressure to operate on a high number of animals, the dog or cat becomes a statistic rather than an individual. The surgeon is then judged on performance of the most operations in the shortest time, instead of judging based on patients who recover the quickest without complications.

A limited survey carried out in Jaipur in India indicated that minor refinements to surgical technique (which was already of a good standard) improved recovery times such that the dogs were released back on the streets more quickly, allowing an overall increase in the number of dogs operated on (the kennel space was the limiting factor).

• Summary So Far

We have looked at the main roles of animal shelters in trying to control street dogs and cats and we have seen that, generally, selective culling is preferable to 'no kill' for many reasons. Next, we will look at the problem of dogs who are aggressive to people and other animals and how misguided legislation can create a problem for shelters trying to re-home certain breeds of dog.

● Aggressive Dogs

Aggression is a category of behaviour. In dogs, it manifests as growling and biting directed towards people or dogs and/or other animals. The context in which a dog shows aggression, and the dog's body language (e.g. position of ears, body posture) can help you to understand the underlying motivation for the dog's aggressive behaviour. The most common motivations are fear and uncertainty which are typically related to how the dog has been socialised and trained.

However, even though aggression is a normal canine response, there is a problem when dogs bite people. In most recorded cases this occurs within a home or when somebody enters a home that is being guarded by a dog. Dogs of any breed may bite and it is a problem around the world — from free-living dogs in Guatemala (Lunney et al., 2011) to pets in the home in the Netherlands (Cornelissen & Hopster, 2010).

However, some breeds have become known as 'dangerous breeds. These breeds have been bred to be aggressive and have a high pain threshold; they are more likely to be aggressive if they have not been well socialized as puppies: lack of socialization makes them likely to be aggressive because of fear. Media pressure has magnified the perception of the problem in Europe and the USA, and has linked it specifically to breeds associated with organized dog fighting. While dog fighting is indeed a welfare issue and in most countries is illegal anyway, the cases of aggressive dogs who receive media attention are often not related to dog-fighting events.

However, the publicity has created pressure on governments to introduce breed-specific legislation to control the problem. The UK reacted very quickly in 1991 and passed breed-specific legislation which was badly thought out and has created many difficulties. In contrast, Spain passed legislation in 1999 and 2002 that targeted breeds and owners alike (Villalbi et al., 2010). Some of you may be called upon to advise on laws to control aggressive dogs, so we shall now look at the UK law, because it is an example of poor legislation.

● The UK Dangerous Dogs Act (1991)

In 1991, a series of high-profile dog attacks on children led the UK government to rapidly introduce the Dangerous Dogs Act (1991). This passed the legislative stages in only one day. There were some general provisions, but the main ones related to a number of specific breeds, including American pit bull terriers, Fila Brasileiro, Japanese Tosas and Argentinian Dogos. It became extremely difficult to prove if a dog was indeed a pit bull, as covered by the law, or a Staffordshire bull terrier or a cross-breed. The future import of dogs of these breeds was to be banned. All existing dogs were to be destroyed unless the owner agreed to meet strict conditions. These included:

- Neutering
- Identification by microchip and tattoo
- Compulsory insurance against injury to a third party
- Muzzling in a public place.

Credit: iStock.

Failure to conform would result in the courts ordering the dog to be euthanized. The courts had no powers of discretion in these cases. However, it was for the defence to prove that the dog was not a pit bull and this led to many lengthy and costly court cases in which dogs were kept in police kennels for up to three years (a welfare problem in its own right) at massive cost to the taxpayer.

Flawed Definition of Public Place

A dog inside a locked car with the windows closed was judged to be in a public place. Therefore, those identified without a muzzle (since they were being given a drink after a walk) were automatically destroyed; the court had no powers of discretion. (An amendment has since been passed to give the courts such powers, but the main law remains.) This law is used to show the potential problems of introducing a poorly drafted law. Despite this, similar laws have been considered in other countries.

- **Aggressive Dogs – The Problem of Breed- Specific**

This summarizes the problems of breed-specific legislation, especially because there are aggressive and non-aggressive dogs in all breeds. For example, when people are bitten within the home, most bites are from breeds such as terriers, which are not listed specifically as a dangerous breed in legislation. A recent study in the Netherlands again confirmed this (Cornelissen & Hopster, 2010).

Credit: Ray Butcher

Another problem with breed-specific legislation is that it is difficult to identify breeds. You may be asked to judge if a dog is, or is not, from one of the breeds termed 'dangerous' in legislation. This is a very difficult task because, often, it is impossible to tell if a dog is a purebred or not. It is also difficult to distinguish breeds such as Staffordshire bull terrier and pit bull terrier, depending on size, etc. Therefore, in such cases, a vet must state that he or she cannot state with certainty the breed of a certain dog.

American pit bull terriers are one of the breeds that has been named as very aggressive. However, the photo shows a friendly pit bull terrier that had lived with a UK family for 10 years since the 1991 Act. A recent study by the Canadian British Columbia Society for the Prevention of Cruelty to Animals (SPCA) followed up on 40 pit bull terriers and 42 dogs of a similar size that the shelter had re-homed. The researchers interviewed the owners and concluded that "their study provided no evidence of greater aggression or poorer care among adopted pit bulls compared to dogs of other breeds" (MacNeil-Allcock et al., 2011).

A further problem with breed-specific legislation is that, unless there are also strong laws making the owner responsible for his/her dog, the penalties are aimed at the dog rather than at the owner of the dog. However, aggression is often the result of fear caused by poor socialisation, lack of training or inappropriate training — all of which are problems caused indirectly by an owner's mismanagement of his/her dog.

- **Aggressive Dogs – The Real Issue**

While legislation is clearly important, the most important solution is for pet owners and the general public to be more familiar with aspects of dog behavior, and exercise responsible ownership. As mentioned before, most dog bites happen in the home. The incidents occur not because of 'dangerous breeds' but because we take dogs into our homes without any knowledge of dog behavior and without teaching them what we want from them, by humane training. Clearly, some dogs may be aggressive and inherently dangerous. Such cases should be assessed on an individual basis, and truly dangerous dogs should be euthanized if they cannot be controlled by other means.

Credit: Ray Butcher

Credit: Ray Butcher

Behavior studies indicate that a very important time to encourage socialization of dogs is between 3 and 13 weeks of age, so that they are not afraid of day to day activities in and around the home and neighborhood when they are older. If puppies are not socialized properly, they can be very aggressive in some situations when they are adults; this is because they are afraid. As someone working with animals, it is essential that you advise individuals to seek guidance from behaviour experts about the importance of exposing puppies to a whole range of new experiences between 3 and 13 weeks. For a review of this, see Lindsay, S. R. (2000) *Handbook of applied dog behavior and training, vol. 1: Adaptation and learning* (Ames: Blackwell).

- **Aggressive Dogs – Research and Legislation**

Data from a recent study in the Netherlands showed the importance of educating dog owners, since they are the people most likely to be bitten — by their own dogs (Cornelissen & Hopster, 2010). A study from Spain showed a marked drop in hospitalisations caused by dog-bite injuries after changes in the law on dog ownership which included breed-specific regulations but also strong criteria for the owners, who had to prove they would be responsible owners (Villalbi et al., 2010). As this shows they had to prove psychological aptitude for dog-owning, as well as that they had no criminal record. We have looked at what animal shelters do, and at the wider problem of aggressive dogs.

We will finish this lecture on the welfare of companion animals by looking briefly at these four areas:

- The pet trade
- Breed standards
- Sophisticated veterinary treatments
- The consumption of dog meat.

- **The Pet Trade: The Pet Shops and Markets**

There are very wide variations in standards of pet shops and traders worldwide. However, there is now regulation for shops, traders, and the entire supply chain. Whenever there is

pressure to reduce costs anywhere along the supply chain, it is likely that the welfare of the animals being sold will be compromised. Consequently, legislation and licensing are critical.

- **Pet Shops – Regulation and Legislation**

It is important that pet traders work with legislators and animal welfare groups to ensure that regulations protect the animals, and that those traders wishing to have high standards are not financially compromised in comparison to those traders who care more for money than for the animals they sell. This requires adequate policing and enforcement. Many countries, including India, have domestic regulations for pet shops, including the need for an annual inspection. you may be asked by your local authority to provide a report on a pet shop.

● Possible Welfare Problems in the Supply Chain

If you inspect a pet shop, you will have no direct knowledge of the conditions throughout the whole chain of supply. This gives examples of the problems that may occur commonly in the pet-supply chain. When inspecting animals in a shop, you may find that their state makes you suspicious about the conditions of the supply chain, e.g. you may find that many of the puppies of a certain breed have entropion (an in-turned eyelid) or heart murmurs, and you may suspect that the supplier may in-breed the dogs.

Most countries do not regulate the entire chain of supply, and not all countries regulate pet shops. Full regulation is needed throughout the chain, to ensure the animals' welfare. In addition, public education should stimulate consumer pressure to insist that their pets are traded from licensed, legislation-compliant sources. If these animals could be sold for more money, this would be a financial incentive for traders to do things correctly.

● Breeding and Showing Dogs – Welfare Implications

In many countries, the breeding and showing of dogs and cats is very popular. However, because individuals are mainly selected for appearance instead of their function or health, many breeds now contain individuals who are predisposed to health problems (McGreevy & Nicholas, 1999). Recent studies in the UK indicate that the 50 most popular breeds registered with the UK Kennel

Club all had hereditary disorders (Asher et al., 2009; Summers et al., 2010).

In addition to the physical disorders that breeders may select for unknowingly, when they selectively breed for cosmetic features, breeders may also have selected for temperaments that are not suitable in a companion animal. For example, they may select for animals that have a low threshold for fear. Fearfulness can make an animal's experience of life very negative and make them likely to have a difficult relationship with their owner, who may then abandon them.

In addition, the breeding standard may include mutilations such as tail-docking. Historically, this procedure may have been carried out in some breeds to avoid injury to the tail during work. However, it has become a largely aesthetic, human preference. However, this is a prohibited & punishable practice in India.

People may transport their animals over long distances and keep them in restricted conditions for a long time at shows. However,regulations pertaining to transport of animals, display/exhibition of animals must be complied with to ensure minimum welfare. You must be responsible in reporting any lapses in dog shows, breeding etc to appropriate authorities..

- **Breeding Standards – Hereditary Effects**

We now look more closely at the problem of hereditary defects. Over the years, breeders have selected dogs and cats with specific traits and this has gradually resulted in the great variety of breeds and types that we see today. To maintain type, strict breed standards have been agreed and these are the yardstick against which show specimens are judged. However, breeding for specific characteristics may reduce the potential gene pool significantly such that hereditary defects may become apparent in some breeds.

In some cases, potential genetic problems (e.g. hip dysplasia) may be recognised by screening programmes so that one can better select future breeding stock. Research into the canine genome will facilitate control programmes in the future. It is important to address these issues in cooperation with breeders and kennel clubs. There are several websites that give detailed information about hereditary disorders in a range of pets. One is the Universities Federation for Animal Welfare (UFAW) site, and it is www.ufaw.org.uk/geneticwelfareproblems.php.

Credit: iStock.

- **Best Standards – Mutilations**

The ‘breed standards’ of some breeds in some countries dictate that certain parts of the body be removed to conform to the agreed standard (e.g. cropping of ears and docking of tails). The attitude to this is variable throughout the world - it is generally accepted in the USA but frowned upon within Europe. Some breed societies still favor the action, but most international welfare, veterinary and government bodies are supportive of the ban as outlined in the European Convention of Pet Animals.

It has been suggested that failure to dock tails in some working breeds would increase the incidence of tail injuries and this has proved not to be the case in countries where docking has been banned. Tail-docking is illegal in Scotland and parts of Australia, without exception. It is also illegal in countries such as Cyprus, Finland, Germany, Greece, Luxembourg, Norway, Sweden, Switzerland, India, England and Wales, but some of these countries have exceptions for working dogs. At this time, there appears to be no convincing scientific evidence to support the docking of tails or the cropping of ears.

- **‘Unnecessary’ Mutilations**

Surgical alterations that are carried out for cosmetic reasons, such as tail-docking, ear-cropping, debarking, declawing and defanging are unnecessary mutilations. They should be banned because they are unnecessary and because they can result in other welfare problems for the animal. For example, tail-docking is usually performed on puppies in the first two to four days of life, without analgesia or anaesthesia. Research using an electroencephalogram (EEG) indicates that puppies are incapable of suffering pain in the first days of life because their brains are not neurologically mature enough to allow it (Mellor et al., 2009). However, research on rat pups and human infants suggests that other parts of the pain pathway are activated by the tissue damage that tail-docking causes, and that this predisposes the pups to oversensitivity to pain in the area later in life, or may lead to a lack of sensitivity to pain there. There is no feasible way of providing analgesia to puppies at the age when their tails are docked (Hewson, 2008). Public education leaflets about declawing and tail-docking created by the Sir James Dunn

Animal Welfare Centre at Atlantic Veterinary College, Canada, are available at www.upei.ca/awc.

- **Welfare Problems with Advanced Veterinary**

In Western society, as pet owners become aware of improved standards of health care and treatment for themselves, they demand similar treatment for their pets. This is a good thing in some ways because it helps to advance the standard of care we give to our pets. However, increasing the *length* of an animal’s life can be at the cost of the *quality* of the animal’s life. There is a risk that vets may perform sophisticated and costly procedures out of their own clinical and technical interest, without first assessing whether the animal will experience a better life as a result. An additional problem for the vet is that there is still a lack of data in veterinary medicine on the prognosis for many diseases, given breed and age and a particular treatment. This makes it difficult for vets to advise their clients.

One example is cancer therapy. Treating a pet with cancer can be difficult and yet very rewarding. In many cases, however, death is an inevitable sequel in a relatively short time - successful treatment may extend a pet’s life by only three months, for example. Again, lack of

data often makes it difficult to know the best course of action to take.

Clinical points to remember are that many cancer therapies are a mixture of drugs, many of which have to be given at the clinic and involve hospitalization and side-effects. This means an animal may have to spend a relatively large part of the three months of remission that your treatment has given him separated from his owner and taking drugs to counteract the side-effects. As research and personal experience provide more data, vets will be in a better position to help owners decide whether or not a new or sophisticated treatment is in the animal's best interests.

For the last part of this lecture, we shall move away from the problems that dogs may experience as pets, and consider the welfare problems that may arise with dog meat consumption.

● The Consumption of Dog Meat

The consumption of dog meat is most concentrated in Asia where dog meat is thought to have health benefits. There are poor welfare conditions in the markets, with overcrowding of dogs in cages, and inhumane methods of slaughter. It is pertinent to note that consumption of dog meat is not permitted by law in India.

The Consumption of Dog Meat: The Dangers

Aside from the ethical problem the consumption of dog meat poses for many people, the industry is widely unregulated, which raises many human and animal welfare issues. There are serious welfare issues at all stages of the industry, including ones linked to overcrowding in large-scale farming, long-distance transportation and slaughter methods. The large-scale trade and movement of dogs of unknown disease and vaccination status also permits the rapid and wide-ranging dispersal of rabies and other diseases, such as trichinellosis (Liu & Boireau, 2002), and so represents a threat to both animal and human health.

- **Conclusion**

This chapter has touched on many aspects of companion animal welfare. Whether as a shelter manager, vet or animal handler, you may see or be directly involved in many of them — from managing shelter operations, providing direct care, to helping shelters adopt a policy that protects animal welfare, to advising legislators about why dogs are aggressive and how best to protect the public with new laws. You may also be advising about the pet trade, and you have seen the need for implementation of the legislation across the entire supply chain.

You will see many of the problems caused by in-breeding, and unnecessary mutilations, especially tail-docking. We have seen briefly that docking puppies' tails is not necessary, and that there is scientific evidence that docking the tail may predispose the dog to difficulties with pain regulation later in life. We have also touched on the importance of considering an animal's overall welfare, not just his/her health, in the case of cancer treatment, and other advanced treatments. Finally, we have seen that dog meat is consumed in some Asian countries and that, it is prohibited in India.

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Chapter 12

Religion and Animal Welfare

Introduction

This Chapter provides an overview of what some of the world's religions teach about animals and how some scholars within each religion interpret these teachings. It also looks at how science can shed light on the interaction between religious beliefs and animal welfare. Specifically, we will look at social science data concerning the influence of religious beliefs on voting about animal welfare. We will also look at data from veterinary studies about whether religious slaughter (without stunning) causes more suffering in animals than secular slaughter (with stunning) does.

Before we begin, we should clarify the context that in this lecture, as in other lectures and as in popular culture, we will speak of humans and animals. However, we recognize that humans belong to the animal kingdom biologically: we and our patients share many of the same biochemical, physiological and behavioral characteristics needed for physical survival. Since it is our cognitive capacity that enable us to have religious beliefs, or not to have them, they also enable us to think about religion and animal welfare in a professional manner.

Religion is a sensitive topic, and it is not possible to conduct a comprehensive exploration of the teachings and interpretations of each religious tradition during this lecture. Our aim today is to review some of the pertinent teachings, so that you understand how religion may contribute to the attitudes and actions towards animals that you will encounter in your professional work.

What Is Religion

First, we need to clarify what we mean by 'religion'. There are many different definitions of religion. The one given here is very general and is adapted from one proposed by the Ontario Consultants on Religious Tolerance where religion is described as "a specific system of belief about a supreme being or deity". Religion usually includes rituals, a holy book, a code of ethics, and a set of beliefs about a deity or several deities, humanity and the rest of the universe, including what happens after death.

There are 19 major world religions, with some 270 branches in total and many smaller sub-groups. Today, we will consider the treatment of animals in five of the most common religions (Hinduism, Buddhism, Christianity, Islam and Judaism) which have informed both popular and scholarly thought about animal welfare. Please note that restricting ourselves to five is not intended to deny or diminish the scope of any other religion, especially any that has influenced the five that we are considering today.

Rituals – Cultural and Religious Sacrifice

The sacrifice of sheep, goats, buffalo, oxen and birds has been traditional in many religions. Animal sacrifice is still carried out in some communities today, although there has been a change towards offerings of flowers, fruit and inanimate objects instead, in many places. The goal of the sacrifice is to seek blessings, to mark festivals, to appease gods, to mark visits by important

guests, and to make particular requests.

Examples of religions that use some form of animal sacrifice are listed below.

- Santeria, or La Regla Lucumi, originated in West Africa, and is practised in many countries but most commonly in Cuba, Haiti, Brazil, Trinidad, Puerto Rico and the USA. Sacrifices or offerings (*ebó*) of chickens, goats, doves and pigeons are used to mark significant events – the initiation of priests, births, deaths and marriages. Sacrifices are also carried out for health, cleansing and purification. The animals are killed by decapitation, or by severing the blood vessels in the neck. This method of killing is poorly controlled in comparison with the requirements for killing of farmed livestock.

- During the Eid-el-Kabir festival, Muslims kill sheep and goats by public neck-cutting. In countries where this is unlawful, local legislators have experienced difficulty in enforcement, facing claims that this enforcement interferes with religious rights.
- The picture shows a pig fattened for the 'Pigs of God' festival in Taiwan, at the end of which 'spirit pigs' are slaughtered. This is not religious sacrifice as such and contravenes national legislation against force-feeding and the public killing of animals.

We shall now look at where the five religions we listed earlier (Hinduism, Buddhism, Christianity, Islam and Judaism) are concerned with animals.

Hinduism and Animals

Hinduism is one of the largest world religions. It has a supreme deity who manifests as other gods and goddesses. This type of religion is known as *henotheistic*. Hinduism originated in India, and the majority of Hindus live there. Hinduism is also prevalent in Nepal, Sri Lanka and Bangladesh. A form of Hinduism is also practised in Bali, Indonesia. There are many variations within the Hindu belief; for example, some Hindus believe that the Supreme Being is Shiva, whereas others believe it is Vishnu. However, all Hindus believe in both gods.

Animals feature highly in Hindu belief and some of the gods appear in animal forms. For example:

- Vishnu is believed to manifest in many forms, known as *avatars*. Some of these are animals, including the snake, which is why there are many shrines to snakes in India. At the same time, snakes are hunted for their skin and as food.
- Another god is Ganesh, who takes the form of an elephant. In India, elephants are used for draught work and in ceremonies, but there also reserves for them.
- Hanuman is a monkey god and monkeys are sacred animals in India.
- The cow is associated with Aditi, who is the mother of all the gods, and in some Hindu texts the cow is known as Devi, which means goddess. The cow is also a sacred animal for Hindus.

Hindus believe that humans are not more significant than other animals. This contrasts with Judaism, Islam and Christianity, which are human-centred religions. The Hindu holy texts include:

- Verses or *vedas*, where the cow is referred to as Devi
- Epic poems such as the Bhagavad Gita, which includes advice to protect the cow and holds her sacred.

Hindus believe in reincarnation. This means that humans may have been animals in past lives and may be reborn as animals in future lives. Therefore, for Hindus, animals are human souls in different bodily form. Not killing animals is important for personal purity and to prevent punishment in one's next incarnation.

Hinduism used to involve animal sacrifices. However, Jainism and Buddhism, which share the concept of respect for all life, influenced Hinduism to adopt the concept of *ahimsa*, which means not harming any living creature. Related to ahimsa is the concept of *aghnya*, which means not killing other beings. Because of these concepts, most Hindus are vegetarian – exemplified by Mahatma Gandhi, who promoted *ahimsa* as a philosophy of life. Some Hindus eat dairy products, and some avoid red meat and killing animals themselves, but will eat chicken and fish killed by

others. As noted earlier, monkeys (rhesus monkeys in particular) and cows are sacred to Hindus. We shall now look at some of the practical implications of this for animals.

Sacred Animals and Hinduism

Traditionally, monkeys were sacred in the Hindu temples because they were believed to be the embodiment of divine beings. There are thought to be at least half a million rhesus macaques in India, of whom about 60 per cent live among people. For example, in Delhi there are thought to be about 7,000 of these monkeys. They move freely through and around public buildings, and can bring about several problems, including traffic accidents, the transmission of diseases, the pollution of buildings with excreta and food, and frightening, threatening and injuring humans. This causes a nuisance and can be a source of tension between Hindus and people of other faiths who do not revere monkeys.

Credit: iStock.

A similar example is found in Bali. We mentioned that Hinduism is practised there, and monkeys are also sacred.

- In certain villages, hundreds of long-tailed macaques gather to be fed.
- As with the rhesus macaques in Delhi, these monkeys in Bali damage buildings and vehicles, and they steal and beg for food. At temples they are fed and are a tourist attraction. Wild monkeys from the forests join these groups.
- These animals are very adaptable, and it could be said that they are simply adapting to a new resource provided by humans. However, local feeding of macaques may lead to unsustainable populations whose long-term welfare is threatened by complete dependence on human food.

Cows Are Sacred to Hindus

Many cows are free to wander where they please, and they are regarded with affection and respect. Cows' milk, curd, butter, urine and dung are used in rites of purification and penance. However:

- Historically, there has not been enough food for cattle in India, and in 2003 it was estimated that up to 120 million cattle may be chronically under-nourished or even starving. With developments in agriculture, that number is probably lower today. However, in rural areas which suffer arid conditions or droughts, lack of food remains a problem. Farmers in those areas may then be displaced to cities, leaving their cows behind.

- The combination of reverence for cows and lack of ownership means that many cows eat rubbish, which causes digestive problems and may even cause death. The cows are at high risk of injury from motor vehicles because they walk into the road.

- Slaughtering cows is illegal in many states, so when they are injured, they cannot be euthanised. They would then need to be transported long distances for slaughter in another state, prolonging their suffering.

This means reverence for cows as sacred animals can be associated with unintentional physical suffering for many of them.

Buddhism and Animals

Here we move on to Buddhism, which developed in India after Hinduism and spread to many countries in Asia. It is the primary religion in Thailand, Tibet and Burma. Academics argue whether Buddhism is a religion or a philosophy, as Buddhists do not worship a deity or have a core sacred text, but work towards transcending the ego, as guided by the writings of great masters. There are several denominations of Buddhism. The main ones are the Theravada and Mahayana branches. The Mahayana branch in turn has other branches such as Zen Buddhism and Tibetan Buddhism.

Like Hindus, and in contrast to Jews, Christians and Muslims, Buddhists believe that humans are not more significant than other animals. The central tenet of Buddhism is compassion for all of life: people are holy if they have pity on all living creatures. Ahimsa follows from this, and meat-eating is forbidden. Like Hindus, Buddhists believe in reincarnation.

Judaism, Islam and Christianity

Christianity, Judaism and Islam are systems of belief in the same god: Judaism existed first; Christianity developed from Judaism; and Islam developed from Christianity. None of them believes in reincarnation. Emphasis is often placed on the differences between these religions rather than what they have in common, such as their common origin. Each of the three religions has a holy book and each has several branches.

The Jews' holy book has three sections and is popularly known by the name of the first section which is the Torah. Judaism includes numerous branches. There are many branches, including Orthodox and Conservative. The Christians' holy book is the Bible, and branches of Christianity include Catholic, Orthodox and multiple Protestant traditions. The Muslims' holy book is the Qur'an, and the main branches are Sunni, Shia and Ismaeli.

Judaism and Animals

Judaism is as much a code of practice for living as a religion and frequently brings animals into the moral arena. The Torah teaches that:

- Working animals, like people, should be allowed rest on the Sabbath
- Cruelty to animals is forbidden, as is hunting animals for sport
- Jews are forbidden to hunt, but meat-eating is left to the individual conscience.

Jewish religious scholars disagree on whether eating meat is permissible. Some argue that because humans are created in God's image, we have a responsibility to be kind to animals and that this requires us not to kill them. Others argue that because humans are created in God's image, human life has more value than animal life. Therefore, any evidence that human activity harms animals must be weighed up against whether the alternatives would still meet human needs. In this view, slaughtering using the methods required under religious law is humane when it is performed correctly, and eating animals is acceptable.

Judaism and Animal Slaughter

The Torah's instruction not to harm animals unnecessarily gave rise to strict rules about how to slaughter animals. The name for this method of slaughter is *shechita*. It involves a single sharp cut across the trachea and oesophagus by a highly trained religious slaughter man known as a *shochet* who has been formally licensed. The *chalaf* (knife) must be sharpened regularly. The shochet also inspects the animal to ensure the killing was carried out correctly, e.g. the tissues were not torn and the animal was allowed to bleed to death.

Stunning before the cut is not permitted. The shechita method of slaughter produces *kosher* meat, which means meat that is permitted.

Christianity and Animals

Whereas Jews are awaiting the arrival of the Messiah, Christians believe that the Messiah was Jesus Christ. The Bible shares many texts with the Torah and so has several teachings about the humane treatment of animals. The Bible also includes other texts that describe the life and

teachings of Jesus and some of his followers from that period. Jesus is not recorded to have given specific teachings about animals. Many of his followers were fisherman and he ate fish. They did not specify a ritual for slaughtering animals.

The subsequent theological view has been that because humans are made in God's image, human life has more value than animal life. Also, the influential Christian scholar Thomas Aquinas argued that, because humans are rational but animals are not, this entitles people to use animals. Note that neither he, nor other scholars, ever called for cruel treatment of animals. Rather, specific guidance on the treatment of animals was generally lacking in core Christian teaching through the centuries, although some notable Christian teachers called for compassion for animals.

In recent decades, the treatment of animals and the natural world has received more attention by scholars of the Christian denominations. For example, one view which overlaps with that of some Jewish scholars is that God's ultimate will is for peace, but the world is not yet perfect. As part of that imperfection, killing animals has been permissible but is harder to justify today, in light of our increased knowledge of animals' capabilities. There are many different Christian denominations. In some of them, abstaining from red meat or from all animal products is required on certain days of the year. Some communities of monks have a vegetarian diet. In all cases, these dietary restrictions are primarily for spiritual purification.

Islam and Animals

As with Judaism and Christianity, Islam teaches that human life has more value than animal life. Muslims believe that we are superior to animals because we can make moral judgements. This means that we can use animals, but that we also have a duty to care for animals, and the Qur'an provides very clear guidance on animal treatment. So, like Judaism but unlike Christianity, Islam has core teachings on the humane treatment of animals. The Qur'an informs Islamic law (known as sharia law) and Islamic tradition (*hadith*). Those indicate that certain things are permitted to humans – they are *hala*' – whereas other things are harmful to humans and therefore not permitted (*haram*). For example:

- The Qur'an requires that followers of Islam should not eat 'carrion, blood, pigs, animals not killed in the name of Allah, animals that die from a violent blow, from a fall, from goring or by being savaged by a wild animal'; all those foods are haram
- The Qur'an requires humans to be 'kind, compassionate, merciful and charitable to all living beings.
- Some other examples of Islamic teaching about animals are:
- Not killing animals for sport
- Providing pack animals with sufficient rest and food
- Not keeping certain species such as dogs, but not mistreating them either
- Slaughtering animals humanely, according to strict guidelines.

Islam and Animal Slaughter

Muslim slaughter can be carried out by most adult Muslims (some rulings list the requirement as 'any sane' adult Muslim). As with shechita, stunning is not stipulated. These are the prerequisites for slaughter amongst Muslims:

- Must be a sane adult Muslim
- Must say the name of God before making the cut
- Must kill by cutting throat with single, continuous back-and-forth motion of sharp knife that will not tear the wound
- Must sever at least three of: trachea, oesophagus, each carotid artery and jugular vein
- Must not sharpen the knife in the animal's presence.

For Animals:

- Must be well treated before being killed
- Must not see other animals being killed
- Must not be in an uncomfortable position
- Must be allowed to bleed out.

Meat from animals killed in this way is permitted (or halal) for Muslims.

Halal and Shechita Slaughter

Before we consider what science tells us about halal and shechita slaughter, there are some important points to make:

- Both those methods and secular slaughter all cause death by exsanguination: in all three types of slaughter, animals die from loss of blood.
- The main difference between them is that, with secular slaughter, animals are stunned first and the intention is that they should not be conscious at any time during exsanguination.
- Shechita does not permit stunning. In halal slaughter, some Muslim authorities permit stunning at or just after the cut. Others do not, and captive-bolt stunning is generally viewed as contravening the requirement not to eat animals killed by 'violent blows.'
- The recommended methods of slaughter required in Judaism and Islam represented best practice at the time when they were developed.

Note that shechita requirements date back 2,500 years, and halal requirements were laid down about 1,500 years ago. In both cases, having a legal requirement for a skilled slaughterer, using a sharp knife, and a requirement for humane treatment of the animals prior to slaughter all help to maximize the chances of animals undergoing a rapid death with minimal distress. It set a very clear standard for animal care at a time when many other parts of the world had no explicit standards.

A related point of information concerning the prohibition on consuming pork for both Jews and Muslims is that pigs can transmit a zoonotic helminth parasite (*trichinella spiralis*) that causes muscle damage and pain in people. Pigs can also transmit tapeworm (*taenia suis*) to people.

Both parasites complete their life cycle when pigs live in close contact with people and eat human faeces or poorly cooked human food waste. Under those conditions, it is important to avoid pigs and not to eat pork.

Summary So Far

You now have a very general overview of the approaches to animals in five main religions. You can see that they all require respect for animals: some have explicit teaching about animal care; others have traditionally been less specific. Also, some allow more use of animals than others, including allowing or prohibiting killing or eating of animals. Next, we shall look at how research can help us to understand how religious belief may affect animals' experience of their lives. We shall look at data in two areas:

- Voting for public policy to protect animals
- Religious slaughter methods.

Religion and Voting on Public Policy

There has been very little research reported on how religious beliefs affect public policies for animal welfare. However, one analysis of voting data in the state of Florida, the USA, used parallel census data to examine if religious denomination was related to how people voted on a proposal to ban gestation stalls for cows. Census data indicated that the main religious groups were Judaism and three Christian groups – Catholics, evangelical Protestants and non- evangelical Protestants.

The data suggested that religious affiliation played a small part overall in how people voted on the issue: religion only accounted for 8 per cent of the variability of the data, and other factors, such as political preferences and socioeconomic status, had a stronger influence. Within the 8 per cent of religious influence, Catholics were more likely to support the ban than were the other groups, especially evangelical Christians. However, it was not clear how much that finding was compounded by factors such as political views (conservatism vs. liberalism) and socioeconomic factors such as the value of housing.

Religious Slaughter

We now move on to discuss religious slaughter. We have seen that the strict requirements of religious slaughter were best practice when they were introduced. However, modern advances in understanding of animal suffering and welfare raise additional questions about best practice in slaughter and which methods can

best minimize pain, fear and distress. With all methods of slaughter, at any slaughter plant, our concern is over what proportion of animals may suffer and how to prevent this. In the case of religious slaughter, particular concerns include:

- If an animal is conscious when his/her throats are cut s/he may experience pain, fear, anxiety and distress due to the method of restraint, and due to the cut, itself.
- If it takes an animal a long time to lose consciousness s/he may feel further distress due to hypotension caused by blood loss
- Cutting the throat may cause aspiration of blood into the upper and lower respiratory tracts, and alveolar hemorrhage during agonal breathing. If animals have not lost consciousness while these changes occur, this presence of blood may cause pain and distress.

Research is ongoing to investigate these concerns scientifically. As you will see, some of the issues are complex biologically and the answers are not yet clear.

Conclusions

To sum up, we have seen that many religions promote positive attitudes to animals. However, some religious practices can be negative for particular species or individual animals. While it may not be mentioned in religious scriptures one form animal slaughter that can be practiced is that of stunning. Since the religious scriptures do specifically state the animal must be caused minimal pain and killed as quickly and as humane a method possible, the process of stunning is what makes most sense. Stunning is a process where the animal is rendered unconscious so that it cannot feel the pain or discomfort. Stunning itself is not a method of slaughter but the process of slaughter must soon follow the process of stunning. Scientific research into particular topics can help to clarify the animal's experience in areas of concern. You are now in a position to explain the science and to use objective measurements, such as auditing, to help ensure humane treatment.

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Chapter 13

Human Conflict and Animal Welfare

Introduction

This chapter will introduce you to the ways in which collective human conflict affects animals. By human conflict, we mean fighting or war in a very broad sense, not domestic violence or aggression between private individuals. We will start by clarifying terminology because there are different kinds of human conflict. We will then focus on how animals may be affected by conflict. That is:

- The ways in which animals are affected when conflict occurs in the region where they live
- The ways in which animals are used actively in a conflict or the planning for conflict.

We will conclude with examples of how we can help to improve animal welfare in areas where there is conflict.

Definitions

Starting with terminology: The Department of Peace and Conflict Research at Uppsala University in Sweden provides the online *UCDP Conflict Encyclopedia*. The following definitions are taken from there. Conflict has several characteristics:

- There is disagreement between at least two parties
- The demands of each side cannot be met by the same resources at the same time. Typically, the resource is territory which contains a commodity needed for economic survival and growth, e.g. grazing for livestock; oil; minerals; water
- The parties use armed force to solve their disagreement
- This causes at least 25 battle-related human deaths in one year.

When all those conditions apply, there is a conflict. When the number of deaths in a year exceeds 1,000, the conflict is called a war.

General Effects of Human Conflict

The main effects of conflict in any region are destruction, injury, disability and death, displacement and insecurity.

- Destruction means damage and breakdown of the social and economic infrastructure, and damage to the environment. The breakdown in social order permits corruption, and this makes it even harder for people to acquire the basic necessities of life.
- Injury, disability and death are the consequences of conflict that we automatically think of,

and they can involve animals and humans.

- Displacement is another well-known consequence of conflict: people leave the area with their animals, either going to other countries as refugees, or moving elsewhere within their own country where they are known as internally displaced persons (IDPs). In both cases, people often live in camps.
- The fourth effect of human conflict is insecurity. This concerns the lack of predictability and availability of the normal features of peaceful life. Aspects of insecurity are physical and psychological and include the risk of injury and death.

Summary So Far

We have looked at different types of conflict, and how they affect people in general. Now we will look more closely at the effects of conflict on animals' welfare.

- First, we will see that domestic and wild animals alike may be caught up in the conflict
- around them and may suffer as casualties.
- Second, we will look at the ways in which animals may be enrolled to work in the conflict and may come to harm because of it.

Animals Living in Areas Where Conflict is Occurring

We begin with animals living in areas where conflict is occurring.

Human Conflict and Animals

We have seen that most of the conflicts in the world occur in countries with the lowest incomes. Before we look at the effect of conflict on animals, we need to clarify this context of poverty. In 2011, the Food and Agriculture Organization of the United Nations reported that approximately 766 million rural livestock-keepers live on less than US $2 per day. In many parts of Africa and South Asia, as well as parts of Central and South America, people living in towns and cities keep chickens, small ruminants and rabbits. Those people may also be poor.

Conflict in rural and urban areas alike can therefore affect large numbers of animals. In these rural and urban communities, livestock and working animals have direct and indirect value:

- The animals provide food for their owners, as well as manure for use as fuel for cooking
- The animals also provide income through the sale of their products, and their use as draught power in agriculture
- They also have cultural value, e.g. as dowries.

The consequences of conflict are a vicious circle. First, there is reduced availability and access to food for people and animals. The resulting malnutrition reduces people's capacity to earn a living and provide the necessary extra care for their malnourished animals. The animals are unable to work well and may die from parasitism and other diseases. The problem of human and animal malnutrition is made worse in regions which are prone to natural hazards such as drought, heavy

rains, etc. When landowners cannot carry out the normal management of their land due to conflict, hazards such as drought have an even greater impact on the ability to grow crops, and feed animals and people.

A related problem is that conflict reduces people's ability to make money, meaning animals may die because their owners can no longer afford to buy food or veterinary services for them. This lack of money may cause farmers to overwork their animals. For example:

- In the study, it was more cost-effective for dairy farmers to maximise milk production by injecting the animals with oxytocin and bovine somatotropin, and milking them until they were cachexic (skeletally thin due to muscle loss). This lack of regard for the animals' welfare is thought to have come about because of corruption and bad decision-making by the state, whereby it was cheaper for farmers to 'use up' their cows, instead of moderating their milk production and re-breeding them. Instead, the farmers replaced their emaciated stock with cows who had been bought cheaply from destitute farmers elsewhere.

- A further problem created for animals by conflict is that the breakdown of normal security and infrastructure means that owners can no longer go out to harvest or buy food for them because of the lack of transport and the risk of violence.
- In many countries where there is conflict, veterinary services are provided by the state, and conflict results in the loss of normal veterinary infrastructure and services, so that sick animals cannot be treated.
- Also, disease control programs stop, meaning diseases such as foot and mouth disease, which have severe effects on animals' wellbeing and productivity, may become epidemic. This creates animal suffering and also slows down the country's recovery when the conflict ends.

Example – Kuwait (1990-1991)

During conflicts, large numbers of livestock may die. For example, during the Iraqi occupation of Kuwait between August 1990 and March 1991:

- The dairy population of 15,000 cows was reduced to 2,500
- The normal population of 800,000 sheep was reduced to 10,000
- Of 8,000 camels, only 2,000 survived the conflict
- Of 3,000 horses, fewer than 500 survived.

Note that, in peacetime, many of the animals would have been killed in routine, planned slaughter for meat consumption or through culling. However, with conflict, the concern is that animals may not be slaughtered humanely, and that they are killed in the course of more general violence and animosity.

The Iraq–Kuwait conflict also affected many wild animals.

- During that conflict, a lot of crude oil was released into the Persian Gulf. This, together with toxic smoke from burning oil wells, is estimated to have killed ~30,000 marine and migrating birds, and threatened sea turtles and marine mammals.
- Also, many terrestrial animals are thought to have been killed because military vehicles ran over the animals and their burrows.

Donkeys in Darfur

A different example of how conflict can adversely affect animals' welfare comes from the Darfur region of Sudan. There has been state and non-state conflict there for many years. At one time, this created approximately 2 million internally displaced people in that region: that is, 2 million people had to leave their homes and live in camps.

However, in 2004, it is estimated that 75 per cent of donkeys in the camps died from the lack of food and water, and associated stress, probably including disease and parasitism. This meant that their owners could not easily collect firewood and water. Often, that is the job of women and children who were now at a higher risk of rape and attack. This example illustrates how conflict can affect animal welfare and how this may then have a serious long-term effect on people.

Transport and Pack Animals

During times of conflict, working animals become more important. This is because the insecurity and loss of infrastructure limit the supply of fuel. Therefore, people use animals for transport and draught power. The problems commonly include malnutrition, pain caused by lameness – especially from foot lesions – and sores caused by ill-fitting harnesses. Lack of shade and the opportunity to drink may also be welfare problems.

Urban Livestock

We noted earlier that in many countries affected by conflict there are urban livestock. For example, the Republic of Congo (note: not the Democratic Republic of Congo, which is a different country) had a series of civil wars in the 1990s. During that time, the population of the capital city, Brazzaville, had to flee and leave all their animals behind. The army killed all those animals.

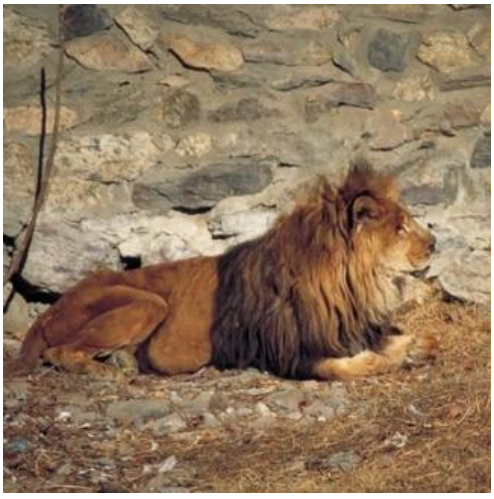
When the people were rebuilding their lives in peacetime, many could not afford to buy more stock. For those who could, it was expensive to keep the animals because feed mills in the country had been destroyed, so they had to import more expensive feed from neighboring countries.

Special Populations: Zoos

Another effect of conflict on animals concerns captive animals. Whereas intensively farmed animals may be released to fend for themselves, most zoo species cannot be released because they are not adapted to the local environment, and because they may be a hazard to human beings. For example:

- When Kuwait International Zoo was inspected after the Iraqi war in 1991, only 28 animals were found, out of an original 440.
- In Kabul Zoo in Afghanistan, by 2002, approximately 40 animals were left out of several hundred. The picture shows the only surviving lion. Most of the other animals were either injured or killed as an indirect result of human battles, and the resulting lack of infrastructure (e.g. running water).

Often aid is given as emergency food supplies, which is essential. However, less attention is usually paid to addressing long-term problems, such as the collapse of the agricultural system, soil erosion, the destruction of infrastructure such as veterinary hospitals, etc. Long-term veterinary plans are often not taken into account either.



All of these issues have just as severe an effect on people's lives, and greater attention needs to be paid to the effects of war on animals in their own right as well as to the impact of animal suffering and death on people in war situations.

Wild animals: Bushmeat

Meat from wild animals is known as bushmeat, and the killing of wild animals for meat happens during conflict for several reasons such as:

- First, other sources of meat and other food supplies have run out.
- Second, the greater availability of weapons and ammunition makes it easier to kill wild animals. The increase in arms may also increase unregulated killing of domesticated animals, and in all cases slaughter may be inhumane.
- An additional concern is that people may kill endangered species because the social and legislative infrastructures that protect these animals during peace-time may collapse. This is a particular concern with endangered primates.

This problem can continue when the conflict ends, because the country and its citizens still do not have adequate resources. For example, the United Nations Environment Programme (UNEP) is reported to have found this problem in Liberia:

- Liberia had two civil wars in recent years. The country remains very poor, e.g. at the beginning of 2012, the capital was reported not to have running water or mains electricity.
- Liberia's trade in bushmeat began during the years of war, and many farmers now rely on hunting as their main livelihood strategy. This is putting endangered species at risk. For example, giant pangolins are reported to sell for about US $1,000 each, and red colobus monkey for about US $200. In addition, Liberia has six Atlantic species of sea turtles, and all are being poached.

Endangered species are also valuable on the international black market. This can be exploited in times of conflict, because of the ready availability of munitions.

Wild Animals: Landmines and Small Arms

Angola had a civil war for approximately 25 years. During this time, landmines killed and injured thousands of animals, including antelopes and elephant. The sale of the elephants' ivory helped to finance some factions in the war. In some cases, it is thought that poachers used landmines to kill or wound elephants in order to obtain ivory. A further problem is that conflict may create a trade in small arms in countries that are not themselves at war, and this can in turn have a negative impact on animals there.

For example, in the 1980s and 1990s, people in the Central African Republic stopped hunting elephants with spears and began to use small arms, which had become readily available due to conflict in neighbouring Chad and Sudan. By the late 1990s, the elephant population in the Central African Republic had fallen by about 90 per cent from the levels known during the 1970s, and the rhinoceros' population had completely disappeared. Most of those deaths are thought to have been due to slaughter using small arms.

Note that in some cases, conflict can lead to 'positive' outcomes for wildlife. That is, if an area becomes a 'no-man's land' where none of the warring parties dares to go, the area can become a haven for wildlife without human encroachment. However, any unexploded munitions there would be a hazard for the animals.

Wild Animals: Naval Exercises

Note that wild animals may also be affected by the preparations for human conflict. There is particular concern about this in the case of marine mammals.

Since the 1950s, there have been several reports of different species of whales becoming stranded in areas where naval military exercises have been taking place. Many of the animals have died and have shown similar pathologies upon post-mortem examination.

- The pathologies have included lesions similar to those seen in people who come up from a deep dive too quickly (decompression sickness). There have also been pathologies found in those animals' acoustic systems.
- Possible mechanisms for the strandings include a behavioural response to sound emitted by naval vessels.
- It may be that the animals find the sound aversive because of its volume and frequency, and this causes them to surface too quickly.

Perhaps because of the secrecy surrounding naval activity, the possible effect on cetaceans is controversial. For example, a paper published in 2010 showed evidence that review papers which were sponsored by conservation groups and the US Navy, respectively, were more likely to report primary research that supported the view of the sponsor concerned. This means the scope of the problem is still not entirely clear. However, Spain has banned naval exercises around the Canary Islands because of concerns for marine mammals there.

Animals Used in Conflicts

You can see that conflict can affect domestic animals and wildlife in several ways. We shall now move on to look at how conflict can affect animals who are used as part of the conflict activities. Animals may be enrolled to work in the conflict or its aftermath. Some of those works are:

- Transport of munitions and military personnel. Animals were widely used for this in earlier centuries, before mechanization. It is probably relatively uncommon today, but still occurs to some extent when fuel supplies fail
- Use of dogs for tracking, guarding, detecting explosives
- Use of dogs and rats in de-mining land after the conflict
- Use of marine mammals to detect mines or swimmers intruding into restricted areas.
- Use of animals in research on injuries and weapons.

We mentioned the use of animals for transport of munitions and personnel earlier, and we shall move straight on to military working dogs.

Military Working Dogs

In state conflict, the state's forces (army and military police) may use dogs to track the enemy, to guard the bases, and to search for explosives or enemy combatants. Military working dogs are generally very well cared for because their work is very important, and because they represent a considerable investment of money and time; for example, some armies may have breeding programs that supply the dogs and training the dogs may take months.

However, the following welfare concerns may arise:

- Training – some training may be punishment-based which may be stressful, and cause fear and anxiety
- Housing conditions – housing may not provide for basic animal needs when in a combat situation. For example, there may be extremes of heat or cold. More generally – during training, and when not deployed in combat areas, military dogs are typically kept in kennels. Research on military dogs in the UK indicates that many of those dogs are very stressed by kenneling.
- Disease and injury – dogs may contract life-threatening infectious diseases in the country or region where they have been stationed, e.g. leishmaniasis or Q fever. Dogs may also be injured in combat or in training, e.g. may suffer ruptured eardrums, wounds from bullets and explosions
- Fear and anxiety – human conflict creates a noisy, unpredictable and uncontrollable

environment. Depending on their temperament and experience, the dogs may find their work very stressful and may suffer from anxiety or other behavioral disorders. Little research has been reported on this however, one example comes from a US study of 268 military working dogs who were discharged from the army between 2000 and 2004. The survey suggested that German Shepherd dogs may be more likely than other breeds studied to develop behaviors that were undesirable in their work. For example, they seemed more likely to develop either too much aggression, or not enough aggression. Those behaviors may reflect negative emotional states such as ongoing fear or anxiety. However, the study was retrospective and the types of behavioral problems involved were unclear

- Rehoming- another potential welfare concern for military working dogs is if there is or not a tailored system for re-homing the dogs after their working lives, as they may not adapt well to life as domestic pets.

Detecting Unexploded Landmines and Munitions

The international body that reports on landmines (the Landmine and Cluster Munition Monitor) stated recently that the unexploded remnants of war are present in more than 70 countries. Countries that well known to be affected include Afghanistan, Cambodia, Angola, Iran, Iraq and Colombia. However, note that the problem exists in countries on every continent. In 2010, there were:

- 8 affected countries in Central and South America
- 11 affected countries in Europe
- 15 affected countries in the Asia Pacific region
- 22 countries in sub-Saharan Africa
- 14 countries in the Middle East and North Africa, and
- 10 countries in the area of the former Soviet Union.

There is general agreement that we do not know the full extent of the injuries caused by landmines. It was thought that 25,000 people and up to 600,000 animals are killed or injured by landmines each year. However, more recent figures suggest that the figure for human casualties may be much lower, although still very high: in 2010, there were 4,191 new casualties (deaths or injuries). Dogs and rats are used in de-mining programs around the world to detect unexploded landmines, so that trained engineers can then make them safe.

- There are between 500 and 900 de-mining dogs working around the world. They cost approximately US $10,000 to train to that level, and they work six or seven hours per day.
- African giant pouched rats are also used to detect mines. These rats cannot cover such a large area as dogs. However, their noses are naturally very close to the ground, which is where the odour of explosives is present in the highest concentration.

There is a relatively low risk of injury to dogs or rats who are used to clear mines, because their

body weight and training make them unlikely to detonate the mines. Also, the animals are expensive to train, and do very valuable work therefore they are generally very well cared for, and given time to acclimatize to areas where they are brought to work, which may be very hot or humid. However, in some areas without mine-clearing programmes, people may deliberately herd their cattle and goats onto mined areas as a way of detecting the mines, which causes death and injury to the animals and is obviously a welfare concern.

Mine Detection: Dolphins and Sea Lions

Mines are also used in marine warfare. The US Navy Marine Mammal Program trains bottlenose dolphins and Californian sea lions to detect and mark underwater mines and swimmers entering restricted waters. The risk of injury to these animals appears to be low, and they are kept in accordance with national standards of care for all marine mammals. Thus, their use for military purposes does not appear to raise additional concerns yet.

Use of animals in Military Research

Countries may use animals in some or all the forms of military research. For example:

- Goats and pigs are used to train physicians and paramedics in how to treat serious and traumatic injuries, including severe blood loss
- Pigs are typically used in safety studies of new weapons to assess safety features and their effect on the target's body.

Some of the research may be secret for the purposes of national defence and security; therefore, not all the research procedures used are clear. As with all research, the animal welfare aspects should be approved by an ethics committee or arbiter, to ensure animals do not suffer because of the research. The use of animals for research related to conflict is controversial, because questions about the ethics of using animals in research are compounded by questions about the ethics of human conflict.

Rescue, Feed and Support

We have now seen that animals may be affected by conflict in many different ways. We will conclude this lecture with examples of how we can help to improve animal welfare in areas where there is conflict.

- A number of international organizations have programs to rescue, feed, support and return animals displaced or threatened by war.
- The welfare impact of this work can be great if there is local political and social will. Some international animal welfare organizations form alliances with humanitarian or government agencies to coordinate relief efforts.
- These efforts could raise an ethical query – can the distribution of food to animals be justified in the short term when people are in need of food themselves? However, often the people most affected by war are very poor and reliant on their livestock and working animals. So, helping their animals benefits both animals and people.
- Afghanistan is an important example of this.

Examples of How Animals May be Helped During Conflict

Afghanistan

In Afghanistan, 80 per cent of the population work in agriculture and rely on horses, donkeys and camels for their livelihoods. During five years of Taliban rule, the infrastructures that offered care for animals were decimated. Many animals died from infections and illnesses that could easily have been treated. In addition, the bombing of Kabul Zoo left many exotic animals wounded or dead. This caused immense animal suffering and placed additional strain on the already over-stretched veterinary clinics.

In Jalalabad, Afghanistan's second-largest city, there was also a lack of fresh water. The small volume available went to the people as priority, leaving little for the equine population, who suffered from dehydration, exhaustion and lameness. With little knowledge of equine care and with few vets available, owners did not know how to care for their animals and were forced to watch as their health deteriorated.

However, between 2003 and 2007 World Animal Protection worked with other animal charities to provide:

- Mobile veterinary clinics
- Harnesses
- Training for farriers and community animal health workers.

As a result, more than 35,000 equines were de-wormed and almost 25,000 camels were treated. An estimated half a million people benefited from the project.

Zoo Animals in Kabul

World Animal Protection's work in Afghanistan also included relocating the few remaining animals from Kabul Zoo into enriched enclosures. Note that you need to do a cost–benefit analysis before starting a rescue of small numbers of animals with special needs because it can be expensive, and the money might be better spent on helping a larger number of animals and people elsewhere.

Donkeys in Darfur

We looked earlier at an example of how human conflict creates many internally displaced people who may have to live in camps. The example concerned donkeys in camps in Darfur. To prevent more donkeys from dying there, a simple program was set up in one of the camps. The program included:

- Feeding and de-worming the animals
- Buying hay when it was cheap
- Treating the place where the hay was stored to prevent contamination by termites
- Involving the community to simplify the distribution of food and worming treatment.

This intervention helped to reduce the adverse impact of the long-term conflict on the animals and the people.

International Conventions

A longer-term solution to help protects animals during human conflict might be some sort of international convention. The Geneva conventions aim to protect people from the worst excesses of human conflict. Animals do not have equivalent protection, and social expectations for animal care can also break down during war. Likewise, the Geneva conventions for people are often ignored.

Moreover, most of the conflicts of the 21st century is internal to countries and may not even involve government forces. Such combatants may be even less likely to abide by any conventions on animals. Thus, unfortunately, it seems very unlikely that international or national conventions and laws could offer much protection to animals as sentient beings at this time.

However, in the future, some international conventions may have the potential to influence animal treatment during war: for example, the 1976 Convention on the Prohibition of Military or Other Hostile Use of Environmental Modification Techniques states that "Care shall be taken in warfare to protect the natural environment against widespread, long-term and severe damage", and it "prohibits the use of methods or means of warfare which are intended or may be expected to cause such damage to the natural environment".

Potentially, animals could be included within the scope of this Convention. However, in the face of human suffering in conflicts, and given a general lack of animal protection in the national legislation of many countries, it does seem unlikely that much animal protection can be achieved under current international law.

Memorial Monument

In London, there is a monument that pays tribute to the millions of animals who served, suffered and died in the human conflicts of the 20th century. On the wall are carvings of dogs, elephants and other animals, and inscriptions such as "They had no choice". On the other side of the wall, there are sculptures of a horse and dog, free from war.Other countries have also erected memorials to animals used in war – there is a memorial to war dogs in the USA.

We end this lecture by remembering that human conflict continues to affect many animals, directly and indirectly. The adverse effects of human conflict on animals are therefore a source of sadness and a strong additional argument against allowing our collective human disagreements to turn into conflict.

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Chapter 14

Economics and Animal Welfare

Introduction

We shall see how improving animal welfare can increase farmers' incomes . We shall also examine how farmers' own preferences and priorities, and the preferences and priorities of retailers, consumers and governments, can affect animal welfare.

Economics: Study of Our Preferences and Priorities

- As farmers
- As consumers (food, fur, pets, endangered species)
- As government (acting on our behalf)
- Our preferences and priorities include
- Animals' welfare
- Our welfare
- These are reflected by the farmer's 'willingness to pay'

Economics is the study of our preferences and priorities. No individual or country has unlimited resources, including money. Therefore, we have to decide on our financial priorities, and what we prefer to spend our money on. We have to balance or 'trade off' some preferences against others. This reality of finite resources and how we choose to spend them affects how we treat animals:

- As farmers
- As consumers, in the broadest sense (i.e. consumers of food and other animal products; pet owners; and guardians of endangered animal species)
- As governments acting on behalf of consumers.

In recent decades, helping to safeguard the welfare of animals who provide us with food, clothing, safe drugs, companionship, draught power, etc. has become an important preference for many people in many countries. This has come about largely because of scientific evidence that animals can suffer. However, despite this preference, as consumers we may not want to spend much or any of our own income on safeguarding animal welfare: we may have other equally legitimate priorities including our own welfare, especially when our income is limited.

This lecture focuses on how this affects farm animals, because they represent the largest group of animals under human care. Our willingness to pay for their welfare ultimately affects how much money a farmer receives for his/her animals and their products. This impacts on how well the farmer can care for his/her animals.

Cheap Food Policy

Increasing global demand for food ➔ increased and more intensive livestock farming (Robinson et al., 2011)

Benefits: affordable food, improved human health, employment in food processing.

The global demand for food of animal origin is increasing, especially in developing countries as they become more affluent, and as their populations continue to grow. In 2011, a report commissioned by the Food and Agriculture Organization (FAO) of the United Nations (UN) (Robinson et al., 2011) indicated that, "For developing countries, livestock production systems will need to intensify if future demand for meat is to be met. In parts of Asia this may continue to involve the industrialization of pig and poultry production systems, while in sub-Saharan Africa the critical role of smallholders in meat and milk production is likely to continue through sustainable intensification, where this can occur."

Intensive farming is a response to the policy of minimizing the production and retail costs of food. This 'cheap food' policy enables everyone to afford to eat meat, dairy products and eggs, which have high nutritional value. Therefore, a cheap food policy can promote human health. However, it is increasingly recognized that this policy has many hidden financial and non- financial costs which are not reflected in the price we pay when we purchase food.

Hidden financial and non-financial costs not reflected in purchase price of food (Hewson, 2007), e.g.

If we expect to pay very little for food, retailers may only pay farmers minimum prices. This results in minimal profit margins for farmers, who may then use husbandry systems with low inherent welfare potential and high stocking density with disease risks in order to balance production output against the input costs of food, labour, etc.

- Animal suffering: Firstly, this industrial approach to the care of animals can reduce our empathy for them and their quality of life, especially when their market value is low and they are kept in the tens of thousands, as in the case of laying hens.
- Farmer suffering (depression, suicide): The second hidden cost of cheap food is that being forced to operate under such tight market conditions can contribute to depression and suicide among farmers.
- Human obesity (diabetes, etc.): Third, there is growing evidence from rich and poor countries alike that cheap animal-based foods contribute to a complex culture of over-consumption which in turn causes obesity and early death from diseases such as diabetes mellitus.
- Environmental damage:A fourth hidden cost of intensive livestock production is environmental damage, which has longer-term adverse effects on wildlife, ecosystems and human quality of life. Those effects result from factors such as:
    - Needing to clear large areas of land in order to grow cereals, soya and other crops for animal feed.

- Potential increase in global warming caused by excessive methane production when ruminants are fed on grains.
- Water pollution when large volumes of animal waste produced in intensive farms leak into rivers.

How Improving Welfare Can Increase Farm Income

Three ways that improving welfare can increase farm income (World Bank, 2006)

- Increase efficiency and profitability of the farm
- Meet local consumers' demand for welfare-friendly products ➔ more sales on domestic markets
- Meet international consumers' demand ➔ more export sales

There are economic benefits to farmers who have high standards of animal welfare. This is being recognized around the world. For example, the International Finance Corporation of the World Bank Group, which supplies loans to businesses in developing countries, has publications specifically on this topic. A report published by the International Finance Corporation of the World Bank Group in 2006 suggests three ways in which improving livestock welfare can improve a farmer's income. They are:

1. When animals function well, feel well, and have opportunities to perform behaviors that are important to them (i.e. when their welfare is good), this increases the efficiency and profitability of a farm.
2. Better animal welfare enables the farmer to satisfy the demand of local consumers for welfare-friendly products. So, the farmer can maximize sales to the domestic market.
3. Better animal welfare enables the farmer to meet that same demand among international consumers. Therefore, good livestock welfare enables the farmer to maximize export sales.

We shall now look at each of these three ideals.

Better Welfare Increases Farms' Profitability

First, when animal welfare is good, a farmer can minimize some input costs and maximize sale value and production. These are direct financial benefits and they increase profitability on a farm.

For example:

- When animals function well they get fewer diseases, so the farmer has less need for the vet to visit and prescribe drugs. This saves input costs.
- When animals feel well their productivity increases, e.g. handling animals gently is associated with higher growth rates, increased milk letdown, etc. This increase output.
- Farmers can also maximize the sale value of animals by helping them to feel well up to the point of sale or slaughter (e.g. by not hitting animals during loading or unloading, this prevents bruising to the carcass, and the abattoir will not need to discard the meat, and so can pay the farmer the full price).

Indirect financial benefits include:

- The farmer having more personal income to pay for domestic needs such as schooling, mortgage repayments, etc. The farmer will also have more income to pay for the upkeep and development of the farm.

Non-financial benefits of high animal welfare include:

- The farmer's peace of mind, knowing that he or she is financially secure while giving his/her animals a good life. Also, some high-welfare systems are thought to have a lower impact on the environment because of reduced antibiotic use, less water pollution, and less impact on local biodiversity
- The farmer having more time to spend on other tasks around the farm and more time with family, because he or she does not need to spend so much time dealing with the consequences of animals being sick, or growing slowly.

Today, we will only look at the direct financial benefits of animal welfare. Note that when animal welfare is good, it can also bring indirect financial benefits and some non-financial benefits.

For example, the direct costs of clinical lameness to dairy farmer (Bruijnis et al., 2010; Cha et al., 2010) was estimated at US $75□$300 per case because of:

- Reduced milk production
- Increased calving interval
- Extra labour on the part of the farmer
- Veterinary visits
- Foot trimmer
- Treatment
- Discarded milk
- Replacement value if have to cull

Another way to view the value of animal welfare for the farm is to see the direct costs of poor

welfare. The exact costs vary with each farm in each country. The data here were estimated from mathematical models of the cost of lameness in dairy cows in the US and the Netherlands. Those models used existing data to estimate the financial consequences of foot disorders in those countries at that time – the papers were published in 2010. (The model in the

Netherlands used values in Euros (€). The values in the article were converted into US dollars ($) using an exchange rate of €1 to US $1.41).

- You can see that each case of lameness may cost the farmer up to $300, depending on whether the problem is clinical (i.e. needing veterinary treatment) or sub-clinical (i.e. pathology is present and affecting productivity, but the animal is not obviously lame yet).
- If the average ongoing prevalence of lameness in a herd is 20 per cent, a 100-cow herd may lose up to $6,000 each year. Conversely, if a farmer invested time and some money in areas such as learning to trim the cows' feet, and providing cows with very deep bedding for several days before and after calving, this might reduce the prevalence to 10 per cent, saving the farmer up to $3,000 each year.

Direct cost if animals are stressed at slaughter (Grandin, 2010):

- Reduced meat quality ➔ abattoir loses contract with retailer
- Penalties, e.g. $20 for each fatigued pig in USA

Our second example of the direct cost to the farmer when animal welfare is low concerns slaughter. In consequence, abattoirs may lose contracts to supply meat to the retailer concerned. Abattoirs may therefore penalize farmers (and transporters) for problems arising from poor welfare.

For example, in the USA, farmers may be charged $20 for every fatigued pig who arrives at the abattoir. The Direct costs of overworking draught oxen (Lawrence & Pearson, 2002)

- One day of normal work uses same energy as 1 kg of weight gain or 4□5 litres of milk
- Overwork and lack of supplementary feed ➔
- Reduced fertility
- Reduced milk output for calves
- Reduced growth of animals for sale as meat when ~12 years old

A third example is the case of draught oxen or water buffalo in Asia. Those animals are often used for working the farmer's own land and may be rented out to other farmers. However, an important part of their financial value to the owner lies in selling the cows and calves or selling mature animals for meat.

When animals work, this diverts energy from their growth or weight gain, or their milk

production. Therefore, the farmer needs to feed them more to minimize these losses, which is a cost. Moreover, if the animals do not get rest periods, and are rented out when they are not working for their owner, they use up more energy. It is difficult to put a figure on the losses caused by overwork, as little research has been carried out on this. However, generally:

- If a farmer overworks his/her animals, or causes them pain because of poorly fitting harnesses, or does not treat and prevent health problems such as parasitism and lameness, this reduces the reproductive performance of the cows, and the milk output for their calves
- If a farmer does not supply extra feed to maximize an animal's capacity to work and to grow, he or she will not get the maximum possible price at market when selling the animals.

Direct costs of malnutrition in free-range merino sheep (Kingwell, 2002)

- Body condition score 1 ➔ reduced profits
- Very thin so reduced price for meat
- Poor quality wool ➔ price is reduced by 25 per cent
- Reduced lambing
- Reduced wool yield
- Higher death rates

Our fourth example of how improving livestock welfare can also increase a farm's profitability concerns mixed farms where sheep are kept outside and rotated with crops such as wheat and chickpeas. Under some systems the sheep may be allowed to become very thin, because farmers overstock the sheep and only feed them pasture and crop residues. Farmers may operate this way because:

- They can generate cash by selling their grain rather than feeding it to the sheep
- They can keep large numbers of sheep on less pasture
- Thin sheep have finer wool, which sells for more money than coarser wool.

However, research indicates that the profitability of those factors is negated by losses caused by poor animal welfare. That is:

- Because the sheep are thin, they have little value at sale for meat
- Very thin sheep actually produce poorer-quality wool, which can reduce the price paid by 25 per cent
- Thin sheep have lower lambing rates, reduced wool yield, and higher death rates. (From a welfare point of view, they would also suffer hunger, cold, disease and malnutrition,

which are non-financial costs.)

Why Do Farmers Not Maximise Welfare?

This chapter illustrates why farmers do not maximize their animals' welfare. Low welfare reduces farm profits and income. However, even when the economic benefits of better welfare to farmers is explained, some may take no action to correct their animal welfare problems. Some of the reasons for this are listed here:

- First, in developing countries, animal diseases can severely affect welfare and farm profitability. Farmers may be unable to do much about this because they may have very limited income and limited access to government services that would help them to control the diseases. This problem is made worse in countries which are prone to natural disasters, or where there is recurrent human conflict, as both factors disrupt the infrastructure and resources needed to control diseases such as foot and mouth disease.

- More generally, it may be hard to quantify the cost of a particular welfare problem such as a stereotypy or even pathologies such as lameness in cows caused by solar ulcers. For example, the cost of lameness in a given cow depends on other factors such as whether she is already pregnant (in which case fertility is not affected and there is no cost there), and how far into her lactation she is. On account of those difficulties in estimating the particular costs of poor welfare, a farmer may not see much benefit in addressing the problem.

- Related to this is the fact that farmers may not recognise how much the welfare issue is affecting their animals or their finances, even though national average figures may be available. This seemed to be the case among some dairy farmers in the UK, who did not recognise the impact of lameness on milk production and their finances and saw lameness as much less important than mastitis.

- Even when farmers do see a longer-term financial benefit to improving welfare, they may not want to make the necessary short-term investments, e.g. paying the vet for advice on biosecurity, or training staff to handle animals more gently.

An indirect financial cost that farmers may not wish to undertake, despite the financial benefits, is time: farmers may be too busy to take time to monitor their animals for lameness, for example, even though doing so would improve the cows' welfare and increase their productivity.

- The farmer's psychology and sense of optimism and self-belief may also affect his/her willingness to take advantage of the economic benefit of improving his/her animals' welfare. Farmers may feel too weighed down by external factors such as low market prices for milk or meat, and the state of their country's economy.

- How you communicate with the farmer may also play a role. For example, one Danish study found that vets thought farmers were most concerned about the economic benefits of having a dairy health plan, whereas farmers were more concerned about how that plan would fit in with their other goals for the farm and their everyday life. Consequently, although the vets' advice would help farmers to help their animals and to maximise their income, some farmers would not follow it. Therefore, talking to the farmer to establish his/her motivation will help you tailor your advice.

- A final financial cost that may prevent farmers from improving their animals' welfare is the capital investment required if they change their husbandry system to one that is better for animal welfare. However, research indicates that in the longer term these costs may not be significant compared to the total production cost, such as feeding animals. So, if farmers had assistance with the initial capital cost, they would soon benefit financially from increased production and, often, lower running costs than before. We shall now look at example figures.

Examples of Links between Better Welfare and Profitability

This chapter shows examples from various developed countries. In countries where the cost of labor and materials might be relatively lower, the extra cost to farmers might be proportionately lower than the examples listed here:

- In the UK, changing from a traditional cage system for laying hens to free-range production outdoors was estimated in 2010 to increase the production cost per egg by 2.08 pence (~3 US¢ per egg). This may not seem a large figure; however, it represents an approximately 33 per cent increase in production cost, which is substantial given the low profit margins of egg production.

  Note that more generally that with free-range systems for laying hens, there is typically increased mortality than in the cage system, and higher labor costs. Also, the market price paid to farmers and the cost of feed from month to month can vary. We can see that farmers who decide to switch systems, in any country, may run the risk of sometimes getting a reduced market price while having increased input costs.

- The next example concerns sows in the USA: there, changing from gestation stalls to group housing is estimated to add US 10¢ to every kilogram of finished pig meat. Keeping sows outdoors in the USA instead of in stalls would result in an estimated increase in production cost of ~US 17 kg pork.

- In Italy, supplying growing pigs with 0.35 kg of straw per pig, once a week, would increase labor costs and involve the cost of the straw. However, the total increase was estimated at only approximately 0.1 US¢ per kilogram of finished meat.

These estimates suggest that the cost to a farmer of changing to husbandry systems with better welfare potential is not always high, and may potentially be recouped through the price charged to the consumer, since many people indicate that they would prefer animals to be farmed in a way that maximizes their welfare. This brings us to the second main area in which providing better welfare can increase a farmer's income; that is, the possibility of higher prices and/or more sales, because consumers feel confident that the animals' welfare was good.

Assurances to consumers: Better Welfare

The first way that consumers can be assured about animal welfare is if there are relevant laws and codes of practice for farmers. The problem here is that if the state does not support farmers in meeting these requirements, farmers may only make a minimal effort to meet them, especially if there is no inspection or enforcement. Alternatively, farmers may go out of business if the state

forces them to make significant or costly changes. A solution to this might be to use public funding to help farmers meet higher standards. For example, the Republic of Ireland launched a state-funded welfare scheme for suckle cows. They include:

- Improving genetic traits related to welfare, e.g. bulls chosen to allow subsequent easy calving
- A minimum calving age to reduce problems with dystocia in heifers
- The weaning procedure: weaning can be very distressing for calves in the beef suckler system. The problem is largely resolved if they are weaned, e.g. by means of a humane nose clip that prevents suckling before they are finally separated from their mothers
- Training farmers in animal welfare.

The scheme has resulted in improved productivity and meat quality, with a marked reduction in the occurrence of disease and the need for treatments.

Assurances to Consumers: Supermarkets and Chain Restaurants

Another way to provide reassurance to consumers that animal welfare was good is if retailers themselves operate assurance schemes. In more and more country's consumers buy most of their food from large supermarkets. Those corporations have considerable power in the grocery market, controlling between 30–90 per cent of it in some countries. In addition, many people eat at chain restaurants such as McDonald's. Many of these operate an audit program to ensure welfare standards are met by farmers and slaughterhouses.

Large retailers increasingly recognize the importance of corporate ethical responsibility. Many offer assurances to customers that their food is derived from farms which protect animal welfare. However, this does not necessarily result in increased income for the farmers who meet those standards.

- Farm assurance schemes can simply be a marketing tool that retailers use in order to get customers to enter the store, where they may buy other goods. Therefore, retailers may not charge customers more for welfare-friendly products, and they may not pay the farmer a premium for providing them. However, because these companies own such a large market share, supplying them may be the only way a farmer can make a living. In this way,
- farmers may be burdened with the substantial initial capital costs of complying with welfare requirements.
- Many farmers in low-income countries may not be able to meet the farm assurance standards of retailers such as a local McDonald's, for example because of lack of resources or knowledge of what is required, or a lack of assessors to monitor them.

You can understand from all the above why farmers may not want to invest in changing their husbandry system, even though animal welfare may be a priority for them.

Examples of farm assurance schemes

- UK: Freedom Foods

- USA: Certified Humane
- Brazil: Ecocert Brazil
- Namibia: Farm Assured Namibian Meat

Here are some examples of successful farm assurance schemes.

- The first is the Freedom Foods scheme in the UK, which was developed by the RSPCA and was one of the first such schemes.
- The second example is the Certified Humane scheme in the US, which was developed from the RSPCA scheme in the UK.
- The third example is "Ecocert Brazil". This applies the same standards as the Certified Humane programme in the United States. In Brazil, the scheme currently has over 20 million certified animals, along with distributors and restaurants. That label is coordinated by Dr. Consuelo Fernandez Pereira at the State University of Campinas (UNICAMP).
- The fourth example is Farm Assured Namibian Meat which enables beef export to EU markets, as well as farm assured supplies for the domestic market.

Better Welfare: Not Always a Selling Point

A further point about assurances is that not all consumers are concerned about animal welfare when they are shopping for food. Clearly, if animal welfare is not a public concern, it is difficult for retailers to promote it or to pay farmers a premium for having high welfare standards. Also, consumers in many countries expect their food to be cheap, and they may be unaware of the welfare implications of this.

This is true both in developed countries and in countries that are transitioning to 'developed' status. We saw in the FAO report earlier that intensive production is widely seen as the best way to meet the growing demand for meat and livestock products in low-income countries. If the public there are unaware or unconcerned about welfare, there may only be a small market for farmers who may wish to use more humane systems to meet the growing demand for meat, eggs, etc.

Also, international trade law means that countries cannot refuse to import products on the basis of how they are produced. That law is governed by the World Trade Organization (WTO) in Geneva. It means that local farmers who choose to follow high standards of welfare may have to compete in the domestic market with imports from farmers overseas who operate lower welfare standards. This problem most affects local farmers whose animal products are used in processed food, e.g. dried egg and dried milk which are used to produce biscuits, cakes, ice cream, etc. However, it also applies to any country that may import meat, egg and milk products to meet growing local demand.

You can see from all the above that there are many reasons why farmers with high welfare standards may not necessarily benefit from more sales in the domestic market, and why farmers may therefore be reluctant to adopt the higher standards.

A further problem with domestic sales is that even though some consumers may value animal welfare, they may not be willing to pay for it in the retail price. They want cheap food, but they feel that animal welfare is a public good that the state should use taxes to pay for. This view has been found in surveys carried out in several EU countries and in Chile.

To address the problems of lack of awareness and reluctance to pay, some research indicates that if advertising campaigns were launched to educate consumers about animal welfare issues, and if food was labelled accordingly in shops, more people would buy welfare-friendly products, even at a premium price.

However, research in the EU indicated that labelling can create information overload so that consumers simply ignore it. Also, some consumers mistrust labels about animal welfare that are created by farmers, supermarkets or the government.

Yet another obstacle to farmers investing money in more humane systems is that, although people may state in surveys that they value animal welfare and are willing to pay a premium for it (e.g. up to 20 per cent more), when they go shopping they may not, in fact, decide to spend their money on those more expensive foods. This gap between our reported values and our actual behaviour is well described, so we will not discuss it here.

Potential Solutions

One way to overcome all these difficulties, so that better welfare standards on farms are rewarded in the domestic market, is through taxation. For example, when farmers are calculating their net profits for tax purposes, the state could give farmers a more generous capital allowance for investments related to animal welfare, e.g. the capital costs of changing from gestation stalls to group housing for sows.

Another option would be not to charge government services tax (value-added tax, or VAT) on sales of welfare-friendly foodstuffs. Therefore, retailers would pay farmers a premium for higher-welfare products, and they would pass on this cost to consumers in the retail price. However, because no extra tax is being paid on those products, the total cost paid by the consumer would be unchanged.

It is harder to solve the problem of international trade law, where local farmers have to compete with cheap, low-welfare imports. Currently any possible approach, from negative labelling (e.g. ‘this product is from a country that has lower animal welfare standards than we do here’) to banning imports of animal products from countries with lower animal welfare standards, would infringe international trade rules.

However, it might be possible for a country to negotiate with the WTO for permission to charge a tariff on a product from a specified producer, if it was not high welfare, rather than charging a tariff on all products from a given country that has low standards. Note that until this legal problem has been resolved, governments may be reluctant to legislate for high welfare standards in their own countries as that would put their farmers at a disadvantage because of the cheaper, low-welfare, imports. Before we end this lecture, we shall look briefly at how better welfare can lead to high export rates. We shall now leave domestic markets and look at how high standards of animal welfare can increase farm income by giving access to export markets.

Those export markets arise because there is high public awareness of animal welfare in some

countries, and retailers meet this demand by operating assurance schemes. Producers from other countries may export to those markets if they meet the welfare standards required. Therefore, the export market can be a good source of income for those farmers. Two examples are:

- In Namibia, Farm Assured Namibian Beef is supplied to retailers in the EU and follows strict animal welfare guidelines
- In Brazil, beef farmers sell to the European supermarket company Carrefour and follow their welfare standards.

However, that market is limited to retailers, again because international trade law prohibits countries as a whole from favoring or banning imports from other countries based on the production methods used. For example, some countries with high welfare standards import dried egg for use in processed food. However, they cannot refuse to consider dried egg from countries with low welfare standards. So, within one of those exporting countries, an exporter would probably not pay a premium to a farmer who incurred the capital cost of producing eggs in percheries, compared to a farmer whose eggs came from hens housed in a conventional cage system. In contrast, retailers can choose not to import products from poor welfare systems and can ask farmers overseas to provide animal products with high welfare standards.

Summary

This chapter sums up what we have covered so far. In this lecture, we have looked at the relationship between economics and animal welfare. In particular, we have examined how improving animal welfare can increase farm income, and how this 'win–win' connection is complicated by the priorities and preferences of consumers and farmers, all of whom have a finite amount of money to spend.

- We first looked at how better animal welfare increases the profitability of a farm. We illustrated this with four examples of how poor welfare increases costs.
- We then looked at all the reasons why farmers may not take action to increase their profitability, even when they know the economic benefits that may result.
- We also saw that the capital cost of improving welfare was not necessarily very high, although it a substantial initial investment could be involved.
- After that, we looked at how better animal welfare can enable a farmer to meet the expectations of local consumers and so maximize sales.
- We saw that farmers could meet the increased production costs associated with high standards of welfare if the state supported farmers, or if consumers paid more and bought more high-welfare products, and retailers passed on that premium to the farmer.
- Again, we saw that there may be a number of obstacles, either because retailers do not pay farmers the premium, or because consumers are not concerned about animal welfare, or because consumers do not want to pay for it in the form of an increased purchase price.
- We then saw that these difficulties could be overcome by adjusting the taxation system so that farmers were rewarded for the cost of higher welfare standards.
- Finally, we saw that high standards of animal welfare can increase farm income by giving

farmers access to export markets. However, we also saw that international trade agreements can limit that market and can create competition in the domestic market.

The positive and negative points we have discussed apply to different degrees in different countries.

- Positives: there are growing markets for foodstuffs that come from animals who have been farmed to very high standards of animal welfare, and many farmers, retailers and consumers are committed to that. We mentioned four examples of successful farm assurance schemes.
- Negatives: international trade law and a common desire for cheap processed food worldwide are creating serious impediments to the adoption of high standards of welfare. However, as policy-makers, farmers and consumers all become more aware of this we can expect that solutions will be found, even though there is a long way to go before

this happens.

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