CIWF TRUST
advancing farm animal welfare

STOP – LOOK – LISTEN
RECOGNISING THE SENTIENCE OF FARM ANIMALS

A report by
Compassion
in World
Farming Trust
2006

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Compassion in World Farming Trust is a charity working internationally to advance the welfare of farm animals. We produce a range of science-based educational resources covering farm animal welfare and associated environmental, social and ethical issues. The trustees are grateful to several grant-making Charitable Trusts and members of the public who have made this work possible.

In 2005, Compassion in World Farming Trust held a conference in London entitled *From Darwin to Dawkins: the Science and Implications of Animal Sentience*, on the growing scientific and ethical understanding of animals and its implications for human activities that use animals. The conference was attended by 600 people from 50 countries.

The conference papers are available in two different publications: the book *Animals, Ethics and Trade: the Challenge of Animal Sentience*, edited by J. Turner and J. D'Silva, Earthscan, 2006 and in a special issue of the journal *Applied Animal Behaviour Science*, edited by John Webster, Elsevier, 2006.

CIWF Trust also hosts a website dedicated to research news and discussion about animal sentience: **www.animalsentience.com**. Further information and a complete list of our available materials and downloadable versions are available at **www.ciwf.org**.

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A report by Compassion in World Farming Trust

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Preface

By Joyce D'Silva, Ambassador, Compassion in World Farming Trust

Everyone who cares about the protection of animals rejoiced when a Protocol was formally added to the European Treaty in 1997 recognising animals as sentient beings. This achievement was largely due to nine years of hard work by animal protection organisations such as Compassion in World Farming.

But fine sentiments, even enshrined in law, do not automatically change the reality on the ground. Even though 'human rights' are enshrined in national or international law they are violated on a daily basis in many countries.

With the sentience of animals there is a further problem. What do we *mean* by this term? Does it mean simply that animals can feel pain? It does mean that, but in our view it means much more.

It means that, as Charles Darwin so bravely put it, humans and the 'higher animals' have 'the same senses, intuitions and sensations, similar passions, affections and emotions… the same faculties of imitation, choice, imagination, the association of ideas and reason though in very different degrees' (C Darwin – *The Descent of Man and Selection in Relation to Sex*, 1871).

Animal science has for so long been rooted in behaviourist theory that few modern theorists have dared to conclude that because an animal *appears* to be happy, frightened, melancholy or angry that it actually *is* experiencing those mind/body states. The time has surely come to broaden our definitions of animal sentience and welfare and embrace gut feelings and common sense. Find me a 7-year-old child who, upon seeing a bird in a tiny cage, does not immediately want to set it free. We can learn much from the uncluttered minds and open sensitivities of the young.

Our problem with realising the full implications of animal sentience may not be the difficulty of 'liberating' animals, but of liberating ourselves from centuries of conditioned thinking. Only then can we see animals for who they are and award them the respect and compassion they deserve.

In our report you will find numerous examples taken from the scientific literature showing how farm animals feel and think, and how current farming practices sadly still cause them suffering. My hope is that this report will help to move forward the process of full appreciation of the implications of farm animal sentience. The animals themselves have waited too long.

Contents

Introduction: What is animal sentience?

'A sentient animal is one for whom feelings matter' [1]

In 1997 the concept of animal sentience was written into the basic law of the European Union. The legally-binding protocol annexed to the Treaty of Amsterdam recognises that animals are 'sentient beings', and requires the EU and its members to 'pay full regard to the welfare requirements of animals'. What this is saying is that animal welfare has to be taken into account because the animals are sentient, capable of feeling pain and of suffering. In other words it matters to them how they are treated.

What exactly do we mean by animal sentience? The dictionary defines 'sentience' as the power of sense perception or sensation, or consciousness. In this report the words 'sentience', 'consciousness' and 'awareness' will be taken as meaning very much the same. If an animal is 'sentient', it is capable of being aware of its surroundings, of sensations in its own body, including pain, hunger, heat or cold and of emotions related to its sensations. It is aware of what is happening to it and its relations with other animals, including humans. Sentience does not necessarily mean that animals have complex abilities to understand, to learn, to solve problems or to be 'intelligent' (what we might call intellectual abilities), although they may have these too. But intellectual abilities must give us a strong indication that the animal is consciously aware and has subjective experiences. One strong indicator of animals' sentience is their ability to distinguish and choose between different objects, animals and situations, which shows that they understand what is going on in their environment. Another strong indicator of sentience is animals' ability to learn from experience, to use their experience to cope with the world more effectively (from their point of view) and to respond flexibly to new situations that confront them.

1.1 Historical attitudes to animal sentience

Scientists and philosophers in the past have both supported and rejected the idea that animals are sentient

Knowledge and beliefs about animal consciousness differ between human societies and cultures and have also differed historically. In the Judaeo-Christian tradition, humans alone are seen as being made in the image of God and animals were put on earth for human use. In other religious and philosophical traditions, however, the distinction between human and 'animal' is less marked.[2]

Following the Western tradition, the French philosopher and scientist, René Descartes (1596-1650), considered the father of modern philosophy, believed that only humans have reason and that animals lack any kind of mental activity or subjective experience. According to Descartes,

'there is no prejudice to which we are all more accustomed from our earliest years than the belief that dumb animals think.' [3]

Descartes believed that animals are automata and according to him they:

'act naturally and mechanically, like a clock which tells the time better than our judgement does. Doubtless when the swallows come in spring, they operate like clocks. The actions of honeybees are of the same nature and the discipline of cranes in flight, and of apes in fighting… All [animal motions] originate from the corporeal and mechanical principle',[4] as opposed to being associated with mental activity.

The European intellectual movement known as the Enlightenment stressed human capacity to advance knowledge and social conditions. This tradition did not see it as irrational to assume that animals have awareness and some mental capacities. The Scottish philosopher of the Enlightenment, David Hume (1711-1776) considered,

'animals undoubtedly feel, think, love, hate, will and even reason, though in a more imperfect manner than men.' [5]

Hume considered that animals learn from experience in a similar way to humans:

'Animals, as well as men, learn many things from experience, and infer, that the same events will always follow from the same causes… [and acquire] a knowledge of the nature of fire, water, earth, stones, heights, depths, etc. and of the effects which result from their operation. The ignorance and inexperience of the young are here plainly distinguishable from the cunning and sagacity of the old, who have learned, by long observation, to avoid what hurts them, and to pursue what gave ease or pleasure.' [6]

The English philosopher and legal and social reformer Jeremy Bentham (1748-1832) pointed out that, quite contrary to Descartes' line of argument, an animal may be fully capable of experiencing suffering even if its intellectual abilities are low. In his book *Introduction to the Principles of Morals and Legislation* (1789) he wrote about the treatment of animals:

'The question is not, Can they *reason*? nor Can they *talk*? but Can they *suffer*?' [7]

The scientist Charles Darwin (1809-1882), whose ideas underlie modern biology, believed that there was continuity between humans and other forms of life and that it was likely that 'the mental act' is 'essentially of the same nature in the animal as in the man'.

In his book *The Descent of Man* (1871), Darwin explained:

'We have seen that the senses and intuitions, the various emotions and faculties, such as love, memory, attention and curiosity, imitation, reason, etc. of which man boasts, may be found in an incipient, or even sometimes in a well-developed condition, in the lower animals.'

'There is no fundamental difference between man and the higher mammals in their mental faculties… The difference in mind between man and the higher animals, great as it is, certainly is one of degree and not of kind.' [8]

Darwin considered that some animals may even be able to think about their own lives:

'It may be freely admitted that no animal is self-conscious, if by this term it is implied, that he reflects on such points, as whence he comes or whither he will go, or what is life and death, and so forth. But how can we feel sure that an old dog with an excellent memory and some power of imagination, as shewn by his dreams, never reflects on his past pleasures or pains in the chase? And this would be a form of self-consciousness.' [9]

1.2 Modern attitudes to animal sentience

Today most scientists and philosophers, and most of the general public, accept that animals are sentient - although our attitudes are often inconsistent

The extent to which animals feel and think is still a matter of debate among scientists and philosophers. But in spite of the scientific and philosophical difficulties of knowing for certain what is going on in another animal's feelings or thoughts, very few people now still believe that all animals are unfeeling and mindless machines.

A powerful influence on how we think about animal awareness is the Behaviourist tradition of psychology, founded in the 1920s in the USA. Behaviourism was opposed to attributing mental states to animals, on the grounds that mental states are not directly observable by scientists and therefore cannot be properly studied. It was considered that only behaviour could be studied (rather than any emotion or conscious intention that might lie behind it). All behaviour was explained as responses to positive or negative stimuli. Whereas at first Behaviourism was applied to both humans and animals, it has left a lasting legacy mainly on the study of animal behaviour. Not long ago, scientists who talked about animals as conscious beings risked being laughed at or put at a disadvantage in their profession. Some scientists are still wary about drawing conclusions about the animals' feelings or intentions, for fear of reading too much into what the animals do, and being 'anthropomorphic' in their explanations.

But the vast majority of people who spend time with animals (particularly mammals, since their behaviour is easiest for us to interpret) assume that they feel and to some extent think. The philosopher Mary Midgley, in her book *Animals and Why They Matter*, points out that we all assume that we can often judge the feelings or 'mental states' of other people and also of animals we are familiar with. She writes:

'[If we agree] that it makes sense to talk of subjective states in humans, and also to say that other humans can often roughly identify these states, reasons must be found for *refusing* to say the same about animals. …Every day and all around us… people rightly assess the moods of dogs, and dogs of people.' [10]

Many scientists now agree with this approach. They also point out that conscious awareness, for both humans and animals, is not an all-or-nothing characteristic. We humans are not conscious of even our deliberate actions some of the time (for example, when driving a car along a well-known route), and that often we are not even conscious of much of the input to our eyes and ears. Similarly, there may be differences between animals in how much they are consciously aware of what is happening to them. But the most basic kinds of awareness, such as awareness of pain and basic emotions, must certainly exist in most animals.

Zoologists who have spent their professional lives studying animal behaviour, either by observation or by experiments to test their mental capacities, believe that many animals feel and think. The expert in primate behaviour Professor Frans de Waal considers the opposition to 'anthropomorphism' in studies of animals to be a mistake. In his book *The Ape and the Sushi Master* he writes:

'I attribute opposition to [anthropomorphism] to a desire to keep animals at arm's length rather than concerns about scientific objectivity.'

'I propose *anthropodenial* for the *a priori* rejection of shared characteristics between humans and animals when in fact they may exist. Those who are in anthropodenial try to build a brick wall between themselves and other animals. They carry on the tradition of French philosopher René Descartes, who declared that while humans possessed souls, animals were mere machines. Inspired by the pervasive human-animal dualism of the Judeo-Christian tradition, this view has no parallel in other religions or cultures. It also raises the question why, if we descended from automatons, we aren't automatons ourselves.' [11]

The zoologist Professor Donald Griffin, in his pioneering book *Animal Minds*, suggests that:

'Conscious thinking may well be a *core function* of central nervous systems. For conscious animals enjoy the advantage of being able to think about alternative actions and select behavior

they believe will get them what they want or help them avoid what they dislike or fear… Although nonconscious information processing *could in theory* produce the same end result as conscious thinking, …it seems likely that conscious thinking and emotional feeling about current, past, and anticipated events is the best way to cope with some of the more critical challenges faced by animals in their natural lives.' [12]

The Oxford University zoologist Professor Marian Dawkins has concluded,

'we are left with a hard core of studies that make it extremely likely that at least some animals do think in rudimentary ways and that they experience pleasure and suffering… Scientific evidence as well as common sense now demand that we take the step of inferring consciousness in species other than our own. …If consciousness is a biological phenomenon, evolved because it made animals in some way more effective at getting through their lives, then any explanation that leaves it out must be missing something very important.' [13]

The expert Panel on Animal Health and Animal Welfare of the European Food Safety Authority in 2005 summarised public awareness of the sentience of both humans and animals as follows:

'Human opinion as to which individuals are sentient has changed over time to encompass, first all humans instead of just a subset of humans, and then certain mammals which were kept as companions, animals which seemed most similar to humans such as monkeys, the larger mammals, all mammals, all warm-blooded animals, and then all vertebrates…. Animals which are shown [by scientists] to be complex in their organisation, capable of sophisticated learning and aware are generally respected more than those which are not, and such animals are less likely to be treated badly. However, some people view animals solely on the basis of their effects on, or perceived (extrinsic) value to, humans and have little concern for the welfare of pests, disease carriers or those that cannot be eaten.' [14]

Many societies now accept animal sentience implicitly or explicitly in their legal systems. Many of the laws and regulations for the protection of animals (apart from those concerned merely with conservation of species) clearly assume that at least all vertebrate animals (mammals, birds, fish, etc.) can experience suffering from a variety of causes, for example from pain, discomfort, hunger, as well as fear, anxiety and frustration.

In addition, the jurisdictions of several states include certain invertebrates such as cephalopods (octopuses, squids) and decapod crustaceans (lobsters, crabs) in the scope of animal protection laws, implying that these animals are also judged to be capable of experiencing pain and suffering.[15]

Human attitudes to animal sentience are still quite inconsistent, depending on prejudice and history or cultural beliefs as much as on scientific evidence. For example, in Western countries where dogs are usually kept as companions rather than as food, there is almost certainly a greater public concern for the suffering of dogs than for the suffering of cows. This could seem illogical to some people in

east Asia, where dogs are used for food, or to Islamic communities where historically dogs have been regarded as unclean.

Beliefs about how much importance to attach to animals' feelings may also depend on people's professions and experiences. People who deal with hundreds or thousands of different animals daily (such as large-scale farmers or slaughterhouse workers) may get de-sensitised to animals' feelings. There is relatively little research on the attitudes of people worldwide to animal sentience, and more research would be very useful. For example, interesting studies of the attitudes of UK veterinary students to whether animals such as dogs, cats and cows feel pain and boredom seem to show that students can become less concerned about animals' feelings over their training period. Most urban people have no relationship with live farm animals, and so are less likely to think about their sentience. In a number of cultures, there is evidence that people try to keep emotionally detached from animals that they know they are going to kill for food.[16]

1.3 Evidence for the mental abilities of animals

Increasing numbers of animal species are recognised as being conscious and intelligent

Scientific research in recent years has given increasing support to the view that many animals are conscious in the sense of experiencing sensations and emotions. In addition to this, research has shown that many animals also have higher-level mental abilities. In order to be able to say that an animal consciously reasons or thinks, scientists have looked for evidence of abilities such as the following: the ability to have an intention and attempt to carry it out, the ability to understand and solve a new problem, the ability to make a mental image of something even when it is absent, the ability to understand what another animal knows or intends to do, and the ability to have complex social relationships. Higher-level mental abilities also include the ability to understand categories, to use symbols as a form of language and to possess a sense of self.

It is now well-documented that some animals possess some or most of these abilities, including apes, dolphins, elephants and parrots. Although these are the species in which intelligence and learning have been most studied, as our knowledge of animal behaviour increases we are finding evidence of mental abilities in more and more species.[17] Some of these abilities are also found in farmed animals such as cattle, pigs, sheep and chickens.

Some of the distinctions that have been made in the past between animals that we think of as intelligent (such as apes) and those we have been likely to think of as unintelligent (such as birds) may not be correct in the light of modern research. Scientists now argue that the cognitive abilities of social birds such as crows, raven, jays and jackdaws (corvids) rival the abilities of apes in spite of the fact that a bird's brain has a very different structure from the brain of an ape (or of a human). Corvids are not only capable of making and using tools, but of travelling mentally in time and space, of understanding the actions and the likely behaviour of other animals (for example when they cache food), of understanding cause and effect and of flexible changes of behaviour. Interestingly, corvids have long been credited with intelligence in folklore.[18]

To a lesser extent, we may have also underestimated the mental abilities of domestic chickens. Hens attempt to teach their chicks which types of food are good or bad to eat and also can anticipate the future. For example, an experiment reported in 2005 found that hens were prepared to wait longer before trying to get a reward when they knew that waiting would get them a larger reward, showing that hens are capable of 'rationally distinguishing near future outcomes' of their choices.[19] Similarly, we may have underestimated the mental abilities of pigs. While apes are well-known to use deception of other animals or of humans in order to get what they want, it appears that pigs may also be capable of using deception to avoid other pigs eating their food.[20]

1.4 Why animal sentience matters

Our treatment of animals must be based on the fact that they are sentient

The majority of people today have no doubt that animals feel pain, fear, affection, hunger, thirst and many other sensations and emotions. The fact that many animals are sentient raises fundamental and important questions about human relationships to them. If animals are sentient, that means it matters vitally to them how we treat them.

Compassion in World Farming Trust believes that the time has come when we must take urgent steps to recognise the sentience of other animals in practice as well as in theory. Practices that subject a sentient animal to severe or long-term pain, to terror or to a lifetime of close confinement in a small cage where the animal can hardly move (as happens now to hens, breeding pigs and even bears) must be seen as totally unacceptable in the 21st century. Many of the practices of modern farming, as detailed in Section 3 of this report, must also be seen as unacceptable and must be ended. It is urgent that we move, internationally, towards animal farming systems that make respect for animal sentience a priority. This means that the animals must be able to carry out their natural behaviour and to live in more natural social and family groups, to have full health and wellbeing, and to be protected from pain and fear.

Compassion in World Farming Trust urges consumers and policymakers to support urgent reform of farming methods, especially in intensive farming, that fail to respect the sentience of animals, and equally to support a move towards extensive and organic farming systems that recognise the sentience of animals in practice.

2. Evidence about farm animals' sentience

Research is showing us that the lives of animals, including farm animals, are much more complex than we previously understood

In recent years there has been a striking increase in public and scientific interest and awareness of the complexity of animals' lives, their mental and emotional abilities and their social lives. Scientists are showing that characteristics that we thought only humans possessed, are also possessed by animals. Apes and crows make and use tools.[21] Apes and parrots can understand human language and appear to be able to use it to communicate both facts and emotions. An African grey parrot understands the categories of colour, shape and material and appears to be able to count. Apes and monkeys show social learning that scientists interpret as transmission of culture. The social lives of apes, elephants and other animals involve empathy, altruism, and ways of behaving that scientists classify as morality. Apes and dolphins, among other animals, learn skills from each other in ways that scientists classify as culture.[22]

But whereas the study of wild animals has progressed by leaps and bounds, much less attention has been paid so far to the sentience of the animals we farm for our own use. Considering the astonishing number of animals that are farmed all over the world, this is a cause for great concern (around 22 billion sheep and goats, cattle, pigs and poultry are farmed at any one time, according to estimates by the Food and Agriculture Organisation of the United Nations).

However, some scientists are in the forefront of demonstrating the need for animal sentience to be fully recognised in farming practice, and explaining the mental complexity of farm animals to the public.

The first section will look at some of the ways in which farm animals feel (sensations and emotions). The following sections will look at the way farm animals have social bonds, communicate, have preferences and the ability to understand, to make decisions and to learn about the world around them.

2.1 Sensations and emotions

'The subjective feelings of an animal are a very important aspect of its welfare. Pleasant and unpleasant feelings are part of the experience of an individual as it attempts to cope with its environment' [23]

The sensations and emotions that animals and humans feel include pleasure, pain, heat, cold, hunger, thirst, fear, anger, liking and disliking. But it is not always obvious what an animal feels, and we may often underestimate the strength of their feelings (or even occasionally overestimate it). If an animal does not react to some event in the same way as a human would do, we may assume wrongly that it feels nothing. An animal that hardly reacts may be feeling much more pain and fear than is obvious from its behaviour. On the other hand, the fact that an animal responds to what scientists called 'stimuli' (such as injury or threat) does not necessary mean that it has a subjective experience of pain or fear. But in spite of these difficulties of assessment, in the case of farm animals there is abundant evidence that they experience pain, discomfort, fear and other emotions.

In most modern countries, the fact that animals can feel and suffer is written into law. In the UK, the 1911 Protection of Animals Act made it a legal offence 'cruelly to beat, kick, ill-treat, over-ride, over-drive, over-load, torture, infuriate or terrify any animal' or to 'cause unnecessary suffering by doing or omitting to do any act'. The Animals (Scientific Procedures) Act 1986, which legalises the use of animals in experiments, assumes that all vertebrate animals can feel pain. The European Union (EU) Directive of 1993 on the protection of animals at the time of slaughter or killing infers that there is pain during slaughter. The Directive requires that 'Animals shall be spared any avoidable excitement, pain or suffering' during slaughter and that they shall be 'stunned before slaughter or killed instantaneously'.[24] All these laws attempt to limit how humans can treat animals on the assumption that animals can suffer physically and mentally.

2.1.1 Pain

Animals feel pain in the same way as humans

The pain felt by humans is usually defined by physiologists as both a sensation and an emotion - an unpleasant sensory and emotional experience. The pain sensation is transmitted by a part of the nervous system referred to as the 'nociceptive system'. The perception of pain starts with 'pain receptors' called nociceptors, for example in the skin, which respond to painful stimuli such as pressure or a cut. The information is transmitted from the nociceptors to the brain stem and to the sensory cortex, and we experience conscious pain. At the same time, the brain produces opiates (natural pain-killing substances) which counteract (inhibit) the transmission of the pain signal. It is well known that, for humans, the subjective experience of pain also depends on the circumstances and context, for example its emotional significance, and on whether there are distractions from thinking about the pain.[25] (See Figure 1)

Do animals feel pain in the same way that humans do? As far as vertebrates are concerned, most features of the physiology and anatomy involved in reception, transmission and central processing of information from 'painful' stimuli are found in all of them.[25] We must assume that conditions that humans find painful will also be painful to animals. As mentioned above, many laws that regulate the human use of animals also make this assumption. The Brambell

Committee, asked by the UK government to report on animal welfare in farming, reported in 1965 that '...all mammals may be presumed to have the same nervous apparatus which in humans mediates pain. Animals suffer pain in the same way as humans.' [26]

This applies also to birds and fish. Birds have nervous systems of similar complexity to mammals and fish have pain receptors and 'similar physiological responses to painful stimulation to those shown by man'.[27,28] The Medway Committee in the UK (1976-9) concluded from the nervous system and anatomy of fish that they feel pain,[25] and a review prepared for the New Zealand Ministry of Agriculture and Forestry concluded in 1998 that 'Fish show many physical responses to tactile and noxious stimuli which no doubt involve conscious perception'.[29] Increasing numbers of scientists also believe there is evidence that some invertebrate animals can feel pain.[15]

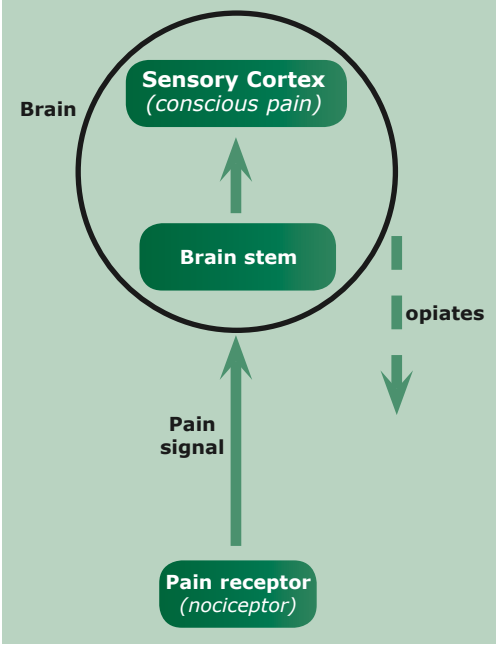


Fig 1 : *Schematic diagram of conscious perception of pain (adapted from ref. 25)*

Animal pain has been defined as 'an aversive sensory experience caused by actual or potential injury'. Pain usually causes the animal to make 'protective motor and vegetative (basic bodily) reactions, causes emotional responses, results in learned avoidance behaviour and may modify social and other behaviour'.[27] Animals need to be able to experience pain in order to escape from damage, and they need a memory of pain to help them avoid the conditions in the future. As scientists have pointed out, 'If the body of an individual is damaged in some way, it is useful for the brain to receive information about this so that appropriate action can be taken'.[30]

Lame chickens choose food laced with a painkiller

How can we tell when animals are feeling pain? There is no water-tight, objective way of measuring how much pain another being is experiencing, even if in the case of humans (but not human babies) they have language to tell us. Animal behaviour experts use a number of indications, such as what the animal does, for example crying out, protecting an injured limb, limping, not using the painful part, learning to keep away from what hurt it; changes of mood (such as unresponsiveness); how the animal responds to anti-inflammatory drugs or to analgesics (pain-killing drugs). Experiments have shown that the pain perception thresholds are broadly similar for horses, cattle, sheep and humans.[25] But the behaviour of an animal in pain varies very much between species. A sheep is much less likely to show obvious signs of pain than a domestic dog, probably because sheep are a species that is preyed on and signs of weakness attract predators.

Examples: How we know farm animals feel pain

(i) When male piglets are castrated (without anaesthetic) the shrillness of their squeals and their behaviour, compared to piglets that are not castrated, suggests they are experiencing 'considerable pain'[30] (see Section 3.1.1)

(ii) When lambs are tail-docked or castrated without anaesthetic, there is a marked increase in the level of cortisol (a stress hormone) in their blood – an increase of 60% after tail-docking and an increase of 97% after castration.[31] Changes in cortisol concentration are considered to be 'an index of acute distress' [32] (see also Section 3.1.1)

(iii) Fish respond similarly to being hooked and to electric shocks given to the roof of their mouths by remote control when they are free-swimming, indicating that they can feel pain in their mouths.[25] When acid or bee venom is injected into the lips of trout they stop feeding, rock, rub the affected part on gravel, and their gill beat rate increases by almost 80%.[28] Administering morphine significantly reduced the fishes' pain-related behaviour and their gill beat rate, indicating that 'morphine appears to act as an analgesic' for fish[33]

(iv) Hens that have been debeaked (part of the beak has been cut off) avoid using their beaks except for feeding[25]

(v) When dairy cows are lame because they have ulcers on the soles of their feet they walk abnormally because of the pain. They arch their backs, move their heads jerkily, take shorter strides and are reluctant to take their weight evenly on their four legs[34]

(vi) Lame meat chickens that have difficulty walking choose to eat feed that is laced with carprofen (a pain-killing drug).[35] Lame chickens given carprofen can walk almost twice as fast as before the treatment[36]

(vii) Dairy calves that are de-horned without any pain relief behave abnormally for at least 6 hours after the operation; they lie down, stop grazing and ruminating and they shake their tails more. If they are given both local anaesthetic and an analgesic before the operation, their behaviour afterwards is more like calves that have not been operated on[37]

From the point of view of physiologists, there is a distinction between an animal responding in some way to a harmful stimulus - for example by the reflex of withdrawing a limb - and the animal being consciously aware of pain. This has led some die-hard scientists to deny that there is any evidence that most animals subjectively experience pain. This is a modern version of Decartes' view of animals as automata, but in this case the argument is not that non-human animals lack a human immortal soul but that they lack a human-like language or a human cerebral cortex.[38] However, the great majority of scientists working with farm animals, as well as good farmers, accept that animals feel pain and should be protected from it.

2.1.2 Fear and anxiety

Farm animals feel the emotions of fear and anxiety, which can cause stress and suffering

Fear and anxiety are responses that animals need for survival, to avoid and escape from dangerous situations. As with pain, the degree of fear that an animal experiences can be difficult to know with certainty. Fear may be a cause of great emotional distress to animals, possibly causing greater distress to animals than it does to humans.[39] Animal protection laws and common sense agree that fear involves the experience of an unpleasant emotion and is a cause of suffering.

Animal behaviour scientists attempt to measure fear by studying both the physiological responses that produce 'stress hormones' (see Box 1) and how the animals behave in response to frightening or anxiety-inducing things and events, both short-term and long-term. Outward signs of fear may be quite different in different animals and different circumstances - for example resulting in attack, in flight or in immobility. Fear-inducing factors have been categorised as: unfamiliar objects or animals or unexpected events; innate fear, such as fear of isolation; learned fears, such as the expectation of attack or pain; and signs of fear in others.[40] Fear, as well as pain, can lead to damaging stress (see Box 1).

In the case of farm animals, fear seems to be a clear indication of their awareness and understanding of their world; they need to be able to remember past events, places and individuals (animals and people) and distinguish those that they have good reason to fear.

Examples: How we know farm animals feel fear and anxiety

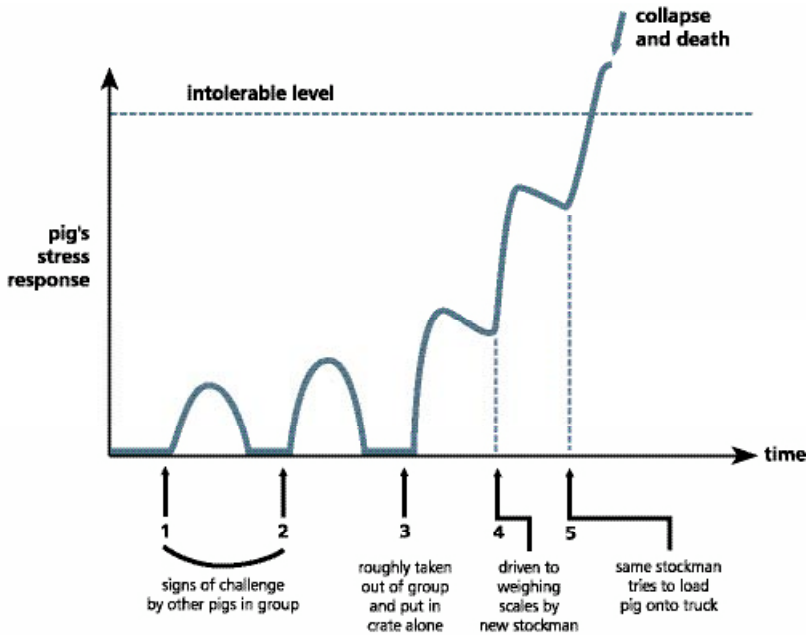
(i) Young piglets separated from their mother give distinctive and frequent squeals to call her, sometimes try to jump out of their pen and in some cases appear to 'give up on life' [41,42] (see Section 3.2.2)

(ii) The heart rate of sheep increases by 20 beats per minute when they are unable to see the rest of their flock and increases by 84 bpm when a man with a dog approaches[30]

(iii) Female pigs that show a high level of fear of their stockmen are $2^{1}/_{2}$ times less likely to become pregnant than pigs that are not afraid. Pigs, calves and cows try to keep away from humans after they have experience of stockmen who hit, kick, prod, shock or threaten them[43] (see Section 3.2.1)

(iv) Pigs can be severely stressed by anxiety and fear caused by being put with unfamiliar pigs and by human handling. They can collapse and even die as a result. Figure 2 illustrates a series of fear-inducing events that can happen in pig-farming practice[44]

Fig 2: *Pigs can be severely stressed by handling. Diagram shows the pig's stress responses to a series of events (adapted from ref. 46)*



Box 1 **Stress**

Stress is associated with unpleasant sensations and emotions, such as pain, distress, fear, frustration, hunger or thirst, excessive heat or cold. Animal welfare scientists define stress as 'an environmental effect on an individual which over-taxes its control systems and reduces its fitness'.[45]

From the physiological point of view, stress can be seen as an animal's response to a hazard in order to mobilise the body's reserves for action (so-called 'fight or flight' response). This involves increased heart rate and blood pressure, and activation of the adrenal gland. Rapid, short-term response is made by the sympathetic nervous system to release catecholamines (adrenaline (epinephrine) and noradrenaline (norepinephrine)) from the adrenal medulla. These hormones increase blood pressure and heart-rate. Longer-term response involves secretion of glucocorticoids (steroid hormones, such as cortisol and corticosterone) by the adrenal cortex. This secretion in turn is stimulated by the adrenocorticotrophic hormone (ACTH) released by the pituitary gland. The hormones increase the amount of glucose in the animal's blood and its metabolic rate. This type of response is caused, for example, by fear. (See Figure 3) (Pleasant events can also cause some of the same physiological effects as stress but, since these are not damaging, we will not consider them here as 'stress'.)

If the stress response is prolonged or frequent there can be serious effects on the animal's health. For example, stress reduces fertility and increases death-rates. High levels of glucocorticoids in the blood frequently or for a long time lead to a reduction in white blood cells (necessary for immune functioning), so that the animal's immune defences are reduced and infections increase. Stress can also lead to stomach ulceration, atherosclerosis (narrowing of arteries) and heart disease.[45,46]

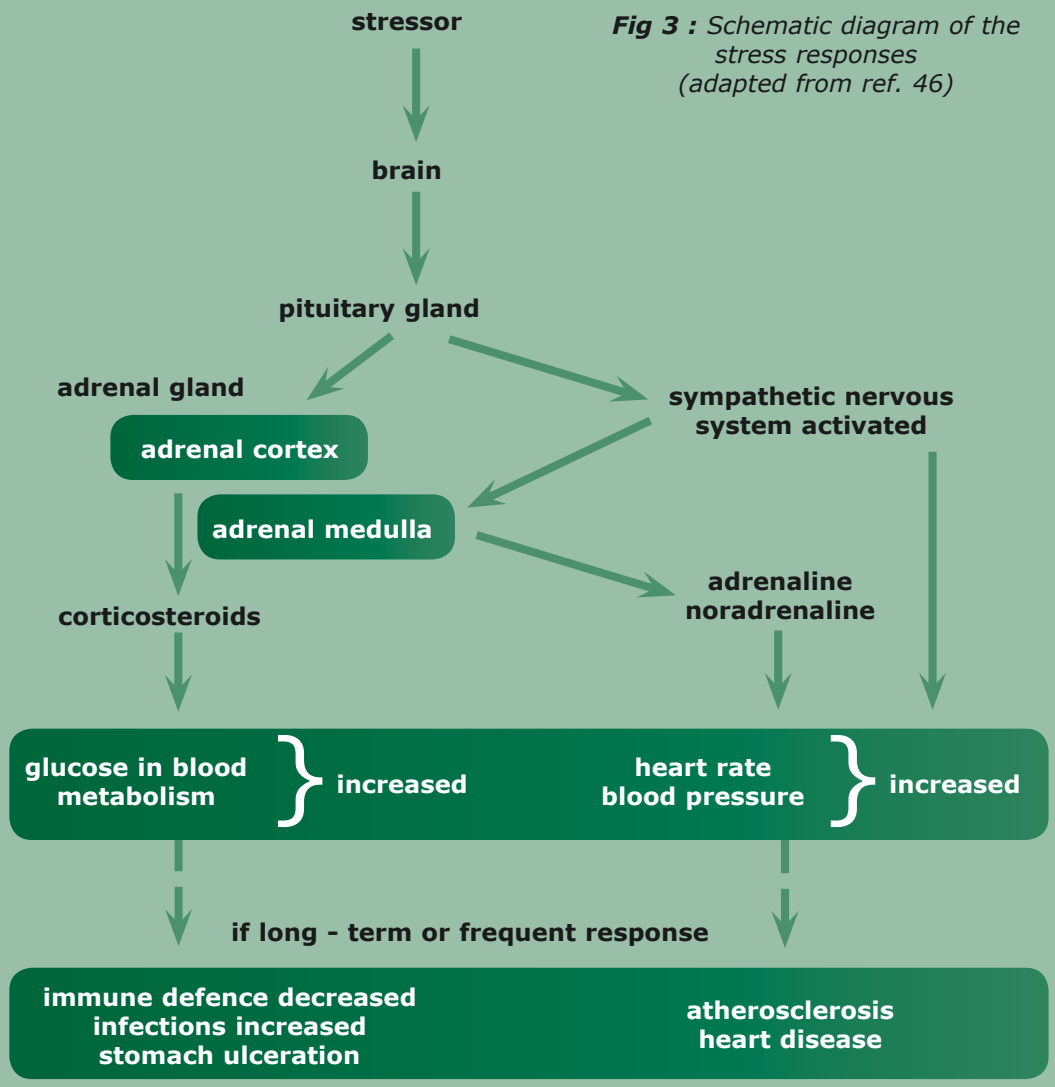


Fig 3 : *Schematic diagram of the stress responses (adapted from ref. 46)*

Sheep transported long distances to slaughter can collapse from heat stress

2.1.3 Frustration

Farm animals feel emotionally frustrated when they are prevented from carrying out natural behaviour or feeding

Scientific observations and experiments show that farm animals feel frustration when they are prevented from carrying out natural behaviour that they are strongly motivated to do, or when they are prevented from getting something pleasant (such as food) that they expected. As with the emotions we have looked at above, animals' responses to frustration show that they have intentions and expectations, in other words that they are aware of what they want to do and how they expect the world to be.

A sow confined to a farrowing crate feels frustrated by being unable to build a nest

Scientists have studied farm animals' feelings of frustration by observing what animals do when they are prevented from performing natural behaviour, such as building a nest, foraging, exploring, or eating. They have also studied the effect of frustration on levels of stress hormones. (see Boxes 1 and 2)

Examples: How we know animals feel frustration

(i) Dairy cows showed an increased percentage of the whites of their eyes, known to be a sign of frustration, when their 4-day old calves were temporarily removed from them.[47] Hungry cows that were prevented from eating grass that they could see and smell showed their frustration by rolling their tongues, shaking their heads and opening their eyes abnormally wide, according to researchers at the Agricultural University of Norway[48]

(ii) Hens have a particular 'frustration' call (the gakel call) when they are thwarted in getting to food, water, a dustbath or a nestbox. When hens were trained to expect food in a particular situation and then the food was withheld, the hens with the highest expectations showed most frustration[49,50]

(iii) Boars were deliberately sexually frustrated, after they had been trained to mount an artificial sow. This increased the levels of endorphin (a natural opioid associated with stress) in their blood and made them restless, indicating a 'negative emotional state' [51]

(iv) The breeding birds used to produce meat chicks are kept on a very restricted diet as they grow up and only spend a few minutes a day eating their ration. They show boredom and frustration by hyperactivity, aggression, stereotyped pacing before feeding times, and pecking at non-food objects[52,53]

(v) Female pigs confined in farrowing crates (for giving birth to their piglets) have higher levels of stress hormones (ACTH and cortisol) compared to sows that have enough space for nestbuilding activity[54]

Compassion in World Farming Trust believes that farming practices that cause long-term or frequent emotional frustration to farm animals, for example by preventing normal feeding, foraging or nesting behaviour, are unacceptable and should not be permitted.

Box 2 **Stereotypies**

When frustration and the accompanying stress become long-term, animals that are kept in confinement often start to carry out repetitive, apparently purposeless actions known as stereotyped behaviours ('stereotypies'). These include the 'weaving' of horses kept in stalls, the bar-biting, tongue-rolling and head-waving of sows confined in narrow 'sow stalls' (gestation crates), the self-licking and tongue-rolling of calves confined in narrow 'veal crates', the repetitive pacing of zoo animals from one end of the cage to another. They seem to be a response to frustration when the animal is prevented from moving freely, from interacting with other animals, from foraging for food or eating, and from exploring. Some scientists believe stereotypies may be a coping mechanism to enable the animal to survive boredom or frustration. These animals may be in a similar state to a human being suffering from a prolonged anxiety attack or psychological disorder.[55]

2.1.4 Pleasure and play

Farm animals feel pleasure when playing or carrying out natural behaviour

If farm animals suffer from negative emotions, they must also enjoy positive emotions from the pleasure of eating, interacting with others in the social group, and carrying out natural behaviour such as foraging and exercising. Although little research is devoted to these positive aspects of farm animals' lives, farmers can tell us about the apparent enjoyment of cows 'turned out' to grass in the spring, the eagerness of chickens kept in small huts to run out to graze and forage in the morning, the playfulness of growing pigs moved from a barren, crowded pen to an outside enclosure.

Many of the skills that farm animals need in their adult lives are partly learned by play activities as young animals - these include moving or manipulating objects, chasing, fighting without causing injury, advancing and retreating and acrobatics. Foals devote 75% of their activity to play. Even isolated calves find inanimate objects (or a human or other animal) to head-butt in play. The play of calves (and sometimes of adult cattle) includes prancing, kicking, pawing, snorting, running, and mounting others. It may start with two calves and a whole group will then join in. After one month of age, lambs start to spend a lot of time with other lambs, and their play includes leaps, 'dances', and group chasing, involving at least 3 lambs. From 2 weeks on, play is an important part of piglets' activity, often in the form of play fights at first, and later involving mostly chasing, gambolling and exploration of the environment.[56]

Animals play more when they have enriched environments, better weather, better food, when they meet other young animals and when they are let out of confinement. Play has some special characteristics, common to sentient animals. It respects rules; the animal must want to play; play is started by some signal meaning 'this is play'; it avoids injuring play partners; the 'playing mood' is transmitted to other animals; the activity seems to be pleasurable to those taking part; play actions are exaggerated, repetitive and there is a rapid change of roles (e.g. chaser and chased); the 'playing' emotion does not include real anger or fear. None of these characteristics corresponds to serious activities such as self-defence, flight, searching for food or predation.

The fact that animals clearly enjoy playing is a hallmark of their complex mental life, and involves the ability to understand another's mood, to cooperate and to 'pretend'. Scientists believe that play 'develops cognitive skills necessary for behavioural adaptability, flexibility, inventiveness, or versatility'.[56] Play may also enable animals to 'develop flexible… emotional responses to unexpected events …and to cope emotionally with unexpectedly stressful situations'. It has been suggested that play involves an emotional state known as 'having fun' and that 'the ability to experience the complex feeling of 'having fun' may require a richly developed cognitive system'.[57]

Examples: Pleasure and play

(i) Young pigs who are given roomy pens with peat flooring and straw are more active and playful, including frisking, scampering and rolling in the litter material, compared to pigs kept in barren pens[58]

(ii) Young meat chickens (broilers) become more active if they are given straw bales that they can investigate and climb on[59]

(iii) Young dairy cows enjoy being able to solve a problem. They showed excited behaviour and their heart rates increased when they succeeded in learning how to open a gate to get to food[60]

(iv) Lambs can be seen chasing and gambolling together in the fields in spring

2.2 The social behaviour of farm animals

In natural conditions, farm animals recognise, understand and communicate with each other in organised social groups

The social behaviour of farm animals is an important aspect of their sentience. It underlines their ability to think and also the significance of their social and emotional bonds.

Farm animals in natural conditions have quite complex social lives and social conventions. Living in groups requires awareness and understanding of the behaviour of others, and the ability to manage social interactions. It involves recognition of different individuals (including those of other species, such as humans), communication, selecting mates and looking after young. Animal behaviour scientists have studied and compared the social lives of farm animals in natural, semi-natural and intensive farming conditions.[61] In spite of thousands of years of domestic use, and decades of intensive breeding and farming, experts agree that the basic behaviour patterns and motivation of farm animals has changed little compared to their wild ancestors. Farmed pigs and chickens can revert to wild behaviour without difficulty.

2.2.1 Social groups

In natural conditions farm animals live in social groups of familiar animals

Cattle, pigs, sheep and chickens naturally live in herds or flocks. They coordinate their activities of moving pasture, resting, feeding, or grazing. They usually form social hierarchies, and in free-ranging conditions these are maintained by some animals avoiding or being submissive to others. The animals also may form friendship pairs. Scientists do not understand in detail how these social arrangements are formed, but the group's dominance hierarchy may be the result of a number of social 'agreements' between individual animals.[62]

Cattle

A few remaining herds of feral cattle have been studied, such as the white Chillingham cattle, which have had minimal contact with humans for 700 years. Cattle generally live in a small herd of both male and female animals, generally up to 20 per group. The herd will defend itself and its calves. Young adult males sometimes form small groups and older males often are solitary except for the mating season. Cows would typically have one calf and one yearling with them. Although cattle are not territorial, they can have specific home ranges, which may be different for males and females. The home range is learned by calves at an early age. Under natural conditions, it would be rare for unknown animals to join the group. There is a dominance hierarchy among groups of both males and females - in the case of females these can be stable for years. Cattle may be able to recognise and remember up to 50-70 individuals.[63,64,65]

Cattle groom each other ('allogrooming') by licking the head, neck and shoulder area. They have preferred partners, which may be relatives, and they groom each other more the longer they have known each other. A special posture indicates asking to be licked. Grooming each other may reduce tension, reinforce social bonds and stabilise social relationships. In commercial conditions, if adult cows are temporarily separated from the herd they show their distress by restlessness and raised levels of a stress hormone, cortisol. Animals seem to be less stressed by novel events (such as a loud noise) if they are with known partners and also seem to be aware of the partner's emotional state; for example they may be less willing to feed if their partner is stressed.[63]

Chillingham cattle

Pigs

Pigs have been studied in the wild (wild boar) and also in groups of feral and free-ranging pigs. Scientists who have observed pigs in semi-natural conditions in the Edinburgh University 'pig park' consider that 'The social behaviour of the domestic pig seems to resemble, in all important respects, that of the European wild boar, *Sus scrofa*, when the domestic [animal] is allowed to live in semi-natural conditions'.[65]

The basic social unit of the wild boar is quite small. It consists of the sow and her litter, which may join with others to form a group of 2-4 sows, with a hierarchy within the group. The sows are often related and unknown sows rarely join the group. The young of the previous year may stay with the sow and her newest litter until they are sexually mature at 8-10 months old. At the mating season the boar joins the family group temporarily and the young males leave.[65]

Free-ranging pigs maintain a home range with different sites for different activities, such as sleeping nests, wallows, feeding sites, dunging sites and rubbing sites. The home range may be between 100 and 500 hectares (aproximately 250-1250 acres). Different groups of sows and offspring may share common territory, but groups keep their integrity and maintain a distance from each other when foraging. In the late afternoon the adults arrange or repair a communal nest, which is well sheltered and has good views outwards, and the young pigs join them there.[65,66]

Pigs often have special neighbours when foraging. Pigs who know each other greet by making nose-to-nose contact, while grunting, and groom each other if they know each other really well.[65] Pigs may be able to recognise and remember up to 20-30 individuals.[64] Experiments at the Scottish Agricultural College have shown that pigs confined in a group establish social

stability by their understanding of each other's behaviour and by working out which other pigs are more aggressive and dominant.[67]

Sheep

Wild or feral sheep who have been studied (such as Bighorn or Soay sheep) usually range in separate groups of females or of males, although young males may stay with females after puberty. Ram groups are usually quite small and some rams may roam alone. Ewe groups consist of mothers and daughters over several generations, but smaller subgroups may graze together. Groups are recorded as being between about 10 and 60 animals, with a minimum of about 4 to form a stable social group. The size of the range varies with season, with the summer range being up to 50 times larger. Knowledge of the range is learned by lambs and yearlings.[68]

The sheep can recognise their own group and neighbouring social groups and identify 'foreign' animals. Domestic sheep are very gregarious and often tend to stay within about 25 metres of another. Isolation from the group causes them stress. There is evidence from aerial photographs that sheep grazing at the edge of a flock keep themselves in a direction where they can see two other sheep at the outer range of their wide field of vision.[68] Ewes prefer to have their own lamb as their nearest neighbour up to 70% of the time (lowland Suffolk ewes are less concerned to keep their lambs close than Black Face ewes, possibly because lowland sheep expect their lambs to meet fewer hazards).[69]

Detailed experiments on sheep by researchers in the UK, using both observation and recording of brain activity, have confirmed that sheep are very good at distinguishing between and remembering other animals. The sheep remembered images of 50 sheep faces for up to 2 years. They can 'remember and respond emotionally to individuals in their absence' (for example, by calling in response to familiar faces, as they would do to members of their social group). They seem to have a 'mental concept' of familiar individuals, since they can recognise animals from their profiles after they have learned to recognise them from the front view. Their perception of others is also influenced by the emotional significance of what they see - whether it is a familiar sheep, a human or a dog (a potential threat). Ewes preferred the faces of ewes unless they were in oestrus, when they preferred ram faces. Researchers concluded that sheep have 'a highly developed requirement for social interaction and therefore a sophisticated sense of social awareness'.[70,71] When sheep are socially isolated, their fear and stress is reduced if they are shown pictures of the faces of familiar sheep. Their high-pitched protest calls, attempts to escape, heart rate and levels of stress hormones are all reduced by seeing familiar faces (pictures of goats or of triangles do not have the same effect).[72]

Chickens

Chickens were domesticated from Red Jungle Fowl in south east Asia several thousand years ago. Jungle fowl live in a number of forested habitats where they can roost at night and have cover to protect their chicks. The home range may be 5 hectares (12.5 acres) in open forest or as low as half a hectare where food is plentiful. The group may move up to 23km to different habitats according to the season.[73,74]

Chickens in natural conditions live in quite small groups. Free-ranging flocks of jungle fowl live in mixed-sex flocks of 4-30 adults, in small male flocks and in groups of one male with a few hens. The birds in the group tend to stay close together and synchronise their activities such as foraging, resting and preening. They maintain contact with a 'Ku' call and they warn each other about danger. They fly to escape danger on the ground, to get over obstacles, or to roost and perch. Males help keep the group together by food calls and food-pecking to attract the females and may stay alert while the hens feed. Males also lead hens to investigate possible nest sites. Domestic hens can establish stable social hierarchies, which means that they recognise other birds and their relative status. Apart from this, they also seem to have preferred flockmates. They prefer to be close to familiar birds and to avoid unfamiliar ones.[73,74]

2.2.2 Family bonds

There is a strong emotional bond between farm animal parents and their young

Raising young is a vital activity for all animals. Because of this, the parent animals have evolved to be very highly motivated to carry out their natural maternal behaviour. The same is true of the bond between mother and young, which is vital for the survival of the young. Numbers of experiments and observations show that building a nest is very important to female pigs and to hens. This drive has an obvious survival value, since piglets are born very small and dependent, and both the mother hen and her eggs are vulnerable during incubation.

Hens

Domestic hens have essentially the same nesting behaviour as their wild relatives. To find a nest site, a hen may walk a considerable distance and explore several possible suitably enclosed sites, for example in thick vegetation, before she decides on one. She then scrapes a hollow and builds a raised edge to the nest before laying. Domestic hens take one or two hours to find a site and lay an egg. In natural conditions the hen would lay several eggs in the same nest and then stop laying and start incubating the clutch. The chicks start communicating with the hen and each other by peeping calls even before they are hatched. They call the hen to turn the eggs or return to incubating and they also respond to her behaviour and to her own calls.

On the day of hatching, the chicks explore and peck at potential food, but they need the hen for protection and for learning about suitable food sources. The chicks 'imprint' on the hen on their first day and she keeps the brood together by running and food-pecking displays and by clucking.[73,74] Experiments at Bristol University have shown that mother hens appear to notice when their chicks are eating what the hens believe to be the 'wrong' sort of food and actively try to teach the chicks to eat 'good' food.[75] Chicks learn dustbathing in their first few days and also start preening, frolicking and sparring, although they are rarely aggressive before about 6-8 weeks. For their first 3 weeks, they can get cold and need to be 'brooded' under their mother's wings. Separated chicks give peep calls which the hen answers and responds to. At about 6-8 weeks the hen and chicks start to roost in trees and she leaves them by 12 weeks to return to the adult group.[73,74,76]

Sows

In wild or free-range conditions, pregnant sows may walk 5-10 km before selecting a sufficiently isolated and protected nest site. The nest can take 10 hours to build and the sow may completely cover herself in the nest material before giving birth. She stays with the piglets in the nest for up to 2 weeks, and then they all leave the nest and return nearer to the rest of their herd. After the first 2-3 days in the nest the sow will go out on foraging trips and the piglets will start to follow her. She calls the piglets to suckle by a 'lactation grunt', which causes them to gather and start to massage her udder. After the sow and piglets leave the nest, the piglets are gradually integrated into the herd and they are gradually weaned by around 17 weeks.[66,77,78]

Cows

Wild and feral cows isolate themselves from the main herd before birth and may keep their calves hidden in vegetation for a few days before returning to the herd.[63] At birth, the cow licks the calf for a long time, until it is dry. Bonding between cow and calf takes place quickly.

The calf suckles often, at first about 5-8 times a day, declining to 3-5 times a day as it gets older. Suckling is initiated by either the calf or the cow calling to each other. After about 3 weeks the calf starts to spend more time with other calves, and the herd appears to establish a 'creche', which it guards. As well as playing, the calf learns how to graze efficiently (its 'bite-rate' goes up from only 14 bites a minute at 2 months old to 50 bites a minute ten weeks later) and it also learns to avoid toxic plants.[63,79]

A wild calf would normally be suckled for at least 8 months or even until the next calf is born and the yearling would stay associated with its mother.[63,79] On a very extensive organic beef farm in England, where family groups are maintained, there is evidence for mother-daughter relationships continuing well after the new calf is born. On one occasion a young heifer's first calf was born dead and her womb was displaced in giving birth. After emergency veterinary treatment she staggered away through the fields to find her mother and the farmers found her lying at her mother's feet, being licked and apparently comforted.[80]

2.2.3 Communication

Farm animals communicate with members of the group or family using several different senses

Communication between farm animals is very difficult for humans to observe, let alone interpret. We find the behaviour even of other humans difficult to interpret without words (silent or foreign-language movies have subtitles to help) and undoubtedly we are still ignorant of much of the communication that goes on between farm animals. For social animals such as sheep, cattle, pigs and poultry, communication is essential for their social behaviour, for maintaining relations between parents and young, for conveying information about danger and food and for expressing intentions and emotions. Communication includes calls and other noises, but also involves posture and gestures, and odours. Farm animals use their senses of sight, hearing, touch and smell to get messages from others.

Cattle

Visual communication is very important to cattle. They have wide-set eyes with 320° panoramic vision. Visual signals can use all or part of their body and head posture is important to indicate aggression or submission. Tail position can be used to indicate mood and activity (for example, in play). Calls are important to indicate excitement, interest, or pleasure (for example in feeding), to express frustration or stress, or to regain contact when isolated or separated - farmers and country-dwellers know that cows can call for days after their new calves have been removed. Cattle also have a large number of odour glands, and odours are important in their social, sexual and maternal behaviour. Tactile communication and grooming are used in establishing social rank, and in sexual and maternal behaviour.[63]

Pigs

Pigs are very vocal. Wild and feral pigs communicate by grunts, squeals, snarls and snorts, champing of jaws, clacking of teeth and roars. Boars use 'mating songs' during courtship. The sow uses a special lactation grunt to call her piglets to suckle. Piglets keep contact with each other and their mother by grunts and squeals.[66] Scientists in Canada have shown that farmed piglets separated from their mother squeal to communicate with her, and that she responds with long grunts. In experiments, when the piglets heard her grunts, they redoubled their own calls. The squeals of cold piglets (kept at 14° rather than a comfortable 30°) are shriller and longer, indicating their need for their mother's attention.[81] The sows recognised when the piglets calling them were especially 'needy' (because they were small, cold and had missed a feed) and responded more strongly than they did when they were called by larger and well-fed piglets.[42]

Chickens

Jungle fowl and domestic chickens are believed to have over 30 different calls, used to exchange information and to indicate the bird's emotional state. Cockerels crow to advertise their territory and to assess other males. There are also contact calls; laying and nesting calls; mating calls; threat calls; submissive calls; distress, fear and alarm calls; contentment calls; food calls, and warning calls. There are distinct alarm calls for aerial or ground predators, which other chickens respond to appropriately by standing up alert, crouching or taking cover. Males are more likely to give alarm calls when there are females nearby. Chickens also communicate by postures and visual displays (for example to signal threat or submission). Bodily features such as comb size and colour are used as signals (for example of sexual or social status) and for recognising each other.[73,74,76]

2.3 Natural behaviour and preferences

Farm animals show that they strongly prefer living in conditions where they can carry out their natural behaviour patterns

Experts agree that domestication of animals has changed their basic motivations and behaviour patterns very little. This means that the animals we farm evolved to perform a wide range of natural behaviours which are still very important to them. By observations and experiments, researchers have provided compelling evidence about how farm animals choose to behave and how they prefer to live.

Chickens

Free-range meat chickens (in Portugal) perch in trees like their wild ancestors

Exploratory and foraging behaviour is very important to chickens. The chicken's beak is used like a sensitive hand for exploration and manipulation as well as feeding. Chickens search for food by scratching with their claws and pecking, turning over leaves to look for seeds, insects or grubs. According to scientists, 'pecking is a precise, high-tech activity' requiring good coordination with the eye. In natural conditions chickens spend between half and 90% of their time foraging, making up to 15,000 pecks a day.[74,82]

Even when all their food is provided in troughs, chickens spend a lot of time pecking and scratching. Harmful pecking of other hens (feather pecking) by farmed chickens is believed to start with re-directed pecking; it is never seen among wild chickens.[76] Farmed hens that have lived on wire floors all their lives show an immediate preference for a floor of woodshavings or peat, where they start scratching and pecking.[83] Every 2 or 3 days chickens dustbathe, when they lie down and rub litter material (a form of 'dry shampoo') through their feathers, tossing litter onto their backs with their wings, and then shaking it out of their feathers. Preference experiments show that hens will 'work' very hard to get conditions where they can carry out natural behaviour that is important to them, such as litter to scratch and dustbathe in and a nestbox to lay their eggs in.[83] (see Section 3.3)

Pigs

Pigs in natural conditions also spend many of their waking hours rooting and foraging, using their sensitive and versatile snouts and their acute sense of smell to find food under soil or stones, but also grazing and browsing on vegetation. They try to keep at a comfortable temperature, by wallowing in wet mud in hot weather and huddling when they are cold. They make a communal nest and sleep in it huddled together.[77]

Several experiments have shown that farmed pigs much prefer a floor material that they can root in and manipulate. Scientists at the Agricultural Institute of Northern Ireland measured the time that pigs chose to spend on several different floor types (peat, mushroom compost, woodbark, sand, sawdust, straw and bare concrete). The pigs clearly preferred peat and mushroom compost (both similar to earth) and their least preferred option was bare concrete.[84] When the behaviour of young pigs in barren pens was compared with young pigs in pens containing peat or straw substrate, the researchers found that the piglets in the pens with substrate material were more active (including frisking, scraping the ground, scampering, rolling in the substrate) and were less aggressive to each other. Compared to pigs in barren pens, they spent 10 times as much time playing.[85] Experiments in Scotland, giving growing pigs relatively small amounts of straw (200 gm each a day), showed that the pigs spent over a quarter of their time occupied with the straw.[86] Experiments in Denmark have also shown the very strong preference of pigs for peat rather than straw,[87] suggesting that pigs feel best able to carry out their natural behaviour when kept outside on earth.

Cattle

Beef cattle are often kept indoors over winter or for final fattening ('finishing'). Often they are kept on bare concrete slatted floors. Experiments at the Agricultural Research Institute of Northern Ireland have shown that steers brought in from their summer pasture to indoor housing much preferred to be on a solid floor covered by either straw or sawdust (they preferred straw). The steers chose to spend over 21 times as long on the solid floor covered with straw than on the bare slatted floor, presumably because they found it more comfortable and more similar to natural conditions outdoors.[88]

2.4 Understanding, problem-solving and learning

Experiments have shown that farm animals have good memories, can form mental images of things that interest them, can learn from each other and can even understand what another animal knows

We tend to underestimate farm animals' abilities to solve problems, to understand their environment, and to learn. In natural conditions, these skills would be an essential part of the animal's equipment for survival. It should be no surprise to find that sheep and goats can remember the position of food sources and learn to distinguish nutritious from unpalatable areas of food. Experiments on farm animals' cognitive abilities show that they can understand and distinguish between objects, people and events in their environment, form expectations of what is likely to happen, and work out how to deal with new situations.

Chickens

Hens, as well as cows, sheep and pigs, can tell individual humans apart. In experiments at the University of Guelph, hens easily learned to tell 2 humans apart as efficiently as cattle. The hens turned away from the human who consistently failed to offer them food.[89] Hens can form expectations; when deliberately prevented from getting at food in experiments when they had been trained to expect a good food reward in the same situation, they gave 'gakel-calls' which scientists interpret as emotional frustration.[49,50] Hens also learn from each other. Mother hens use 'food displays' (scratching, pecking) to teach their chicks what is the right sort of food and are concerned when they see chicks eating what they think is the wrong food.[75] Hens can also learn from watching other hens perform a task.[90] Even 2-day old chicks seem to be capable of making mental images. The chicks were set a task of finding an object they had imprinted on, when they could only see it through a small window in a barrier. They were able to keep the object that they were trying to reach in their minds when it went out of sight.[91] Two-week old chicks are able to use their spatial memory to find hidden food.[92]

Pigs

Pigs are generally recognised to be at least as good at problem-solving as dogs, and can remember where to find hidden food. But they also seem to have an understanding of what is going on in other pigs' minds and make their own decisions accordingly in order to get what they want. This type of thinking has often been assumed to be special to apes and humans. Bristol University scientists have showed that if one pig has been taught where food is hidden, other pigs notice that the pig is 'informed' and follow the leader rather than searching randomly. They then steal the food from the 'informed' pig. In response, the 'informed' pig avoids going directly to the food when the non-informed pig is near, in order to have time to eat some food before the other pig arrives.[93,20]

Box 3 **The 5 Freedoms**

Many animal welfare scientists consider that the 5 Freedoms form a useful minimum checklist we can use to assess animal farming practices:

Freedom from hunger and thirst: by ready access to fresh water and a diet to maintain full health and vigour

Freedom from discomfort: by providing an appropriate environment including shelter and a comfortable resting area

Freedom from pain, injury and disease: by prevention or rapid diagnosis and treatment

Freedom to express normal behaviour: by providing sufficient space, proper facilities and company of the animal's own kind

Freedom from fear and distress: by ensuring conditions and treatment which avoid mental suffering

'The welfare of an animal includes its physical and mental state and we consider that good animal welfare implies both fitness and a sense of well-being.'

Farm Animal Welfare Council, www.fawc.org.uk

3. How we respect animal sentience in farming

Too often, intensive farming practice fails to take proper account of the sentience of farm animals. Extensive and organic farming systems are capable of respecting animal sentience much better

Commercial farming increasingly seeks to control every aspect of animals' lives and reduce the choices animals can make. Our control includes their environment, their movement, their food, their contact with other animals, their mating and the relationship between parent and young. Often, the way we exercise our control is contrary to the welfare needs of sentient farm animals.

Intensive animal farming dominates in the most industrially developed countries and is rapidly spreading throughout the world. As world competition for the lowest food prices grows, many farmers are feeling the pressure to reduce their costs and work their animals harder. Intensive farming aims to get the greatest output from the animals for the minimum input, which usually means minimising the amount of space allowed per animal and the number of people allocated to look after them, restricting the animals' movements to make them easier to control and supervise, and separating the animals into groups that are most convenient for the farming enterprise. Pigs, poultry and increasing numbers of dairy cows (and even beef cattle) are kept indoors, often in crowded conditions, often on bare concrete, many never having access to the outdoors in their lives. Some are kept in close confinement such as battery cages for laying hens, the sow stall (gestation crate) and farrowing crate for breeding sows when they are pregnant and suckling their piglets, and the veal crate for young calves.

Speed is all-important in modern farming. We aim to minimise the time that animals take to grow up to slaughter weight, to be slaughtered and processed, for breeding animals to become pregnant and reproduce, to wean their offspring and to become pregnant again. Together with the drive for maximum yield, the drive for maximum speed puts an enormous strain on the animals' bodies and arguably distorts their relationships with each other and our relationship with them.

The welfare potential of extensive animal farming is much greater. In extensive farming the animals have more space and access to the outdoors (but they may still be subjected to painful mutilations – see Section 3.1.1). Organic animal farmers aim to respect the natural behaviour of their animals, promote their health and protect them from pain and distress.

This section will give some examples of how current farming methods fail to respect: the animals' capacity to feel pain and discomfort, fear and frustration; the social and emotional bonds between animals; and their need to explore and forage.

Box 4 **Space allowances for farm animals**

Battery cages for laying hens: In the European Union (EU) each hen has a minimum area of 550cm^2, less than an A4 piece of paper (620cm^2). In the USA each hen has an area up to 432cm^2. In the 'enriched cage' (EU) each hen has a minimum 'usable area' of 600cm^2 plus a shared nest box and perching area

Sow stalls (gestation crates) for pregnant sows: The floor area of a sow stall is typically less than 1.5 m^2 (0.7m x 1.2m)

Veal crates for calves: Crates for veal calves are typically 2' (61cm) to 30" (76cm) wide, giving a floor area of around 1m^2

Meat (broiler) chickens: For birds of 2kg weight, up to 19 birds per square metre, or more, is typical in much of the EU. Stocking densities vary within and between countries

Meat pigs (fattening pigs): In the EU, the minimum area per pig of weight 100kg (typically 5 months old) is 0.65m^2

Breeding sows in loose housing: In the EU the minimum area per sow is 2.25m^2, which can be reduced by 10% for groups of over 40 sows

Farmed fish: Large salmon in sea cages may have a space allowance the equivalent of a bathtub of water each. Young salmon parr may be stocked at the equivalent of 83 fish in a bathtub of water. Trout may be stocked at the equivalent of 27 fish in a bathtub of water

3.1 Pain and discomfort

Many farming practices cause animals pain and discomfort, either directly or indirectly

Farm animals are subjected to pain and discomfort in a number of ways.[94] Pain and discomfort can be caused by deliberate procedures (such as mutilations or rough handling). Sometimes it is the unintended result of intensive farming practices, for example in housing, breeding, feeding, handling at markets, transport and slaughter, that do not take sufficient account of the animals' capacity to suffer.


© Victor Schonfield

Chicks destined to be egg-layers are often de-beaked, causing lasting pain

3.1.1 Mutilations

Mutilations that are often carried out in farming include the tail-docking of piglets, lambs, calves and cows, the castration of male piglets, lambs and calves, the dehorning of calves and the de-beaking of hens (cutting off part of the beak). These operations are normally carried out without the use of pain-relieving drugs. Scientific studies show that mutilations can cause the animals both acute pain and lasting pain.

Pigs

Piglets very often have most of their tails sliced off to discourage them from biting each others' tails in crowded pens where they have no environmental stimulation. Tail-biting must be very painful and stressful for the pigs but it is a problem caused by intensive farming. Several scientific studies have shown that providing straw or other environmental enrichment, or rearing pigs outdoors, greatly reduces or stops tail-biting altogether.[85,86] In many countries, male piglets being reared for meat are also castrated.

Both tail-docking and castration cause pain. Measurements of the squeals of piglets being castrated with a knife have shown that the frequency of the piglets' screams increased by 1000 Hz when the first cut was made and increased almost as much again when the second cut was made. Up to a week after the operation, the male piglets were less active than their female littermates, and showed more trembling, leg shaking, sliding on their hindquarters and tail-jerking. Some vomited and they lay down slowly, sparing their hindquarters.[95] Scientists have commented on these findings that 'it seems reasonable to assume that considerable pain is experienced for several days'.[30] During the castration procedure, studies in Canada and Germany have shown that the piglets cried out the most when the spermatic cord was pulled out of the scrotum and cut, and that these vocalisations during surgery were significantly different from the squealing of piglets who were picked up and handled but not castrated,[96,97] leading to the conclusion that these vocalisations were 'indicators of pain and suffering'.[97]

Cows and calves

Studies of the tail-docking of dairy cows (a mutilation that is done in some countries) shows that the operation is painful and prevents the cows getting rid of biting flies by swatting them with their long tails. After the operation, cows spend less time lying down, a sign of discomfort. Research on Holstein calves in Indiana and Wisconsin found that tail-docking by 'banding' (cutting off blood supply to the tail using a rubber ring) caused the calves 'moderate acute pain' - they were agitated, lay down less and kept touching their tails with their heads. Docked calves had more flies on their rears and made less effort to swing their tails to get rid of them, sometimes trying to lick them off instead.[98] Lactating cows in a Canadian study showed their pain on docking by holding their tails pressed close to their bodies.[99]

New Zealand studies of pain caused by dehorning dairy calves found that the calves behaved abnormally for several hours after the operations, indicating the 'acute pain experienced'. The researchers concluded that calves should be given both local anaesthetic and an analgesic (anti-inflammatory) drug 'to alleviate the pain associated with this procedure'.[100] (See Section 2.1.1)

Lambs and sheep

Lambs are routinely tail-docked and castrated without pain-relieving drugs. This is usually done either by cutting off the blood supply to the tail or scrotum using a rubber ring, by cutting with a knife or hot iron, or by an instrument that crushes the nerves and blood vessels instantly ('bloodless castrator'). All these methods have been shown to cause pain and distress. The bloodless castrator involves 'a brief shock of intense pain experienced by the lambs as the instrument is applied', according to a veterinary scientist at the University of Edinburgh.[101] Studies by the Royal Veterinary College, University of London, of the abnormal behaviour of lambs after they were tail-docked and castrated by the rubber ring method concluded that the lambs 'experienced acute pain'.[102] Studies in New Zealand showed that lambs tail-docked or castrated by constriction of their tails or the neck of the scrotum (by a rubber ring) suffered 'significant distress'. Some lay on their sides, writhed and kicked. They repeatedly lay down and stood up again, up to 40 times more often than normal, for the first hour after the operation. When a knife was used to cut off their tails and cut out their testicles, the lambs walked with splayed legs or stood completely still, seemingly unaware of their surroundings ('statue standing'), behaving abnormally for at least 4 hours. The operations caused the concentration of cortisol in the lambs' blood to approximately double.[103,104]

Sheep in Australia are subjected to 'mulesing' (when the skin around the base of the tail is cut off leaving raw flesh, to reduce fly attack) and to tooth-grinding. Both of these are done without pain-killing drugs. The levels of cortisol in the sheep's blood is still high 24 hours after mulesing. Scientists believe that both of these operations 'would be expected, from the knowledge of pain receptors and the responses of other animals, to be extremely painful'.[30] In response to public pressure, Australian merino sheep farmers' associations have agreed to a phase-out of mulesing by 2010.

Laying hens

De-beaking (partial amputation of the beak) of chicks is carried out to prevent hens from injuring or even killing each other by pecking at each other's feathers and bodies. De-beaking is used on farms where the hens are kept in cages, in barns, and even on free range farms. Apart from the pain of the operation itself, scientists believe that the amputation causes the development of neuromas (tumours on nerve tissue) in the beak, which give lasting pain. This discourages the hens from using their painful beaks in a natural way for foraging and exploration. Animal welfare experts in Canada and the UK have concluded 'It is clear that beak trimming (or de-beaking as it is sometimes called) shows all signs of being a painful operation with prolonged painful effects as well as effects on feeding and exploratory behaviour'.[30]

3.1.2 Close confinement and indoor housing

Many farmed animals worldwide are kept in 'close confinement', almost unable to move, in cages, stalls or crates. Many others are kept in barren and crowded indoor housing. These housing systems cause pain and discomfort from injury and poor health

In 1976, the Council of Europe's *European Convention for the protection of animals kept for farming purposes* stated the principles that:[105]

'Animals shall be housed... in a manner... appropriate to their physiology and ethological needs in accordance with established experience and scientific knowledge' (Article 3)

and

'The freedom of movement appropriate to an animal… shall not be restricted in such a manner as to cause it unnecessary suffering or injury' (Article 4(1)).

In practice, many aspects of animal housing in intensive farming are not based on the behavioural needs and preferences of the animals but on the convenience of the farmer. Millions of animals worldwide live their lives in 'close confinement' in what are essentially cages. Close confinement, where the animal's movement and natural behaviour is severely restricted, has been shown to cause suffering both because of the behavioural restriction and because of increased incidence of some types of injury and diseases.

Keeping laying hens confined in battery cages prevents exercise and natural behaviour, and also makes them more prone to brittle bones (osteoporosis) and bone breakages. Sows confined in sow stalls (gestation crates) suffer both frustration and physical deterioration. Young calves raised for veal in narrow 'veal crates' cannot turn round, groom themselves or exercise, leading to abnormal behaviour and ill health.

When the animals are not physically confined by bars, they are often kept crowded indoors, without environmental enrichment and in conditions that contribute to disease. Concrete or slatted floors are unsuitable for pigs and cattle and contribute to long-term painful lameness.[106] Meat chickens (broilers) are so crowded that both their movement and resting are disturbed. The manure-filled litter on the floor causes them to suffer pain from skin sores and from irritation of their respiratory tracts and eyes caused by air pollution.[107,108]

Research at Bristol University has shown that broilers find high concentrations of ammonia aversive and 'avoid ammonia at concentrations commonly found on poultry units' if they are given a free choice of where to spend their time.[107] Broilers' eyes can be damaged by the very low light levels provided in broiler sheds (typically 10-30 lux compared to 250 lux in a business office).[108] Broilers' health can also suffer in some intensive systems where the light is kept on most of the time in order to encourage eating, and the birds are not provided with long enough periods of darkness.[109]

Box 5 **Veal crates**

Most male calves of the dairy herd who are used to produce veal in North America (and traditionally in Europe) are housed alone. Often they are kept in narrow veal crates, unable even to turn around, often tied by the neck. Veal crates may be only 2' (61cm) to 30" (76cm) wide or even narrower. In the most extreme of these systems, the calves are fed a liquid diet deficient in iron and fibre, in order to produce white meat. These calves 'can have serious health problems, can show serious abnormalities of behaviour and can show substantial abnormalities in gut development', according to the report of the European Union's Scientific Veterinary Committee in 1995.[110] The calf's rumen does not develop properly, predisposing it to enteritis and indigestion. The calves suck, lick and bite their pens and roll their tongues purposelessly. They are unable to exercise, interact with other calves or explore. Their levels of cortisol show they are experiencing increased stress. [111]
(See Box 10 for legal reform of this system in Europe)

Box 6 **Cages for laying hens**

Worldwide, 70-80% of hens are kept in battery cages. In Europe, these cages usually have floor dimensions of 50cm x 50cm, with wire mesh floors, and hold 4-5 hens. In these cages, each hen has less space than an A4 sheet of paper (620cm^2). In the USA hens are allowed up to 432cm^2 of space each. Scientists have shown that a hen occupies 893 cm^2 to stretch her wings and 1271cm^2 to turn round. She needs 13550cm^2 to feel free to flap her wings. Hens in cages lose their feathers from pecking and are at risk of skin abrasion. They are prone to bone weakness, due primarily to lack of exercise, and surveys have found that up to 30% suffer broken bones at the end of their lives when the 'spent hens' are removed from their cages, packed into crates and transported to the slaughterhouse.[112,113] (See Box 10 for legal reform of battery cages in Europe)

Box 7 **Sow stalls** (gestation crates)

Breeding sows are kept to produce piglets to be reared for meat. In most of the world's intensive pig industry, breeding sows are kept in narrow 'sow stalls' (gestation crates) for each of their 16½ week pregnancies, so that they spend nearly all of their adult lives in these stalls. The stalls are typically 0.7 metre wide by 2.1 metre long and the floor is bare concrete or slatted. As well as preventing natural behaviour such as foraging, rooting and interacting with others, sows stalls prevent exercise. The sow is unable to turn round and may have difficulty lying down and standing up. Sows are often also fed a restricted diet without roughage, much less than they would choose to eat, so that they feel chronic hunger. Sows kept in stalls have been found to have increased incidence of urinary infections, gastrointestinal problems, reduced muscle and bone strength, increased lameness, reduced cardiovascular health, chronic stress and depression. A scientific survey found that 50% of their time can be spent in clearly or arguably stereotypic behaviour.[114, 115] (See Box 10 for legal reform of this system in Europe)

A sow bites the bar of her sow stall in frustation

3.1.3 Intensive breeding

Breeding farm animals for maximum yield often causes them to suffer from painful and debilitating health problems

Modern intensive farming aims to breed animals that produce a maximum yield of meat, milk or eggs. Cattle have been bred to be specialised for milk production or beef production. Chickens have been bred to be specialised for meat production or egg production. Breeding for maximum yield has resulted in increased pain and injury, often due to disease, because of the excessive demands put on the animals' bodies.[116]

Dairy cows bred for high milk yield (which can be 35-50 litres a day) are more likely to suffer long-term pain from lameness and mastitis.[116] Mastitis is a very painful infection of the udder. Surveys show that the majority of cows are likely to suffer from both of these painful conditions within their working lives.[117] According to a survey of lameness on 53 farms by the University of Bristol Veterinary Department, 14% or more of the cows were observed to be lame on 80% of the farms studied – on the worst 20% of the farms, between 30% and 50% of the cows were lame.[118] The Holstein dairy cow typically lasts only for around 3 lactations before she is sent for slaughter, often because of low fertility, mastitis or lameness. Dairy cows in France are reported to last for only 2.5 lactations.[97,98] The cow's low fertility is an indication of her chronic physical exhaustion. More traditional 'dual purpose' breeds of cow (they can be used for both beef and milk) can last for over 15 lactations.[121]

Meat chickens (broilers) are bred to grow so fast that they often suffer from painful lameness because their bodies are too heavy for their legs. These lame chickens have been found to choose food that contains an analgesic.[35] Lame chickens may not be able to stand up to reach food and water containers. Severely lame birds have been found to drink avidly when water is put within reach.[122] (See Box 8)

Box 8 **Meat (broiler) chickens** [123,124]

Meat chickens are usually reared in sheds containing thousands, or tens of thousands, of birds. The main commercial strains have been selectively bred to grow to their slaughter weight (typically 2kg) within 6 weeks, when they are still juveniles. Their rate of growth has approximately doubled in the last 30 years and breeding companies are still striving to increase it further. Their breasts have been broadened compared with their wild ancestors, which puts additional stresses on their hips and legs. As a result of their fast growth, many of these chickens suffer from painful lameness and from heart failure at an early age. Large surveys in Denmark (1999) and Sweden (2002) found that in Denmark 75% of chickens had some walking abnormality and 30% were very lame. In Sweden, over 72% of chickens had some walking abnormality and around 20% were very lame. 37% of chickens in Denmark and around half of chickens in Sweden had leg deformities and around half the chickens in both countries had disorders of bone growth. Between a fifth and a half of the chickens had foot pad dermatitis (skin sores on their feet).[125] Broiler chickens are very inactive and spend at least 75% of their time sitting or lying towards the end of their short lives. This leads to ammonia burns to their breasts and legs from the manure-filled litter on the floor of the shed. 82% of supermarket chickens surveyed in 2005 in the UK had 'hock burns' (skin sores on their legs).[126] Worldwide, around 5% of broilers develop heart failure, a result of their increased need for oxygen for fast growth, which puts an excessive strain on their hearts and lungs.

3.1.4 Handling, transport and slaughter

Farm animals are often subjected to rough and painful treatment during handling, transport and slaughter

The handling of animals during marketing, transport and slaughter is a frequent source of injury and pain as they are moved, loaded, unloaded and processed in large numbers, often with maximum haste. A study of livestock markets in England, published in 2002, found that cattle were hit or poked with sticks or goaded by gates in all of them. Three quarters of the cattle that had passed through a market had some bruising.[127]

According to the EU's Scientific Panel on Animal Health and Animal Welfare in 2004, 'Some very poor welfare in transported animals is caused by bad treatment of animals during loading or unloading, by bad driving or due to inadequate inspection'.[128]

Throughout the world, farm animals such as sheep and cattle are subjected to long-distance transport for slaughter, in journeys that may take days or even weeks in crowded conditions, sometimes without feed, water or rest. Laying hens and meat chickens travel less far for slaughter, but are often injured by being packed into crates and transported. In the EU alone, it can be estimated that between 18 and 35 million chickens arrive dead at the slaughterhouse every year, often due to heat stress or broken bones.[124]

In Western countries it is normally legally required that animals are stunned before slaughter in order to spare them pain when their necks are cut. However, in many countries pre-slaughter stunning is not required, and even in countries where it is legally required the stunning may be carried out incompetently, so that it subjects some animals to additional pain and fear. Animals can also be frightened by the unfamiliarity and noise of slaughterhouses and can suffer from rough handling.

Chickens are normally stunned after being hung upside down by their legs in shackles when fully conscious. Hanging in shackles is likely to be very painful, especially when birds are lame or have broken legs. Experiments on the activity of nociceptors in the legs of (anaesthetised) chickens during shackling concluded that 'shackling is likely to be a very painful procedure'.[129]

Shackling is likely to be very painful for chickens

If farm animals are not stunned effectively, or the time between stunning and neck-cutting is too long, they may still be conscious when they are being killed. In the case of chickens (up to 200 birds are slaughtered per minute in a modern slaughterhouse) it has been estimated that 9 in 1000 chickens may have their throats cut while conscious. This would amount to more than 50 million chickens a year in the EU alone.[124]

Some pigs and poultry are stunned by gassing them with carbon dioxide (CO_2), which is likely to be both painful and distressing. Carbon dioxide forms an acid with water; when humans breath it, it gives a 'burning' sensation and at 30% concentration it causes hyperventilation, severe acidity of the blood, raised blood pressure and mental stress.[130,131] Experiments show that carbon dioxide is aversive to rodents, pigs and turkeys and can cause severe respiratory distress. Scientists at the University of Birmingham (UK) have concluded that carbon dioxide gas should not be used for stunning or killing animals.[132,133,134,135]

Fish are now farmed in very large numbers throughout the world, the production growing at around 5% per year.[136] Some slaughter methods used for fish almost certainly cause pain and distress. Some fish have their gill arches cut without pre-stunning. Fish may be left to suffocate in air, or on ice, when they are fully conscious. Because of the cooling effect of the ice, the fish can take 15 minutes to lose consciousness. Salmon and trout are sometimes stunned in water saturated with CO_2, which causes severe distress. The fish do not lose consciousness for 4-9 minutes, which means they may often be conscious when their gills are cut with a knife.[137]

3.1.5 Pain and discomfort caused by force feeding and feed restriction

The luxury product 'foie gras' (meaning 'fat liver') is produced by force feeding ducks and geese. The bird is force-fed during the last weeks of its life before slaughter, until its liver has swollen to 6-10 times the normal size. The birds are often kept singly in small cages during the force-feeding period. Force feeding is done by pushing a metal pipe into the animal's beak and cramming grain down its throat. The result is fatty degeneration of liver cells, leading to a pathological condition of the liver, according to the EU's Scientific Committee on Animal Health and Animal Welfare in 1998. The birds suffer pain, discomfort and sickness both from the force feeding procedure and from the effects of liver pathology. Force feeding for too long can lead to liver haemorrhages, jaundice and death. In addition, the swollen liver expands the bird's abdomen, making standing and walking difficult.[138]

Meat (broiler) chickens that are used for breeding are often kept on a very restricted diet. Their ration can be as low as one fifth of what they would choose to eat as they grow to adulthood and they suffer from constant hunger. Feed restriction of up to 50% may be continued during adulthood. The feed restriction is done because meat chickens have been genetically selected to grow so fast that they can not survive healthily into adulthood unless their growth rate is held back. Scientists who have studied this practice conclude that the chickens are 'highly motivated to eat at all times' and that they are 'chronically hungry, frustrated and stressed'.[123,139,140]

3.2 Fear and anxiety

Farmed animals are often caused fear and anxiety by farming practices that fail to respect their awareness and capacity to suffer

3.2.1 Fear of humans and handling

Rough handling can cause high levels of fear in farm animals

Farm animals live under human control and they can suffer considerably from fear of what humans may be going to do to them. They show this fear by escape or avoidance behaviour. Scientists have concluded that animals that show high levels of fear of their stockmen may be living in a state of 'chronic stress'.[141]

Experiments have shown that pigs, calves or cows subjected to hits, slaps, kicks, pushes or threats by stockpeople rapidly learn to avoid humans. Dairy cows when hit or slapped as they move into the milking shed are restless, flinch and kick during milking. The fear is associated with long-term high levels of cortisol and enlargement of the adrenal glands (both indicative of stress). Pigs used to being handled roughly responded to the presence of humans with a 200% increase in corticosteroids. Fear of humans can reduce the productivity of pigs (growth and reproduction) by as much as 20%. High levels of fear also reduce the productivity of laying hens and broiler chickens. Positive handling, on the other hand, leads to less fear of humans.[43,141]

In the case of pigs, the fear can show up in their meat. Australian scientists found that pigs prodded with electric goads as they were moved from a slaughterhouse lairage to the stunning area were much more likely to produce 'pale soft exudative' (PSE) pork, which is caused by the chemical effects of acute stress before slaughter.[124]

In normal farming practice, animals are caused fear by moving, handling and transport. Studies have shown that sheep show a large increase in heart-rate when merely approached by a man with a dog (+84 beats per minute). Chickens and calves show greatly increased levels of stress hormones, and sometimes glucose depletion, during transportation,[30] presumably caused both by fear and by discomfort or pain.

3.2.2 Separation and weaning

Separating the parent and young by early weaning causes fear and distress

Fear and anxiety are very likely to be caused by separating young animals from their mother by forced weaning, but commercial farming practice rarely allows natural weaning. Natural weaning is a gradual process controlled by the mother.

Pigs

Piglets are usually removed from their mother when they are still very reliant on her

Natural weaning takes about 16-17 weeks in the case of pigs. In the EU piglets are usually weaned at 3-4 weeks old, but in some countries, such as the USA, piglets may be weaned and removed from their mother at 2 weeks old or even earlier. Scientists from Bristol University have noted that 'Piglets are commonly removed from the mother when they would still be suckling, maintaining a strong social attachment to her, and relying on her for 'social security' and protection under natural conditions. They are thus weaned when they are still behaviourally highly reliant on the sow'.[143] The stress of abrupt weaning results in a high incidence of clinical disease and diarrhoea among the piglets.[144]

As we have seen above (Section 2.2.3), the piglets have a special distress call when separated from the sow, which the sow responds to. Scientists in Canada studied how much piglets called, depending on age of weaning (3, 4 or 5 weeks of age). All the piglets called very frequently in the first few days after weaning (they had rarely called when with the sow), at the astonishing average rate of 8 calls a minute on the first day, reducing to 1.6 calls a minute after 4 days. The piglets weaned at 3 weeks called over 50% more than those weaned at 5 weeks and called at higher frequency.[145] Tests on piglets weaned at 7, 14 and 28 days found strong evidence that the early-weaned piglets were distressed. The piglets weaned at 7 days old (when naturally they would still be in the nest with the sow) spent more time trying to jump out of the pen and belly-nosing each other (a re-directed suckling behaviour that can cause injury). They showed little interest in eating. Their behaviour was described as 'loss of will to live' in a survey of Canadian farms.[146]

Cows and calves

The dairy industry depends on the separation of the mother cow and her calf. A dairy cow in commercial farming is usually required to produce a calf once a year so that she will lactate for the following 10 months. In natural conditions a calf would not be weaned below six months and possibly not till 9-11 months.[79] In commercial dairy farming, calves are usually removed after the first 24 hours, when they have suckled enough to provide them with the protective antibodies in the mother's colostrum; or they may be removed immediately and fed colostrum by the farmer. The calves may be reared to be milking cows in their turn, or they may be reared for veal or beef. Male dairy calves of a pure dairy breed are often considered useless for prime beef production, and may be killed at birth.

Experts agree that the separation of the dairy cow from her unweaned calf causes suffering. It is argued that the suffering may be less if the calf is removed soon after birth because, by two weeks from birth, the cow and calf have formed a strong emotional bond and when they are separated 'the distress shown by both mother and calf is loud and prolonged',[147] according to a leading UK animal welfare expert. However, it is also known that the long-term health and welfare of the calves is reduced if they are removed very soon from their mothers and that they are less fearful and more sociable if they are allowed to remain with her for longer.[148] Hungry calves kept alone in stalls and fed their milk ration only twice a day 'start bawling' when a stockperson comes into their barn.[149] Even when beef calves are removed from their mothers at 6 months old, the cows can call for days.[150]

Compassion in World Farming Trust interprets this evidence as showing that early weaning of young animals, as is common practice in commercial farming, is an unacceptable infringement of the animals' family relationships and their psychological well-being.

3.3 Disruption of social and family behaviour

Separation of a cow and her calf causes great distress to both

Farming practices often disrupt the social and family relationships of farm animals, leading to anxiety, frustration and stress

'Almost everything about the way they are kept is abnormal… From a psychological point of view, they are a wild animal stuffed into an artificial containment system.' [149]

The natural family behaviour of animals is often ignored in modern commercial farming. Scientists are aware that their natural behaviour may be 'ill suited to the unnatural physical and social environment' that the animals are kept in. Farm animals are predisposed to behave in certain social ways that are not allowed in intensive farming. The newly hatched chick is predisposed to imprint on a parental figure. The sow is predisposed to wean her litter gradually as they grow up. Females of many farm species are predisposed to select a mate based on certain attributes. The chick will have been born in a hatchery and will never see its mother. It will grow up with hundreds or thousands of other chicks of the same age. The piglet may be weaned and mixed with numbers of other unknown pigs at an age when it would still be spending much of its time with the sow.[151] Artificial insemination is now used for at least 60% of breeding sows in Europe and North America and for the large majority of the dairy cows in developed countries. Breeding boars are often kept solitary in pens and 'milked' for their semen. Cattle semen (and sometimes embryos) can be frozen and sold throughout the world.

Frustration of nesting behaviour

We have seen that hens have a very strong motivation to lay their eggs in a nest and experiments show that they will 'work' hard for access to a nestbox. At the time they are about to lay an egg, hens 'search frantically for a nestbox, suspending all other behaviour to do so', according to a leading animal welfare expert at Oxford University. She concluded that 'at least once a day, the millions of hens that are confined to cages without nestboxes experience a strong sense of frustration at not being able to find one'.[83]

Breeding sows have a strong motivation to build a nest of sticks, grass and other materials where they can give birth to their piglets. In farming conditions, they build nests of straw when that is available. Even when they are in a barren pen without straw, sows will try to go through the motions of nestbuilding on the floor.[77] Even sows confined in narrow farrowing crates try to redirect their nestbuilding activity to the bars of the crate.

Researchers at the Universities of Edinburgh and Wageningen recently found that pigs about to give birth had higher levels of stress hormone when they were kept in crates rather than in pens, where they had more space and could carry out more nestbuilding activity. This was the case even if the pens had no straw, when the sows nosed and pawed at the floor. The scientists concluded that the space restriction in the crate was 'stress-inducing' for the pigs and produced 'an aversive psychological state'.[54] Over time, as they get more experience of having litters, the sows in straw pens appear to improve their nest building, whereas the sows who continue to farrow in bare farrowing crates do less nest building, possibly giving up the attempt.[152]

Compassion in World Farming Trust interprets this evidence as showing that laying hens and breeding pigs are caused unacceptable frustration and psychological suffering when they are prevented from being able to select a nest site or build a nest.

Disruption of social relationships

In natural conditions, cattle, sheep, pigs and poultry form social groups with familiar members and understood relationships, and these groups are rarely joined by unknown animals. This appears to minimise conflict, fear and stress. Many commercial farming methods cause social problems for the animals by joining unnaturally large numbers of animals together, by changing or splitting up groups and mixing unfamiliar animals, for the convenience of farming practice. Animals are often sold on to different farms at different stages of their rearing or reproductive lives, to join unfamiliar animals.

Pigs kept in barren pens with concrete or slatted floors cannot explore or forage

Unnatural social groups make conflict more likely. The animals may not be able to recognise all the others in their flock or herd, especially if the group is unnaturally large. Fights, fear and stress are likely to be caused when animals are removed or new animals join even small groups. The confined conditions and overcrowding may often make it impossible for weaker animals to avoid or get away from more dominant animals that bully them, or to get to food. Pigs are well known to have confrontations and fights when they are mixed with unfamiliar pigs, because they have to establish a new social hierarchy; this is particularly stressful for piglets when they are removed from their mothers and put together with unknown pigs at weaning.[153] In large or crowded feedlots for beef cattle, some animals who are unable to escape from harassment by dominant steers become so weak that they collapse. Scientists believe this so-called Buller Steer Syndrome may be the result of 'chronic social stress' in feedlots.[149]

Problems of social conflict among the animals are often 'solved' on intensive farms by confining animals in small stalls or cages. Compassion in World Farming Trust believes that farm animals must be kept in stable social groups that respect the animals' natural social organisation (see Box 9).

Box 9 **The Family Pen System for pigs**

In the Family Pen System, pioneered at the University of Bern (Switzerland), piglets and fattening pigs grow up together with their mother in family groups that are similar to the natural social organisation of pigs. In this system each family group, made up of 4 or 5 sows, lives in a family pen containing separate nest areas for each sow and communal areas, including an outside yard. Straw bedding and materials for rooting are provided. About 2 weeks after farrowing, the group of sows with their litters are enabled to mix together. Piglets are suckled for 7 weeks at least and stay with the sow for 5 months. Tail-docking of the piglets is not allowed. This system is practical on a commercial farm. Sows brought up in the system produced 21.4 piglets a year, which is comparable to many intensive pig farms.[154]

3.4 Prevention of natural activity

Intensive farming systems prevent animals from carrying out natural behaviour such as exploring, foraging and grooming

Farm animals kept in barren conditions indoors are often unable to carry out many of the activities that are important to them. This may frustrate their strong motivation to forage for food, to explore in a complex environment and to groom and preen.

Laying hens

Laying hens kept in cages are deprived of nearly all their natural behaviour. They are unable to forage, to peck and scratch on the wire floor, to dustbathe or to stretch their wings. Caged hens will still go through the motions of having a dustbath, by squatting down, raising their feathers, rubbing themselves on the floor and flicking imaginary dust onto their backs. If they are then given access to litter material for a dustbath, 'They do it over and over again, apparently making up for lost time when they were unable to do the real thing'.[83] Pecking is a natural behaviour that would normally take up much of a hen's day. In the unnatural conditions of commercial farming, some hens turn to pecking at the feathers and bodies of other hens. This may be linked to the frustration of the hens' motivation to forage or dustbathe.[155] Feather-pecking is a serious problem in farming, since the hens can seriously injure or even kill each other. Hens (whether kept in cages or free to move about in barns) are often de-beaked to reduce the amount of damage they can do to each other, but this also prevents them from carrying out normal exploratory behaviour.

Pigs

Intensively farmed pigs are most often kept indoors on concrete or slatted floors, where they cannot carry out their natural foraging and exploring behaviour. In natural conditions, pigs spend much of their time in rooting, sniffing around for food, and chewing. Animal behaviour experts believe that 'rooting may constitute a need in its own right in pigs'. Pigs show how important this behaviour is to them by the way they still go through rooting motions, directed at the bare floor or the pen, for much of their time even when no rooting materials are provided. A minority of breeding sows are kept outdoors in fields, where they have access to earth and grass. However, the sows are often nose-ringed, to prevent them from digging up the land. Nose rings cause the sow pain if she tries to root and inhibits her from carrying out this natural behaviour.[77,156]

Compassion in World Farming Trust interprets this evidence as showing that farming systems that prevent animals from carrying out natural behaviour such as rooting, foraging and pecking cause them unacceptable psychological and physical suffering.

Box 10 **Progress in animal welfare**

Progress in the EU

In the European Union (EU), the following are examples of steps towards the recognition of farm animal sentience that have already been made:

- **Veal crates:** Confinement of veal calves in narrow veal crates is prohibited from 2007. Calves must be fed some roughage and iron. Veal crates are already prohibited in the UK .
- **Battery cages for laying hens:** Confinement of hens in battery cages is prohibited from 2012.
- **Sow stalls (gestation crates):** Confinement of pregnant sows in sow stalls (gestation crates) is prohibited from 2013. Sow stalls are already illegal in Sweden and the UK. Sows must be given some bulky or high fibre food to satisfy their need to chew.
- **Environmental enrichment for pigs:** Pigs must be given materials such as straw, woodchips, compost, etc., to enable them to carry out their exploratory behaviour.
- **Mutilations:** Routine tail-docking of piglets is illegal. De-beaking of hens will be prohibited in the UK by 2011.
- **Long-distance live animal transport for slaughter:** From 2007 tighter rules on training, certification and enforcement will come into force, together with requirements for on-vehicle drinking systems and control of ventilation and temperature and, from 2009, satellite navigation systems on transport vehicles to verify compliance with the rules on journey times. Journey times within Europe are still unacceptably long, and the EU is due to review the maximum journey times and required rest times in 2011.
- **Broiler (meat) chickens:** The EU is in the process of agreeing the first Directive to protect the welfare of meat chickens. The new rules will set maximum limits on stocking density, require monitoring of welfare indicators at chicken slaughterhouses and make some improvements in requirements for lighting, ventilation, air quality and dark periods. The European Parliament has voted for a maximum stocking density equivalent to 17 birds per square metre (34 kg per m^2), which is considerably lower than current commercial practice in much of the EU.
- **The EU Council Directive 98/58/EC** concerning the protection of animals kept for farming purposes states: 'No animal shall be kept for farming purposes unless it can be reasonably expected, on the basis of its genotype or phenotype, that it can be kept without detrimental effect on its health or welfare' (Annex, Para. 21).

Global progress and initiatives

- **Welfare standards of the World Organisation for Animal Health (OIE):** The OIE is an inter-governmental organisation with 167 member countries, which was founded in 1924 to set global rules for monitoring, prevention and control of animal diseases. In 2001 the OIE formally decided to extend its work to include animal welfare and in 2005 the OIE adopted the first ever global standards for animal welfare. The first 4 sets of standards are for the protection of

  - animal welfare during transport by land
  - animal welfare during transport by sea
  - animal welfare during slaughter for human consumption and
  - animal welfare during slaughter for disease control.

  The standards set out the responsibilities and competence required of workers, good practice in handling and slaughter methods, requirements for the animals' welfare during transport, and practices that are unacceptable.

- **The Universal Declaration on Animal Welfare:** The initiative for a Universal Declaration on Animal Welfare is led by the World Society for the Protection of Animals (WSPA), supported by CIWF, and aims for the United Nations to adopt a declaration recognising animals as sentient beings capable of feeling pain and therefore should be protected from cruelty.

  An intergovernmental conference was held in 2003 in Manila and attended by 22 governments, including the governments of India, China and the European Commission, where the principles of the proposed Universal Declaration were agreed. An intergovernmental steering committee meeting in Costa Rica in 2005 agreed to take this initiative forward by holding an intergovernmental conference in 2007.

Box 11 **Farming with respect for animal sentience – free range and organic farming**

Consumers are increasingly choosing to support higher standards of animal welfare by buying free range and organic meat, eggs and milk. Although the welfare standards of organic farming vary globally, the best – as exemplified by the Soil Association in the UK – aim to 'nurture positive health and vitality… and the encouragement of positive animal welfare… [to ensure] the satisfaction of the animal's needs including behavioural needs and not merely the avoidance of cruelty'.[157] All animals must have access to a suitable range outdoors for most of their lives and they are allowed more space than in intensive farms. Slower-growing breeds are used and the animals are kept in reasonably stable groups. The relationship between mother and young is respected. The Soil Association organic farming standards recommend that every calf should be reared by its own mother and that piglets should not be weaned earlier than 8 weeks old.[157]

Free range hens enjoying a dust bath together

Free range pigs foraging in woodland

Conclusions and recommendations

4.1 The sentience of farm animals

Every year we discover more about the cognitive abilities and emotional complexity of animals, including farm animals. They can feel pain and suffer physically and they also experience psychological wellbeing and psychological distress. The scientific studies cited in Section 2 of this report show that the subjective feelings of an animal are a very important aspect of its welfare. Pleasant and unpleasant feelings are part of the animal's experience of its life. We know that farm animals:

- Feel pain in the same way as humans, and have thresholds for pain perception broadly similar to humans (2.1.1)
- Feel the emotions of fear and anxiety (2.1.2)
- Feel emotionally frustrated when they are prevented from carrying out their natural behaviour patterns or feeding (2.1.3)
- Feel pleasure when they are playing, feeding or carrying out natural behaviour patterns (2.1.4)
- In natural conditions live in organised social groups (herds or flocks) which are small and stable enough for the animals to know each other (2.2.1)
- Form strong emotional bonds between parents and young, such as between a cow and her calf or a sow and her piglets (2.2.2)
- Communicate with other members of their group or family using their senses of sight, sound, touch and smell (2.2.3)

- Show a strong preference for living in conditions where they can carry out natural behaviour, such as nesting and foraging (2.3)
- Have good memories, can form mental images of things that interest them, can learn from each other and can even understand what another animal knows (2.4)

Too often commercial farming practice, especially intensive (factory) farming, fails to take proper account of the sentience of farm animals. Farming practices that are commonplace today cause animals both physical suffering and psychological distress. Scientific studies cited in Section 3 of this report show that common farming practices cause farm animals to suffer from:

- Pain and discomfort caused by mutilations (castration, tail-docking, de-beaking, de-horning) without pain relief (3.1.1)
- Pain and discomfort caused by close confinement in cages, crates or stalls, or in crowded sheds (3.1.2)
- Painful health problems caused by breeding animals for maximum yield (3.1.3)
- Stressful and painful treatment during marketing, transport and slaughter (3.1.4, 3.2.1)
- Fear and distress caused by the separation of parent and young and the early weaning of piglets and calves (3.2.2)
- Anxiety, frustration and stress caused by isolation, crowding and the disruption of social relationships (3.1.2, 3.3)
- Frustration and stress caused by being prevented from carrying out natural behaviour patterns (3.3, 3.4)

4.2 Recognising farm animal sentience in theory and in practice

In view of what we now know, it is time for human society to recognise the sentience of animals without reserve and to act on this recognition. In the past and even sometimes today, there has been a grudging attitude to the sentience of farm animals, which implies that they do not feel very much or that their feelings or their pain do not matter very much. The attitude has sometimes been that long-established farming practices do not really need to change to take account of farm animals' sentience. This attitude is inconsistent with what we now know, and is based on prejudice rather than on scientific evidence. On the contrary, our treatment of farm animals needs to be based on the fact of their sentience and their capacity for both physical and psychological suffering or wellbeing.

In view of what we now know, society can no longer ignore the fact that many aspects of commercial farming practice fail to recognise and respect the animals' sentience. Some of these practices, such as confinement in cages, crates or stalls, mutilations, early weaning, overcrowding, extreme selective breeding and long-distance transport for slaughter are entirely incompatible with our understanding of the animals' capacity for physical and mental suffering. These practices should be prohibited internationally, even though they are backed by tradition or the interests of agribusiness.

For the future, we must aim for the highest standards to protect the physical and psychological welfare of the billions of animals that we farm worldwide. Compassion in World Farming Trust believes that the following standards must be met if we are to recognise the sentience of farm animals in practice:

Environment and housing

- Free range, with daily access to the outdoors (unless climate/weather renders this impossible) and adequate shelter
- Natural light and ventilation where possible
- Space for natural movement and exercise
- Comfortable and appropriate bedding

Health

- Promotion of positive health status, and prevention of disease, as primary strategy
- Prompt treatment of injury and disease, including seeking veterinary advice
- Prompt and humane killing of animals where suffering cannot be relieved

Breeding

- No selective breeding for traits that could compromise animal welfare
- Use of slower-growing, more sustainable animals, preference for dual-purpose breeds
- No genetic engineering or cloning

Feeding and management

- Adequate and appropriate feed. No restricted feeding regimes which cause hunger
- Prohibition of force-feeding
- Access to clean water at all times
- No non-therapeutic mutilations, operations or invasive procedures
- Ability to perform natural behaviours, including rooting, foraging, nesting, dust-bathing, grazing

Respect for social behaviour

- Companionship of own kind
- Stable and appropriate social groups for each species
- No isolation or overcrowding
- Natural weaning periods

Marketing, transport and slaughter

- Transport of live animals for sale and slaughter should be minimised
- Animal welfare training and licensing of all stockmen, transporters and slaughterers
- Prohibition of electric goads and rough handling
- Where various slaughter methods exist, then the best option for welfare should be mandatory
- Animals should be effectively stunned before slaughter or killed instantaneously

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