Module 18
Welfare of Working Animals

Lecture Notes

Slide 1:

This lecture was first developed for World Animal Protection by Dr David Main (University of Bristol) in 2003. It was revised by World Animal Protection scientific advisors in 2012 using updates provided by Dr Caroline Hewson.

Slide 2:

At the end of this lecture the student 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.

Slide 3:

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

Up-to-date 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.

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).

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.

Slide 4:

This slide 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.

Buffalo (*Bubalis* spp) 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; *Bos* spp) 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.

Slide 5:

- 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.

Most of this lecture will focus on the welfare problems of draught animals, especially equids.

Slide 6:

Overall, the most common problems suffered by draft 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. This can create a lack of responsibility in the individuals borrowing the animal, and the animal may work long 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. However, an owner may feel unable to wait until the donkey is four before working them.
- 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.

Slide 7:

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'.

Slide 8:

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.

Slide 9:

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.

Slide 10:

We will start with some background on the different equids.

Horses are much less hardy and less efficient workers than donkeys. Briefly, horses are 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. Behaviourally they retain a strong flight instinct.

Donkeys are 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 utilise 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.

Slide 11:

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.

Slide 12:

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. 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).

Slide 13:

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 (we will come to final point on Slide 16).

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.

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.

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.

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.

Slide 14:

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.

This slide illustrates a harness with a flawed design:

- A rope bridle can rub and be uncomfortable over the poll (top of the head between the ears) as it is a sensitive area and the thin rope is pressing down causing friction.
- The bit is potentially too tight and might be a problem.
- The neck collar is too tight with no clearance through the throat, creating pressure on the crest of the neck. There is no hame (metal bar) on the collar to stop it bending and forming a more circular shape, hence the restriction to throat and crest.
- There is no driving saddle for the back strap to rest on: the strap will sag when the cart is stationary or when bearing a heavier load putting extra pressure on the back.
- Once the pony is in draught (pushing forward) the end of the wooden shaft will be too far back and could dig in the shoulder.
- It would also be necessary to examine all the inside surfaces of all the parts of the harness to see if anything was sticking out causing rubbing.

(S. Russell, pers. comm.)

Slide 15:

The World Association for Transport Animal Welfare and Studies (TAWS) provides guidelines for the harnesses used for equids in developing countries.

Slide 16:

The third criteria of welfare within area 2 (good housing) is thermal comfort.

Most working equids are in countries with hot climates that may be arid, or sometimes very humid. When equids are carrying heavy loads with badly designed harnesses and carts, they are at high risk of suffering heat stress. That is, their thermoregulatory systems cannot cope with the heat being generated within their bodies because of exposure to sun and excessive use of their muscles in their work.

Signs of heat stress include panting, increased body temperature and reduced elasticity of the skin when it is pinched.

You treat heat stress by pouring buckets of cold water over animal. To prevent heat stress, owners must:

- provide shady resting places

- not overwork their equids, especially when it is very hot. However, it is difficult to specify what 'overwork' is, as it depends on the nutrition and size of the animal. We saw in Module 9 on welfare assessment that when guidelines are non-specific, it is hard for people to know what standard of behaviour they should aim for. In developed countries, it is generally considered that horses should not pull more than 25 per cent of their bodyweight. However, those horses are not generally draught animals. On slide 14, we saw that research carried out on donkeys in Lahore indicated much higher loads, if other welfare factors were good
- provide enough water to drink. This is very important: donkeys need much less than horses.

It seems likely that many working equids are dehydrated, based on a study of 4,903 animals in five different, hot countries which showed that 40–50 per cent of animals were dehydrated using the skin-pinch test.

Slide 17:

We shall move on to 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.

We will take lameness first.

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

Common causes of lameness are listed on the slide:

- hooves, e.g. overgrowth (see photo), trimmed too short, cracks, ulcers, thrush, etc.
- arthritis/tendonitis: swollen joints
- injuries: for example, from 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.

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.

Slide 18:

We now move on to painful conditions of the skin.

Most injuries are due to:

- saddle/harness sores
- beating injuries on hindquarters
- lesions from tether/hobble
- injuries from falling down/cart/accidents.

Two of these are illustrated on the slide.

Slide 19:

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 example, 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.

Slide 20:

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, especially if there is no legislation or 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: this professional could offer humane killing to individuals along with adequate equipment and knowledge for humane killing
- government agencies could offer some money for these animals – organising transport, euthanasia and disposal. This could be more efficient than individual efforts, would make it easier to arrange disposal, and it would be better for the animals.

Slide 21:

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 vet walking around them to observe them, or people walking past) as a threat. This means their wider experience may be unnecessarily distressing.

For example, in one large international study researchers found that equids in cities were more likely to show aggression to people than equids in rural areas. The authors concluded that this may be because equids in cities are beaten or hurt by their owners more than animals in the country.

Another important aspect of welfare in the area of appropriate behaviour 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.

Slide 22:

We need more 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.

Slide 23:

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.

Slide 24:

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.

Slide 25:

The water buffalo was domesticated in India from the wild water buffalo, now an endangered species.

The water buffalo 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.

Water buffalo 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 good milk producers.

Slide 26:

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.

Slide 27:

The main issues of welfare concern for working water buffalo and cattle are shown on this slide.

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 there are comparable problems to draught equids, although there are 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 behaviour

- 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.

Slide 28:

A source of information about the design of harnesses and carts for cattle is the Centre for Action Research and Technology for Man, Animal and Nature (CARTMAN), in India.

Slide 29:

Here is an example of an intervention programme for working oxen in Madagascar. Note again the importance of including local people and their knowledge and needs when coming up with solution to help the animals.

- The Programme Transport et Milieu Rural (PTMR) wanted to improve transport in Madagascar and found that the traditional ox carts, which had wooden, steel-banded wheels, made ruts in roads, making transport more difficult. In a workshop, delegates decided to ban traditional carts.

Slide 30:

However, when people in villages were asked, they pointed out several benefits of the traditional carts. They said the carts:

- were cheaper and easily available
- were puncture-free and long-lasting
- had very good braking systems: this was also an essential point for animal welfare as it prevents injuries and takes pressure from animals, especially when the harness is inadequate
- had high clearance for poor roads and people can push them – this is also good support for draught animals
- make 'the right noise', and people can hear them coming. Some arguments do not always seem logical to outsiders, but are important to local people and need to at least be considered.

Outcome: the traditional carts were not replaced.

Slide 31:

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 are used in small numbers overall and are typically treated well and highly prized.

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 example:

- their humps stores fat which enables them to go for long periods without food. Also, when the fat is metabolised, 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.

The llama is a working camelid, used to transport goods in mountainous terrain in South America. Like camels, llamas are well adapted to extreme temperatures. They are also adapted to thrive in dry conditions and to eat and digest lignified plants that are typical of dry environments.

Slide 32:

The main issues of welfare concern for working camelidae are shown on this slide.

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.
- Llamas and 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.
- Llamas have thin skin and their legs may be injured quite easily, e.g. by tethers.

Area 4: appropriate behaviour

- 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.

Slide 33:

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.

Working elephants 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.

Slide 34:

The main issues of welfare concern for working elephants are on this slide.

Area 1: good feeding

- Elephants need huge amounts of food (depending on body weight, 150–300kg/day) and time to eat it: wild elephants spend about 10–18 hours eating per day. As with all draught animals, if the owners are very impoverished, they may not allow the animals enough to eat, or enough time to eat (meaning working elephants may experience prolonged hunger and become very thin).
- In terms of food quality, roughage (minimum of 15 per cent of an elephant's diet) is very important. Sugar cane, which is used as a positive reinforcement, should be given only in very small amounts as it can damage teeth.

Area 2: good housing

- Because the animals may be captured from the wild their captivity may be very confining in comparison and may cause discomfort.

Area 3: good health

- The skin of elephants is 2–4cm thick in some areas, such as the back and the forehead, but in other areas it is only a few millimetres thick and wrinkled. Wallowing in water/mud is essential to avoid skin problems.
- Sores can arise from ill-fitting harnesses and saddles.
- Elephants' feet also need to be monitored, as they are soft and are not adapted for walking on concrete.

Area 4: appropriate behaviour

- All the criteria here are of potential concern, especially because the animals may be captured from the wild and may then be kept in a very confined environment.

Slide 35:

- All dogs originated from the wolf, a species showing most of the behavioural 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.

Slide 36:

The main issues of welfare concern for working dogs are shown on this slide.

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 behaviour

- 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.

Slide 37:

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.

Slide 38:

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 design of harnesses, carts, etc.
- education of owners, with incentives such as subsidies, and penalties
- improved breeding.

Those general areas were proposed by Ramaswamy in 1998, but many countries have been slow to take action in any of these areas, perhaps because they do not appreciate the economic contribution that working animals provide, both for their owners and for the agriculture and functioning of the country.

In 2011, the Food and Agriculture Organization (FAO) of the United Nations carried out an international consultation about how to improve the welfare of working animals. The report suggests that governments may not fully recognise the importance of working animals for local economies, where the farmers would otherwise have to do the same work by hand. Possible reasons for this lack of recognition were thought to include:

- the difficulty in calculating all the financial benefits of using working animals
- cultural and political reasons, e.g. poorer people who use working animals may tend to be overlooked by their governments. Also, a government may be concerned that its country may seem underdeveloped if its government invests in the management of working animals.

The FAO's Animal Welfare Portal provides information on this and other initiatives.

Slide 39:

As a vet, you may be most involved in treating animals and advising their owners 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.

You will learn in other modules about the diagnosis and treatment of malnutrition, heat stress, lameness, skin wounds, and all the health-related problems we have noted today.

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).

As a vet, you may need to recommend 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 health-care programmes can be developed, including vaccinations and appropriate de-worming of animals.

Slide 40:

When you are advising owners, it is important to remember the behavioural 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 behaviour: especially when they live in cities, animals are rarely able to perform normal locomotory behaviour. 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 behaviour: 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.

Slide 41:

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.

Examples of changes that reduce skin injuries are:

- owners can change the material they use to pad the harness and equipment. The slide lists soft materials that they should use; other materials such as plastic bags or rubber from tyres are not suitable
- 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.

Slide 42:

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. Module 30 on human–animal interactions will look at how dogs who are used to assist people with disabilities – which is an increasingly common use of dogs in developed countries – may suffer in various ways because of ignorance among trainers and owners.

Slide 43:

- Improved breeding is needed to improve factors such as the conformation of the animal so that they are better able to work without developing injuries or lameness, e.g. because of back problems.
- Breeding might also help to select animals with the best temperaments for work, and who are disease-resistant.
- Attention to breeding really requires input from government agencies to fund and coordinate this work.

Slide 44:

To assess and improve working animal welfare it is important to know the species involved and its special needs and behaviours (e.g. feeding behaviour, comfort behaviour).

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.