Animal Welfare: from Science to Law

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Animal Welfare:

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Opening speech to the symposium

Pr Jean-Claude Nouët
Honorary President of La Fondation Droit Animal, Éthique et Sciences (LFDA)
(The Foundation for Animal Law, Ethics and Sciences)

Mr Louis Schweitzer, the President of La Fondation Droit Animal, Éthique et Sciences, and I express our gratitude to Daniel Janicot, the President of the French National Commission for Unesco for granting us with the patronage of the Commission for this conference, without any hesitation, even with enthusiasm. We also thank His Excellency Philippe Alliot, the French ambassador to Unesco, who has approved that this international conference is held here, in the world centre for science and culture.

This is the twelfth conference that our Foundation has organised since its creation in 1977. At the time, we were five people who wanted to constitute a think tank about the living conditions that humans impose to animals for their own interest. Let us remind ourselves who were the founders: Alfred Kastler, Nobel Prize in Physics, Rémy Chauvin, ethologist, Philippe Diolé, author and explorer, Georges Browers, legal expert, and myself, biologist and doctor. From the beginning, we have seen the necessity to make people with too often compartmentalised knowledge meet, zoologists, lawyers, moralists, biologists, historians, doctors, veterinaries, religious people, etc.

I will not list all our conferences, but I underline the evolution of the subjects throughout the years. The first ones mainly dealt with philosophy and ethics, then the interest focused on neurophysiology and behaviour, and then tightened on the feeling and suffering of animal and humans' responsibility, entitled, "Human and animal: from pain to cruelty", topic of our 2007's conference, and "Animal suffering: from science to law", in 2012. These two conferences allowed us to reaffirm the existence of pain and suffering in animals. That of 2012 more precisely showed that the law, still often limited to ban practices that can harm the animals, can and must progress based on the acquisition of scientific knowledge, and evolve towards measures which positively benefits the animals, meaning which can bring them satisfactions, in a word, a feeling of welfare. The topic needed to be dealt with in depth, and in his general conclusion, Mr Schweitzer had wished – I quote him – "that the next symposium will address the issue of animal welfare and its perception throughout the world, because science is also moving forward in this area and that we have a great deal to learn from this field and its consequences in ethical and legal terms".

Since 2014, we have fully worked on the design of a balanced and as complete a programme as possible, as well as on the search of the most qualified speakers. We very much thank the speakers who kindly accepted our invitation and travel, some of them from very far away, in order to share with us their science and enrich our exchanges.

From this conference, we expect to have answers to questions of primary interest, as for example: What is the scientific definition of animal welfare? On which criteria should it be assessed? Which national or international legislations take it into account? Which animals are concerned with it, which are not and why? What are the obstacles to the concern of securing animal welfare?

This conference and its conclusions will significantly contribute to inform the public. They will also reinforce the steps to undertake in favour of new regulatory measures, particularly because of the reorientation of regulations, which, regarding animal welfare, tend to abandon obligations of means and only target a result obligation, which will lead to the necessity of controls which will have to be based on rigorous and unquestionable appraisal criteria. If our conference may result in

a progress of the law related to the welfare of the animals that humans are using and for which they are ethically responsible, it will have achieved its goal.

But there are other animals for which speaking of welfare is improper: these are the countless animals pertaining to the countless wild species. Yet, their lives become more and more difficult, because humans are destroying nature, polluting it, appropriate it, and act as blind and deadly predators. At this time, the 21st Conference of Parties to the United Nations Framework Convention on climate change is ending. Organised in the aim to save our planet, it seems above all, preoccupied by saving humanity and its sustainable development. There has been less discussion about other living animal species, considering the cataclysm of the 6th global extinction has already begun and the balance of life on Earth is in jeopardy.

Because it is here at Unesco that in October 1978 we proclaimed the Universal Declaration for Animal Rights, in the name of science and culture, because the fundamental right of wild animals is to be able to live freely in its natural habitat and to breed, and also because I am the last survivor of the five founders of our group, I allow myself to propose that the next conference of La Fondation Droit Animal, Éthique et Sciences deals with wild animals living freely in the wild, to discuss its fair place in the law, to debate on our ethics towards them, and to consider that we should grant them a good life, as we cannot assure their welfare. I would like to honour the donors of our foundation, whose generosity during their lifetime or beyond, allows us to coordinate all our actions totally independently and with a complete freedom of expression. Their generosity allows us particularly to organise conferences like this one today, to which every donors can attend freely. This is a considerable financial effort for our foundation, but for the founders who were academics, the dissemination and acquisition of knowledge must be free. This was and remains our rule. I thank you for coming in such large numbers and I wish you an enriching conference.

Introduction

Sophie Hild
PhD, ethologist, director of La Fondation Droit Animal, Éthique et Sciences (LFDA)

This publication follows the conference “Animal welfare, from Science to Law” which took place on 10 and 11 December 2015 at the “Maison de l’Unesco” in Paris, and under the patronage of the French commission for Unesco.

It gathers texts written by the invited speakers and was updated in 2018, unless mentioned otherwise. The publication is divided in four parts, as was the case during these two conference days. Each deals with one aspect of the subject: definition, situation, factors of influence, and propositions for the future. They are introduced below.

First part

What is animal welfare?

We live in a society that sees itself as more and more ethical and progressive. As an area of philosophy, ethics guide human actions towards what is right and virtuous. It pushes us towards a fairer and more respectful treatment of other human beings. It translates, among other things, into social progress and legislations in favour of human rights. Likewise, respecting nature and its living beings must constitute a principle guiding our choices and actions. Chapter 1 of this publication will remind us of the philosophical considerations on animals and of the progress made by human minds on the subject of animal welfare.

Animal welfare has become a familiar concept to us all, thanks in particular to the high visibility given recently to farm animals. Animal protectors have used the term for a long time, and researchers have worked on the subject for decades. Their research has had basic objectives, like the studies helping us understand animals’ emotional and cognitive abilities, as well as applied objectives, like the work aiming at mitigating stress in farm animals, often to improve performance (productivity, reproduction…). Nevertheless, advances in animal welfare science are not universally known, and for some it remains a blurry concept. Chapters 2 and 3 will explain some essential scientific notions related to animal welfare in order for us to understand, among other things, how we can evaluate what animals feel and what welfare level they experience.

Even among the specialists, some terms are debated. Chapter 4 will explain the difference between the uses of two words in French: "bien-être" (welfare) versus "bientraitance" (good treatment) and the consequences of using one word or the other. Chapter 5 will analyse the absence of a legal definition of animal welfare in the French law: which animals are concerned by legal protections? Without being exhaustive on the subject, this first part will give the readers essential keys to understand the essential notions and definitions of animal welfare, and allow them to think critically on the subject. Knowledge and hindsight will allow us to use the terms “animal welfare” in full understanding of its meaning. We already observe “welfarewashing”[1] in some domains: some practices are said to improve animal welfare without any demonstration of actual and significant effects. We must be vigilant so that animal welfare does not become an empty shell used only to reassure the public and the consumers.

Second part

Animal welfare as taken into account by law around the world: globalisation and disparities

Knowledge is not enough to make society respect living beings. It can help us take decisions to improve the life of animals. Nevertheless, economical constraints, a resistance to change or even unawareness of scientific facts can slow down an effective account taken of scientific recommendations. This is where the law has a role to play, with its legislations and regulations. Although it is often late to take into account the progress of science and ethics, the law can forcibly make people, or on the contrary prevent them to, perform some practices or behaviours.

Science is the same wherever we are on Earth, but its transcription into legal texts around the world varies greatly. Europe is known as the most advanced as regards legal texts protecting animal welfare. Chapter 6 will show us what those European texts on animal welfare are, while Chapter 7 will compare norms in several European countries. Chapters 8 to 11 will explore the state of laws conducive to animals in several countries in the world: the United States of America, where animal welfare is still struggling to penetrate the law, although activists there are the most powerful; Brazil, which has become a major animal exporter; South Africa, where traditions rule animal breeding; and India, where the gods wear animal faces, where respecting animals is a rule of life, but where misery is in conflict with these honourable principles.

Third part

Animal welfare in the face of socio-economic and cultural factors

Many factors explain such discrepancies. Chapter 12 will start by giving an overview of the costs and benefits of actions taken in favour of animal welfare. On legal grounds, adopting norms favourable to animals can depend on pressures from international trading. Chapter 13 will explain how animal welfare friendly norms can be seen as obstacles in free trade agreements between countries.

Being able to get rid of preconceived ideas is also important to evaluate animal welfare. Access to pasture is not enough in itself to guarantee that animals are in good welfare. Chapter 14 will explain why there is not a simple correlation between the size of a farm and animal welfare. Chapter 15 will turn to the farmers to understand what is at stake for them regarding animal welfare. Practices evolve, sometimes with the help of new technologies that allow a more efficient management of threats to animal welfare.

To end this part, we will see how “hard law”, binding, normative, is not always the most responsive means to improve animals’ living conditions. Chapter 16 will tell us of a Swiss NGO initiative in collaboration with a big supplier to improve animal welfare using “soft law”, helped by consumers.

Fourth part

Objectives for the future: finding alternatives, overcoming the shortcomings

Despite everyone’s good will and intentions in favour of taking fully into account the welfare of animals, there still exist legal practices inflicting great suffering on animals: male castration, force feeding of geese and ducks, dehorning of bovines or caprines… Chapter 17 will give an overview of the current threats to animal welfare.

In parallel, in order to mitigate the negative effects of some husbandry practices, enriching the living environment of animals is a growing subject. Are these measures effective or are they mere

plasters to cover the wounds? Chapter 18 will deal with animal needs and what kinds of enrichments are used to improve animal welfare, especially in captive wild animals.

The part will end on the initiative of the French Ministry of Agriculture to develop a strategy for animal welfare in the period 2016-2020, built in collaboration with all stakeholders, including NGOs. Chapter 19 will show the 5 axes and the 20 measures that were adopted.

What about the other animals?

Animal welfare is a human duty relevant to animals that are held captive by humans, under their responsibility. Of course, wild animals living freely in nature independently from humans - at least in principle[2], can be in states of good welfare, may they be short lived or for a longer period. But it is not a duty for humans to ensure their welfare. How could it be? If we want to make hares safe, we should prevent foxes from eating them. What about the welfare of foxes then?

This publication deals almost exclusively with those called "production animals". Still, we ought to ensure welfare for captive animals in other categories (those used for company, for science, for zoos, for shows…). Far from ignoring those categories - each deserving their own volume - the organisers of this publication have chosen to focus on those representing the larger number of animals held under the responsibility of humans. In France, more than a billion of terrestrial animals are "produced" each year - including 800 million chicken. The numbers pertaining to aquaculture are harder to read given the production of fish is given in tonnage: about 35,000 tons of fish are produced in France each year, including 96% of rainbow trout.

Be that as it may, and to conclude this introduction by going back to notions of ethics, recent years have seen a growing collective awareness with regards to animal welfare[3]. The main objective of this publication is to contribute to elevate the debate on the subject, to make it healthy, constructive and open, by giving the reader aessential pluridisciplinary knowledge (law, sciences, philosophy, economy…).

We hope you enjoy your reading.

1. In reference to "greenwashing".
2. "In principle" because human activities have a devastating impact on animals' natural environments and on climate.
3. Eurobarometer "Attitudes of Europeans towards animal welfare", March 2016, for the European Commission.

PART 1
What is animal welfare?

I
Animal Welfare: A Brief History

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Abstract

This paper traces the relationship of humankind to animals from the ancient Greeks to the 21st century. Up until the 17th century, philosophers regarded animals as being quite distinct from human beings; human beings had rationality whereas animals had none. This meant that animals had only instrumental value and could be used in any way that human beings desired. During the Enlightenment, philosophers started to realize that the distinction was not clear-cut; animals had some rationality. Bentham (1823) pointed out that rationality was not the important factor; animals could suffer and that was what mattered; animals had intrinsic value. Also during the 19th century, as part of Darwin's theory of evolution by natural selection, it was seen that states of suffering and states of pleasure could also be adaptive. Although the foundation was now in place, the emergence of modern animal welfare science was delayed through the first 70 years of the 20th century by Behaviorism, which eschewed any consideration of subjective experiences. It took a controversial book by a layperson, Ruth Harrison, to stir both the scientific and philosophical community into developing theories of animal welfare and a book by an ethologist, Donald Griffin, to make it acceptable to study the feelings of animals.

Philosophers and Animal Welfare

A short consideration of the history of how animals have been dealt with by various Western philosophers sets the scene for how they are regarded today. Much of this early history is taken from Preece and Chamberlain (1993) and Preece (2002).

Aristotle (384-322 BC) studied under Plato at the Academy in Athens. Because Aristotle's ideas were so different from those of Plato, he did not succeed Plato as head of the Academy when Plato died. Instead Aristotle moved to Macedonia for a few years where he educated Alexander (the Great). He then returned to Athens and founded his own academy called the Lyceum. He obviously had an interest in animals since he gave lectures on zoology at the Lyceum. But of course, he is better known for his views on ethics and logic. Aristotle thought that the ability to reason is the highest of all abilities and it is this that sets human beings (actually Greeks!) above all other creatures. Aristotle also introduced the teleological argument i.e. "things being there for a purpose" e.g. "the purpose of rain is to water the plants". From these two ideas, a great hierarchical structure was built in which those with more reason should control those with less (with Gods being superior to men and controlling them, men being superior to women, Greeks being superior to other races, humans being superior to animals, and so on). According to this structure, human beings had absolute authority over all animals and could do what they liked with them. However, the indifference of the Greeks to the plight of animals pales into insignificance when compared to the attitude of the Romans. The Roman period is infamous for the cruelty to animals (and to human beings) inflicted over 400 years. Hundreds of thousands of animals of a wide range of species were subjected to unspeakable cruelty in the circuses - and all for human entertainment. The decline of the Roman Empire giving way to the Dark Ages is generally mourned as a loss of civilization, but at least the scale of cruelty to animals waned.

There is little in recorded history during the next thousand years detailing how animals were regarded by humankind until Aquinas in the 13th century. Saint Thomas Aquinas (1224-1274) was

an Italian Philosopher and a Theologian. He was educated at first at a monastery in Monte Casino, then at Naples, Paris and Cologne. He is best known for his subtle and delicate assimilation of Aristotle's ideas into the theology of his day. His ideas have experienced short periods of popularity through history. Aquinas rediscovered Aristotle's writings and he agreed that it was the ability to reason (or rationality) that made human beings distinct from all other animals. However, he gave Aristotle's ideas a Christian twist. He postulated that animals do not have immortal souls. He also claimed that human beings had no direct obligations to animals. However, they might have indirect moral obligations, in that people who mistreat animals may (1) pick up cruel habits and then treat other human beings badly, and (2) perpetrate a property wrong against the owner of the animal. According to Aquinas, animals do not have moral standing; they only have instrumental value. It is noteworthy that in one respect, Aquinas was correct. Recent research has shown that people who are maliciously cruel to animals early in life are at greater risk of being cruel to people later in life (Boat, 1995; Tallichet and Hensley, 2004; Hensley and Tallichet, 2005).

René Descartes (1596-1650) is often thought of as the father of modern philosophy. He was also a physicist, a physiologist and a mathematician. Descartes is usually singled out for special blame for introducing the idea of animals as 'automata' or machines. However, in a more considered review of Descartes' works, Cottingham (1978) points out that even though Descartes states that animals have no thought or language he does not actually say that they have no feelings or sensations. Indeed Kenny (1970) translates Descartes as saying "Similarly of all the things which dogs, horses and monkeys are made to do, are merely expressions of their fear, their hope, or their joy; and consequently, they can do these things without any thought." Present-day scholars continue to argue about what Descartes really meant by this. However, he certainly did not *treat* animals as if they were sentient. He was a vivisectionist, and dissected living, conscious animals (usually dogs) which suggests that he thought that 'fear', 'hope' and 'joy' were in some way unconscious emotions. The concept of 'unconscious emotion' is controversial and is currently being debated (e.g. Őhman *et al.*, 2000; Winkielman and Berridge, 2004). Like Aristotle and Aquinas, Descartes also believed that rationality distinguished human beings from other animals and he added that language, which is a unique human attribute (sic), is the only real test of rationality. However, as suggested by the translated passage above, his translators and interpreters may have gone too far in blaming him for 'animals are machines'. He does seem to allow that animals might have emotions and might be driven by these emotions.

Thomas Hobbes (1588-1679) was an English philosopher who, in 1651, wrote the famous book ***Leviathan*** which formed the basis for Western political philosophy. ***Leviathan*** concerns the structure of society and legitimate government, and is regarded as one of the earliest and most influential examples of social contract theory. Hobbes' contention was that human beings act out of self-interest and that this leads to co-operation and social contracts. Since animals have no language (sic), they cannot enter into social contracts with other animals or with human beings. They are therefore not worthy of moral consideration. So, whereas Descartes thought that language was important as a sign of rationality, Hobbes thought that it was necessary for the drawing up of social contracts. However, the end result was the same; animals do not have language, therefore they do not merit moral consideration.

Overlapping with Hobbes was the English philosopher John Locke (1632-1704) who is considered to be the first of the British Empiricists. Empiricism emphasizes the role of experience, particularly sensory perception, in the formation of ideas. Locke postulated that when people are born, their minds are 'blank slates' or 'tabula rasa'. This was contrary to the previous belief that people were born with innate ideas. Locke also developed Thomas Hobbes' ideas on social contract theory. He was one of the earliest and most influential thinkers of the Enlightenment contributing to political philosophy and liberal theory. His ideas had a big influence on later Enlightenment thinkers such as Voltaire, Jean Jacques Rousseau and David Hume.

It is in Locke's writings that we get a first glimpse of a change of view with regard to animals. Locke says that there is evidence that animals (or what he calls "brutes") have the capacity to remember. He also allows that animals seem to have some very simple ideas and they can compare one thing to another – but only very imperfectly. To some extent they can compound (put ideas together) but Locke draws the line at abstraction. He clearly states that animals cannot form abstractions. So Locke concludes that there are huge differences between human beings and other animals, but that animals do have some simple mental capacities, and this is a big departure from calling them 'automata'.

The German, Immanuel Kant (1724-1804) lived well after Locke but he maintained the traditional view that animals have only instrumental value. Kant is an important philosopher in the development of moral philosophy. He wrote a very influential book called *Groundwork of the Metaphysic of Morals*. Kant believed that morality is a case of following absolute rules. For example, he thought that lying was morally wrong and that we should never lie no matter what the circumstances are. Kant's philosophy was that one should treat a human being as an end in himself/herself and not as a means to an end. He developed the philosophy that human beings have intrinsic (or inherent) value and not merely instrumental value. The reason they have intrinsic value (once again) is that they have rationality and in particular they can ***reason about ethics***. Animals, on the other hand, cannot reason (particularly about ethics!), and therefore have only instrumental value.

So these five philosophers, Aristotle, Aquinas, Descartes, Hobbes and Kant, developed a position that has dominated the traditional Western view of how animals should be treated. The position was based on two claims: (1) Human beings have a special attribute that makes them distinct from all other animals (a factual claim) and (2) having this special attribute makes human beings objects of direct moral concern (a moral claim). The special attribute was rationality, and in particular having language and being able to engage in ethical thought. The traditional Christian view incorporated an additional distinction, namely that animals did not have immortal souls. John Locke has been left out of this list because he was the first to realize that the distinction between animals and human beings was not as clear cut as the others suggested.

With the emergence of the period we call 'The Enlightenment' in Europe, things started to change. The Scottish philosopher, David Hume (1711-1776), wrote on learning in animals, "It seems evident, that animals learn many things from experience, and infer that the same events will always follow from the same causes". He went on to say: "Is it not experience, which renders a dog apprehensive of pain, when you menace him, or lift up the whip to beat him?" (Hume, 1739 pp. 397-398). He thus began to dispute the previous views that animals have no moral standing. Hume was a hard-line atheist and so the question of anyone having an immortal soul did not arise.

Jeremy Bentham (1748-1832) was an English social reformer who was very concerned about the conditions that many workers were forced to accept during the Industrial Revolution. He worked closely with James Mill, a like-minded Scottish social reformer. In contrast to Kant, Bentham thought that it was the consequences of actions that were important. So, for example, telling a lie might be morally acceptable if the consequences of doing so were better than not telling a lie. He had little to say about animals. However, in one of his books he dealt very briefly with animals. He rejected both of the previous claims of Aristotle, Aquinas, Descartes, Hobbes and Kant outright. According to Bentham, rationality is not the relevant matter. "The question is not, Can they *reason*? nor, Can they *talk*? But, Can they *suffer*?" (Bentham, 1823). John Stuart Mill (1806-1873) was the son of James Mill and a close friend of Jeremy Bentham. Mill developed Bentham's ideas into the philosophy of Utilitarianism (Mill, 1910) or The Greatest Happiness Principle according to which "Actions are right in proportion as they tend to promote happiness, wrong as they tend to produce the reverse of happiness". Happiness is defined as pleasure and the absence of

pain; unhappiness is defined as pain and the privation of pleasure. Bentham and Mill did not wish their new theory to have the title "The Greatest Happiness Principle" and they searched around for another name. They came across the word "utilitarian" in the writings of a Scottish novelist, John Galt, and they asked him if they could use this for the name of their theory, and Galt agreed.

Scientists and Animal Welfare

These ideas and theories were those of philosophers. But what about scientists? When did they start to think about animal welfare and, in particular, when did they start to think about sentience? Of course, it could be argued that Descartes was a scientist as well as a philosopher. However, as has already been argued, the evidence shows that Descartes certainly did not treat animals as if they were sentient or as if their welfare mattered.

Most people would probably reach back to the writings of Darwin for some reference to animal sentience. However, more than thirty years before Darwin's (1872) *The Expression of the Emotions in Man and Animals*, an English veterinarian was writing about sentience in animals. William Youatt (1776-1847) embarked on a career as a veterinarian at the mature age of thirty-five. He was training to be a minister of the church when he suddenly left home in south-west England and moved to London. He attended the Veterinary College there (later to become the Royal Veterinary College) for two years before leaving and setting up in practice without completing his training. He was a very prolific writer and published several books including *Canine Madness* (1830) (a book on rabies), *The Horse. With a Treatise on Draught* (1931), *Cattle. Their Breeds, Management and Diseases* (1834) and *Sheep* (1837), many of which are still referred to today. The book that is of particular interest to us is one that deals with many different aspects of animal welfare (Youatt, 1839). In this book Youatt writes of animals' senses, emotions, consciousness, attention, memory, sagacity, docility, association of ideas, imagination, reason, instinct, social affections, the moral qualities, friendship and loyalty. So he, most definitely, knew that animals were sentient! He wrote of the intellectual faculties "We are endeavouring to shew that the difference [between humans and animals] in one of the most essential of all points, is in degree and not in kind". He also wrote "We are operating on animals that have, probably, as keen feelings of pleasure and of pain as ourselves". Youatt condemned many practices as being cruel and inhumane such as, too early training of race horses, steeple-chasing, transport methods for newly-born calves, methods of raising veal calves, slaughter-house management, tail-docking and ear-cropping of dogs, using live bait for fishing, dissection of living animals, and force-feeding of capons and turkeys. It is noteworthy that many of these practices are still being hotly debated today!

In his book *The Expression of the Emotions in Man and Animals* Darwin (1872) noted the universal nature of human facial emotional expression, described some commonalities in expression of emotions in animals, and suggested a shared evolution. Darwin was mainly interested in emotional expression and so he described the underlying anatomy and physiology, the signal value of the expression, and the evolution of the emotions. He seemed to accept the subjective experience associated with the emotions, but this was not explored in any depth. It was left to George John Romanes (1848-1894), a friend and disciple of Darwin's, to be explicit about the subjective experiences of feelings. In his book *Mental Evolution in Animals*, Romanes (1883) wrote "*Pleasures and Pains must have been evolved as the subjective accompaniment of processes which are respectively beneficial or injurious to the organism, and so evolved for the purpose or to the end that the organism should seek the one and shun the other*."

The 100-year Hiatus

Since it was accepted 130 years ago by philosophers, scientists and society in general that animals have feelings, why did it take another 100 years for animal welfare science to develop as an

accepted discipline? The answer seems to be that Behaviorism emerged at the start of the 20th century and had a huge inhibiting effect on the study of subjective phenomena. Behaviorism is a branch of psychology that was developed in the USA during the first 70 years of the 20th century. The foundations were laid by William James (1842-1910) who, late in his career, wrote "Consciousness … is the name of a non-entity, and has no right to a place among first principles. Those who still cling to it are clinging to a mere echo, the faint rumour left behind by the disappearing 'soul' upon the air of philosophy… It seems to me that the hour is ripe for it to be openly and universally discarded" (James, 1904).

The father of Behaviorism is usually considered to be J.B. Watson (1878-1958). He laid out the principles of the discipline and wrote, "The behaviorist sweeps aside all medieval conceptions. He drops from his scientific vocabulary all subjective terms such as sensation, perception, image, desire and even thinking and emotion" (Watson, 1928).

The psychologist who developed techniques for measuring behaviour objectively according to behaviourist rules was B.F. Skinner (1904-1990). He is best known for inventing the operant conditioning chamber or 'Skinner Box'. He stated, "We seem to have a kind of inside information about our behaviour – we have feelings about it. And what a diversion they have proved to be! … Feelings have proved to be one of the most fascinating attractions along the path of dalliance" (Skinner, 1975).

The Behaviorists were important scientists and their influence was felt throughout the animal behaviour field including in the discipline of ethology which was developing rapidly in Europe. With very few exceptions, behavioural scientists eschewed any consideration of animals' subjective experiences. There is no doubt that this delayed the emergence of animal welfare science by 80-100 years.

A Re-awakening

Big changes took place in animal agriculture following the Second World War. In response to the huge demand for cheap food there was a rapid industrialization of production methods. It seems likely that the general public was not aware of these changes since they often took place in closed housing systems. When the more intensive methods were revealed and criticized by Ruth Harrison in her book *Animal Machines* (Harrison, 1964), there was a huge public outcry. Harrison criticized intensive broiler production methods, poultry slaughter houses, battery cages for laying hens, crates for white veal production, broiler beef production, intensive rabbit production and 'sweat-box' conditions for fattening pigs. In her criticisms, Harrison laid much emphasis on animal suffering, that is, on the negative subjective states that the animals were experiencing. The public condemnation was so great that the British Government felt obliged to form a Committee of Enquiry under the chairmanship of Professor Rogers Brambell. Their report, often called the 'Brambell Report' (Command Paper 2836, 1965) concluded that, indeed, there was some cause for concern about animals in intensive production systems but that, in many instances, there was a lack of good scientific evidence to draw firm conclusions. They also thought that feelings were an important feature of welfare. They stated, "*Welfare is a wide term that embraces both the physical and mental well-being of the animal. Any attempt to evaluate welfare, therefore, must take into account the scientific evidence available concerning the feelings of animals that can be derived from their structure and functions and also from their behaviour*" (Command Paper 2836, 1965).

Nevertheless, in spite of these allusions to the feelings of animals in general and the suffering of animals in particular, the widespread view amongst the scientific community at this time was that welfare was intimately connected with stress. This can be seen in the publications of this period as scientists struggled to investigate welfare (e.g. Bareham, 1972; Bryant, 1972; Wood-Gush *et al.*, 1975).

This pattern was broken by an American ethologist, Donald Griffin, who wrote a book entitled *The Question of Animal Awareness* (Griffin, 1976). He himself was not particularly interested in animal welfare, but his ideas legitimized a consideration of animals' subjective experiences and suddenly new approaches became available to animal welfare scientists. Thereafter, there was a burgeoning literature on animal sentience and welfare (e.g. Dawkins, 1980; Duncan, 1981, 1993; Appleby *et al.*, 2011).

In parallel with the scientific re-awakening of interest in sentience and animal welfare, there has been an intense focus on the ethics of animal use. This was probably started by Peter Singer (b1946), an Australian philosopher who now holds the Chair of Bioethics at Princeton University. He has vigorously promoted a utilitarian approach to animal welfare. He published *Animal Liberation* in 1975 with a 2nd edition in 1990 and a 3rd edition in 2002. This was (and is) a very influential book. Singer argues that most animal use (including animal agriculture) is deeply objectionable. So he is arguing about the *facts*. He says that he *is not* against using animals or even against killing them, if (and only if) they have a good quality life and a painless death. Interestingly, Singer is also regarded as the father of Animal Rights although he himself is most definitely a utilitarian. A utilitarian approach has proved to be very useful in dealing with various moral dilemmas in human affairs. However, when animals are involved, it often becomes extremely difficult to weigh the happiness of humans against the suffering of animals. For example, should a scientist carry out medical research on chimpanzees in which many of the chimps will suffer and die but the research may find a cure for AIDS which will reduce suffering and benefit millions of human beings?

Using much of the evidence produced by Singer in *Animal Liberation*, Tom Regan (1938-2017), Emeritus Professor of Philosophy at North Carolina State University, developed the philosophy of Animal Rights and in 1983 published *The Case for Animal Rights*. In this book he argues that we are all subject of a life, conscious beings, have an individual welfare, want and prefer things, and believe and feel things. Therefore we (and all sentient creatures) have inherent value. Regan builds his argument as follows, "*Individuals who have inherent value have an equal right to be treated with respect… It follows that we must never harm individuals who have inherent value*" (Regan, 1983). According to Regan, killing is the biggest harm we can do to another individual. Regan is an abolitionist. He believes that human beings should not use animals at all – in animal agriculture, in biomedical science, for work or sport, or even as companions. It should be pointed out that Regan's version of animal rights is extreme; it is possible to build theories of limited animal rights (Tannenbaum, 1995). Such a theory might assign rights such as: farm animals have a right to be protected from climatic extremes; laboratory animals have a right to express strongly motivated behaviour; companion animals have a right to daily exercise; and so on.

One of the problems with Complete Animal Rights is that it only deals with human ***use*** of animals. However, many human activities are more indirect; the pollution of rivers, lakes and oceans, the pollution of the atmosphere, global warming etc., can all have a profound effect on the welfare of animals. Even activities like building roads, laying pipelines, and growing crops can have adverse effects on welfare. How can these indirect effects of human activities be studied properly if we are constrained by the philosophy "Do not use animals"?

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II
How to access animal sentience? The close relationship between emotions and cognition

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Introduction

Animal welfare has become one of the major issues of our modern civilisation due to the evolution of moral questions, the intensive use of animals for testing and production, and the omnipresence of pets. The question of animal sentience is now at the heart of societal concerns. Animals have acquired a legal status as sentient beings in both European law (Treaty of Lisbon, 2007) and French law ("sensibilité de l'animal" enshrined in the French Civil Code via Law No. 2015-177 of 16 February 2015). Animal protection now concerns all animals whose lives are dependent on humans (pets, laboratory animals, farm animals, zoo animals, etc.).

The expression "*bien-être animal*" was introduced in France in the 1980s from the English word "welfare" which covers both the well-being of an individual (its health, comfort, etc.) and its protection, in other words, the measures defined by legislation to guarantee its welfare. Unlike most concepts developed in biology, there is no unanimously recognised definition of welfare. Nevertheless, most authors agree on the principle that welfare is both a state of physical health, represented by the absence of injury or illness, and of mental health, covering the absence of prolonged negative emotions and the search for positive emotions (Dawkins, 1980; Duncan, 1993). The French Agency for Food, Environmental and Occupational Health & Safety (ANSES) recently proposed an updated definition of animal welfare (2018): the welfare of an animal is its positive mental and physical state linked to the fulfilment of its physiological and behavioural needs in addition to its expectations. This state can vary depending on the animal's perception of a given situation. Emotions therefore play a key role in the definition of welfare: the welfare of an individual is the result of an absence of prolonged negative emotions such as fear, pain or frustration and the presence of positive emotions such as joy or pleasure (Fraser and Duncan, 1998). Defining animals as sentient beings means accepting that they are capable of feeling emotions. As Duncan stresses (2002), an animal's welfare is all to do with its emotional experience and not simply the primary needs that form the basis for its emotional experience. Nevertheless, applying terms usually employed to describe emotive states in humans to animals is not unanimously accepted in our societies due to its anthropomorphic nature. This is why there is a need to further scientific exploration of animal's emotional sensitivity in order to facilitate dialogue between stakeholders and give weight to initiatives designed to ensure their welfare.

This chapter aims to show that it is possible to have a scientific approach to animal sentience to better understand their welfare, and therefore offer them greater respect. I would first like to recall the difficulties and reticence that for many years have dampened scientific analysis of the subjectivity and intentionality of animals. Then, based on my research on sheep inspired by cognitive psychology, we will examine the close relationship between emotions and cognition. We will see that emotions are triggered by cognitive processes that the animal carries out to assess the situation with which it is faced. We will then see how these same assessment processes can be affected by the animal's emotional state. We will end this chapter by insisting on the subsequent need to explore the positive side of emotions that has been ignored for too long, in order to be able to define behavioural strategies that could improve animals' quality of life.

What do we know about animal subjectivity?

An emotion is traditionally described by a subjective component, which is, strictly speaking, the emotional experience, and two expressive components, one motor and the other physiological (Dantzer, 1989). The subjective component is generally inferred in humans by means of verbal self-reports. However, understanding the emotional experience of animals remains a difficult process due to their lack of verbal language, and hence can only be inferred from behavioural and/or physiological components. For many years the "scientific" study of emotions in animals has been very restricted and the exact nature of animal emotions remains poorly understood. The existence of subjective states common to both humans and other animals has not been readily accepted within the scientific community. Evidence of this is that the arguments stating animal sentience and the need to respect animal welfare are often accused of anthropomorphism*. To safeguard against this and remain relatively objective, ethology, as the science of behaviour, has long been constrained to somewhat reductive classic approaches in which the animal is removed from its sensory and emotional environment, and its behaviour is reduced to a set of more or less conditioned reactions. The classic approach that consists of only measuring the intensity of the animal's behavioural and physiological reactions to evaluate its emotional response has never been able to establish a clear relationship between the situation supposed to generate an emotion, the animal's reactions and the intensity and/or nature of its emotion. Likewise, animal welfare assessment has long been limited to neuroendocrine and/or behavioural indicators of stress with no attempt to link these indicators to the existence of affective states (Dawkins, 2001; Dantzer, 2002). Yet any close contact with animals shows us that the animal is not only reacting to its immediate environment and that its sentience is not limited to physiological sensations but that it is capable of perceiving, feeling and attributing emotional values to components within its environment.

To overcome the limits of the classic scientific approach to emotions over the past 20 years, research has taken inspiration from human sciences in order to move beyond the simple description of animals' behaviour and physiological parameters towards an understanding of their specific affective states (Désiré *et al.*, 2002; Mendl & Paul, 2004). As such, the "phenomenological" approach initially developed in human psychology (Merleau-Ponty, 1997) helps rethink animal behaviour as a subjective experience. Phenomenology considers that animals, just like humans, do not only react to their environment, they also have their own point of view, their own consciousness, which gives meaning to their behaviour. Authors have taken inspiration from this approach for fresh insight into the mental state of animals in their natural environment (Calatayud, 2010; Dantzer, 2010), considering that behaviour does not happen in a void or as a simple response to external stimulation. Alongside this phenomenological approach, "cognitive psychology" is another source of inspiration for renewing ethology paradigms. Cognitive psychology looks at the way in which an individual processes information to categorise this information as mental representations, memorise it and repeat it. The field of cognitive psychology is not limited to information processing; it can be widened to emotions by capitalising on the cognitive side of emotional processes. Therefore, theoretical advances demonstrating the intrinsic ties between emotions and cognition in humans (Lazarus, 1993) recently led to the development of a new conceptual framework in ethology to explore the mental world of animals. Here, the animal is defined by its cognitive capacities required to assess or judge what is around it, far beyond a simple reaction to its environment.

How the study of animals' assessment processes allows us to understand their emotions

Animals are capable of giving their environment an affective value. Studies of stress have shown that it is the way in which an animal pictures the event rather than the event itself that determines its reaction. For example, it is not so much the absence of food as the perception of deprivation that induces stress (Mason, 1971). Thus, the notion of stress must no longer been seen mainly as a physiological concept but rather as a behavioural concept: the animal is not only reacting to external stimulus but is capable of appraising the situation as a whole. The animal's behaviour is therefore a reflection of the way in which it perceives and evaluates its environment. Hence the need to acknowledge the cognitive processes of which the animal is capable in order to better understand the emotional experience that it feels.

A far remove from the first theories, current developments in human psychology no longer see emotions as pre-programmed reactions but rather as the sub-product of an evaluation process. The evaluation theories developed in cognitive psychology (review: Scherer, 1999) provide a conceptual architecture that can be more or less transposed to animals because it sees past verbal communication, and are based on elementary cognitive processes. According to Scherer (2001), emotions are elicited when an individual appraises an event using a limited number of elementary criteria, namely the novelty of the event, its valence (pleasantness or unpleasantness), its pertinence to the individual's goals, and the individual's capacity to cope with the event and refer to social norms. By evaluating the novelty of the event (its suddenness, familiarity, predictability and intrinsic valence) the individual is able to assess the pertinence of the event. Likewise, evaluating the consequences of the event in relation to the individual's expectations allows it to estimate its importance. Evaluating its capacity to cope with the event also helps the individual to perceive the event as more or less controllable. Finally, evaluating the social context in which the event takes place has an impact on the individual's response. Furthermore, the intensity and the very nature of the emotion felt are determined by the outcome of the combined elementary criteria (Sander *et al.,* 2005). These quasi-automatic processes are effortless, intuitive and related to the individual's mental state.

After adjusting the conceptual framework with regard to animals' cognitive abilities, I endeavoured to demonstrate that these elementary criteria are also relevant to the animal (Boissy *et al.,* 2007a; **Figure 1**). To do so, we conducted work on a species not reputed for its cognitive

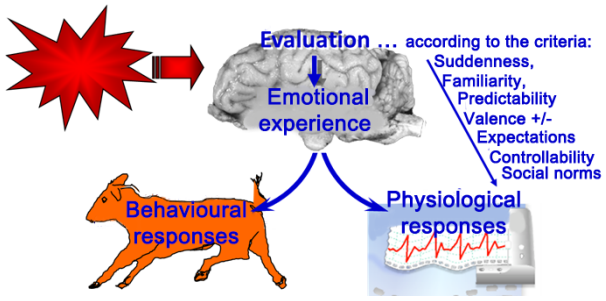

Figure 1. Conceptual framework developed to study emotions in animals. Emotion is broken down into four components: the subjective component (emotional experience), two expressive components (behavioural and neurovegetative reactions), and the cognitive component that corresponds to the evaluation that the animal is expected to make in order to interpret the trigger event. This evaluation is said to operate using a limited number of criteria (right side). This framework draws on the work of Scherer and colleagues (2001) conducted on humans. The validation of this framework on animals facilitates the experimental identification of the extent of animals' emotional repertoire (Boissy *et al.*, 2007a; Veissier *et al.*, 2009).

qualities, sheep. We demonstrated that lambs use the criteria of suddenness and unfamiliarity to assess stimuli to which they are exposed in their usual environment. We were able to identify behavioural and neurovegetative response profiles specific to each of these two processes. The sudden appearance of an object elicits a startle response and a brief increase in heart rate (tachycardia), which indicates an accentuation of the sympathetic tone (Désiré *et al.,* 2004). The appearance of a new object produces immobility, behavioural orientation toward the object, and a transitory increase in heart rate variability, related to an accentuation of the parasympathetic tone. We have shown that the combination of suddenness with newness has a synergistic effect on the animal's emotional responses. For example, the heart rate acceleration specific to suddenness is accentuated when the sudden event is also unfamiliar (Désiré *et al.*, 2006). We were later able to show that lambs are capable of more complex evaluation processes. The criterion of unpredictability was tested using suddenness to elicit emotion: the startle response and tachycardia are reduced when the sudden event can be predicted (Greiveldinger *et al.,* 2007; **Figure 2**).

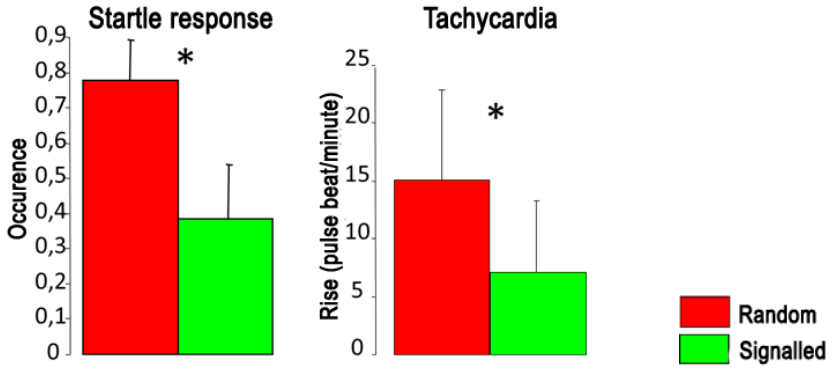

Figure 2. Influence of predictability on reactions to suddenness, known for eliciting a startle response and tachycardia. Lambs receive food intermittently with a sudden event sometimes associated with food deliveries. Some lambs are given a signal to be able to anticipate the occurrence of the sudden event. Their responses to the suddenness were reduced (Greiveldinger *et al.,* 2007).

Sheep are also able to develop expectations and react if the situation does not meet their expectations: after being trained to carry out a given task to receive food, lambs show distinct behavioural agitation and bleat if the quantity of food is suddenly reduced (Greiveldinger *et al.,* 2011). In addition, the ability to control access to food reduces their emotional response (Greiveldinger *et al.*, 2009; **Figure 3**). Finally, lambs are able to adapt their emotional responses according to the social context: the presence of a dominant individual accentuates their physiological reactions such as tachycardia, in response to a sudden event (introversion strategy) while the presence of a dominated individual accentuates their behavioural reactions (extraversion strategy) (Greiveldinger *et al.*, 2013). Through this approach, we were able to identify ear positions specific to particular emotions, on the same principle as facial expression measurement in humans (Boissy *et al.*, 2011). The emotional responses recorded in these studies on lambs are therefore not simple reflexes but imply cognitive processing of information. Therefore, not only do animals produce emotional reactions, they do indeed feel emotional experiences. We have seen that they are capable of the same evaluation processes that humans use to understand their environment.

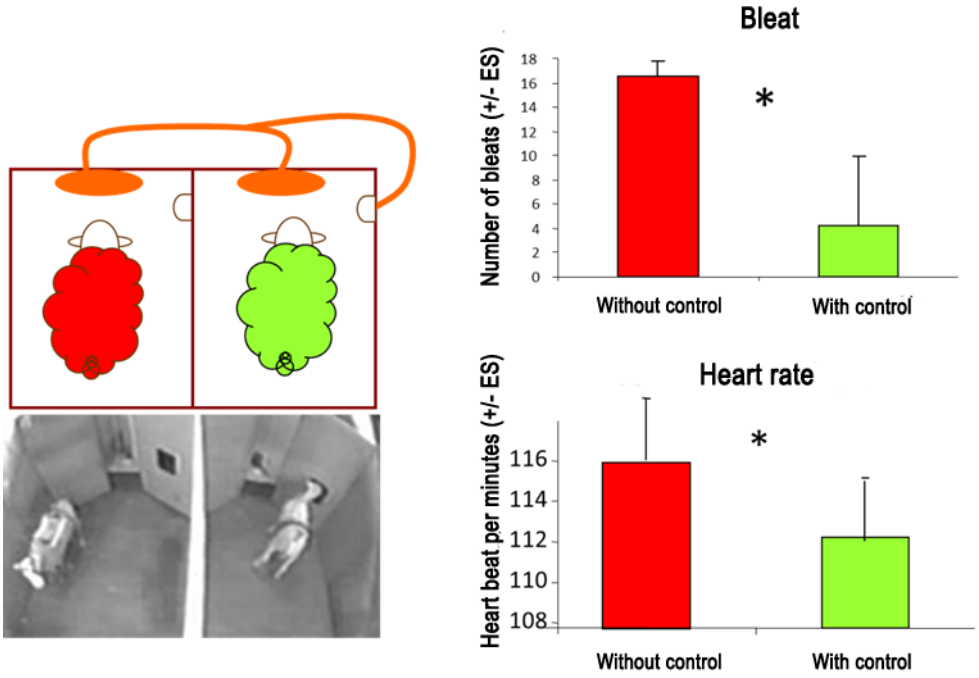

Figure 3. Influence of controllability on suddenness responses. The lambs are tested by pair: one can activate the food distribution (lamb with control), the other cannot (lamb without control). When the lamb with control activate the food distribution, both lambs received the same quantity of food. Whereas both animals receive the same quantity of food, emotional responses linked to the food distribution (agitation and tachycardia) are stronger in the lamb without control (Greiveldinger *et al.,* 2009).

The ethological adaptation of the approach originally developed in human psychology offers a promising avenue for understanding the emotional experience of animals (Boissy *et al.,* 2007a). Acknowledging the animal's evaluation capacities, combined with an assessment of its behavioural and physiological reactions, allows us to explore the wealth of its emotional repertoire. Based on the evaluation combinations identified in humans and defined to generate specific emotions, it is possible to postulate that animals have the potential to feel various emotions such as fear, rage, despair, boredom, even disgust, but also joy and pleasure (Veissier *et al.,* 2009). The results of this work, which has been carried out on other animal species (rats, pigs and birds), validate our conceptual framework inspired by cognitive psychology theories.

How the accumulation of emotions modifies an animal's evaluation processes and welfare in a long-lasting manner

While emotions constitute the basic elements of welfare, their short-lived nature contrasts with the persistent states of welfare. To better understand how to go from a single emotion to a state of welfare, we can once again borrow from psychological approaches. A significant body of work in human psychology has shown how emotions can have a deep impact on cognitive processes, such as learning and memory performances. Such emotional modulations of cognitive processes also exist in animals (Paul *et al.,* 2005). For example, heifers subjected to a strong stressor are unable to abandon a previously learned behaviour that is no longer rewarded (Lensink *et al.*, 2006). In addition to affecting learning and memory performances, work in human psychology has clearly shown how emotions act as key factors in other cognitive functions, such as judgement and decision-making (Mendl *et al.,* 2009).

New studies have been conducted on sheep to explore the way emotions can influence evaluation or judgement processes, the very ones which cause emotions as we saw in the previous section. We therefore asked ourselves if an emotional experience could change the way in which an

animal perceives its environment. After learning to discriminate between a location where a bucket is associated with a punishment and a second location where the same bucket is associated with a food reward, lambs are then re-exposed to the bucket placed in between the two locations, as a deliberately ambiguous situation. If the lambs are placed in a livestock crush just before the go/no-go test, they demonstrate a judgement bias: they avoid the bucket placed in the middle area in the same way they avoid the bucket placed in the area associated with the punishment (Doyle *et al.*, 2011a). However, this judgement bias is no longer observed if the test is conducted several hours after the restraint. A negative emotion, here induced by the restraint, is therefore capable of momentarily changing the animal's cognitive processes, which themselves create emotions.

We then exposed lambs to a moderate stress model in which the animals are repeatedly and unpredictably exposed to stressful events (presence of a dog, transport, delayed food delivery, shearing, etc.) for six weeks. After this stress treatment, the lambs were given a go/no-go test. The stressed lambs avoided going near the bucket placed in the middle area, unlike the control animals (Doyle *et al.*, 2011b; Destrez *et al.*, 2013; **Figure 4**). Therefore, a stressful experience at a young age creates a lasting bias in the animal's cognitive processes, as it tends to pay more attention to negative events. This lasting modification of the evaluation process could explain the persistence of a state of stress beyond the exposure to the stressful situation.

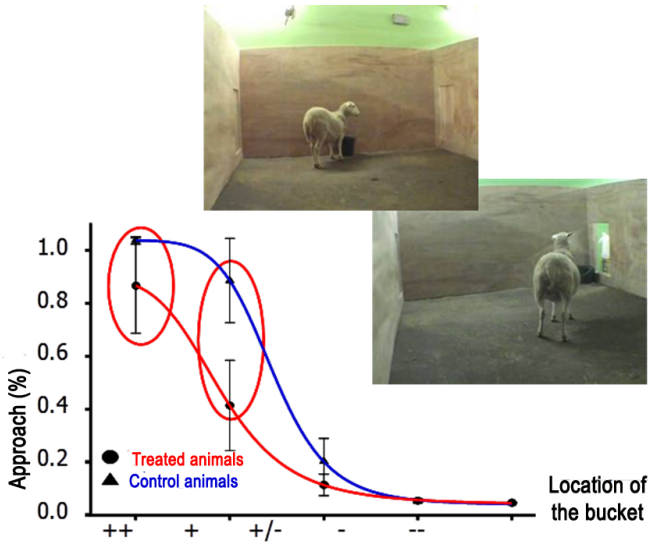

Figure 4. Percentage of approach to a bucket of food based on the location of the bucket. Lambs are trained to distinguish between the same bucket's two locations: one in which the bucket is filled with food (go), the other in which it is empty and associated with a frightening event (no-go). Once the go/no-go instruction was learnt, half of the lambs were subjected to six weeks of a validated moderate stress treatment lasting six weeks. After this treatment, the lambs are given the go/no-go test once again but this time the bucket is placed between the two learnt areas to make it an ambiguous location for the animal. The stressed lambs avoid going near the bucket placed in the middle area, unlike the control animals. Therefore, prolonged exposure to anxiety-inducing events reduces the expectation of positive events and reinforces a negative interpretation of ambiguous events (Doyle & al., 2011b; Destrez & al., 2013).

In farming, gestating females can be exposed to adverse practices and/or external disturbances (shearing, transport, handling, sanitary isolation, etc.) that when repeated can lead to various levels of stress that can alter the maturing foetus and later affect the offspring's behavioural development and well-being (Braastad, 1998). Thus, lambs born to isolated ewes that were transported during their gestation show exacerbated exploratory behaviour (Roussel *et al.*, 2008). Likewise, lambs of ewes that received negative handling during gestation show increased fearfulness (Coulon *et al.*, 2011). We wanted to explore how stress experienced by a gestating female impacts its offspring's evaluation and judgement processes. In the final third of their

gestation period, ewes were exposed or not to the same moderate stress treatment defined in our previous work; their offspring were then given a judgement test at the ages of two and four months. The same judgement biases as those shown in lambs exposed to stress at a young age were observed: lambs born to mothers exposed to stress during their gestation avoided the bucket placed in the middle zone whether two or four months after birth (Coulon *et al.,* 2015; **Figure 5**). The effects of prenatal stress are therefore more persistent than in the case where the stressful process is applied to the animal itself. Furthermore, the change in judgement is all the more marked as the mothers had been previously characterised as strongly reactive. The accentuation of the effects of prenatal treatment therefore seems to depend on the intensity of the stress experienced by the ewes during gestation, with active ewes perceiving the adverse events of the treatment more negatively, as confirmed by their higher cortisol levels, which may have affected the lambs' development. If exposed to chronic stress or repeated disturbances, a portion of the maternal cortisol is thought to cross the placenta barrier and could affect the development of the foetus.

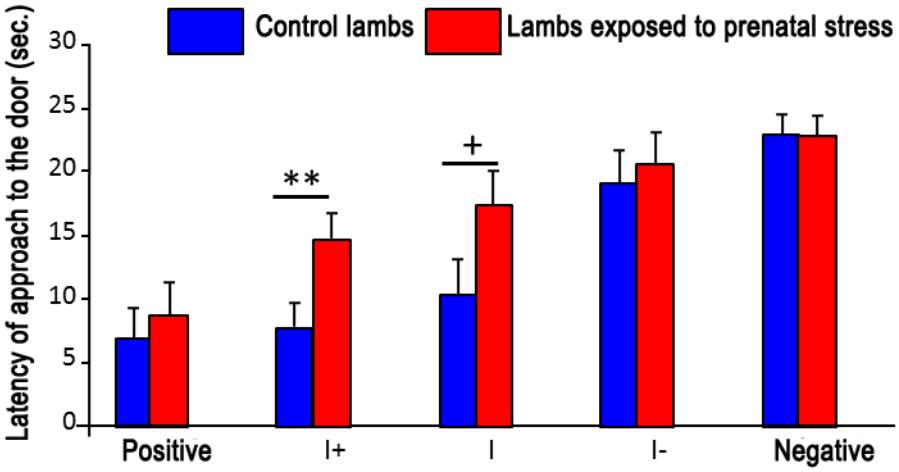

Figure 5. Female lambs' latency of approach to a feed bucket depending on the location of the bucket, in lambs born to mothers exposed or not to a stressful experience during gestation. After being trained to distinguish between two placements of the same bucket associated with a reward or on the contrary a punishment (go/no-go), the lambs are then re-exposed to the bucket placed between these two opposite locations. Lambs born to mothers that were stressed during their gestation (prenatal stress) avoid going to the bucket placed more or less near to the reward location (Coulon *et al.,* 2015).

Inducing positive emotions to favour a state of well-being in animals

In light of game behaviour observed in young animals of many species and the aforementioned work on evaluation processes, we can no longer settle for a negative definition of welfare, namely reducing suffering and/or favouring adaptation to stress. As Dawkins (1980) and Duncan (1993) already noted, welfare does not only mean the absence of negative experiences or suffering, but also means seeking positive experiences. It is therefore vital that actions to improve animal welfare can stimulate the emergence of positive experiences. Based on the conceptual framework established to understand emotions in animals, it is therefore possible to identify cognitive processes involved in inducing positive emotions. This applies to i) anticipating positive events, ii) the option to control access to positive events, and iii) exposure to positive contrasts (i.e. the animal receives more positively valenced events than expected). Pigs that have benefited from cognitive enrichment using a sound signal during feeding thus appear less fearful (Zebunke *et al.,* 2013). Returning to our experiment with lambs born to mothers that were stressed or not during gestation, we placed half the lambs in an environment enriched with objects (balls, brushes, etc.) and/or positively valenced events (sound and light systematically preceding food delivery, allowing

for anticipation) for four weeks. In an ambiguous situation, the prenatally stressed lambs raised in enriched conditions present a less pessimistic view than conventionally reared, prenatally stressed lambs. Nevertheless, they still appear more pessimistic than lambs of mothers not exposed to stress during gestation. We should note that enriched farming conditions can partly counteract the detrimental effects of prenatal stress (Destrez *et al.*, 2014; Boissy *et al.*, 2016; **Figure 6**).

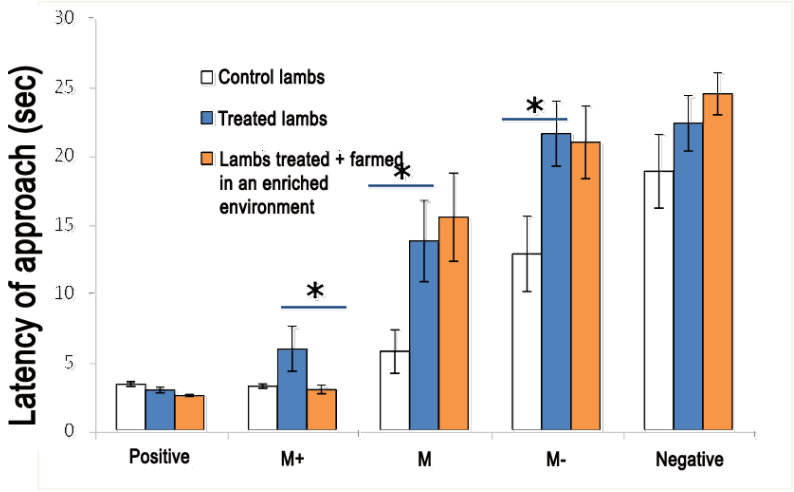

Figure 6. Female lambs' latency of approach to a bucket of food depending on its location. Lambs are trained to distinguish between the same bucket's two locations: one in which the bucket is filled with food (go), the other in which it is empty and associated with a frightening event (no-go). Once the go/no-go instruction has been learnt, two-thirds of the lambs are subjected to a moderate stress treatment for six weeks, paired or not with an enriched farming environment. After the treatment, the lambs are given the go/no-go test again but this time the bucket is placed more or less near to one of the two learnt locations, which are intended to be ambiguous for the animal (M+, M and M-). The stressed lambs had more trouble approaching the buckets placed in the middle areas, but the stressed lambs raised in an enriched environment more readily approached buckets in the ambiguous location nearest to the reward location. Therefore, being raised in an enriched environment can partly counteract the detrimental effects of a stressful experience (Destrez *et al*., 2014).

There has still been little work done on this approach, which we need to examine further in order to try and improve animal welfare, in other words "do good" through revised or innovative practices. The experimental approach put forward in this paper should help consolidate the "cognitive enrichment" concept developed elsewhere (Boissy *et al.*, 2007b). Eventually, if it can be clearly demonstrated that the repeated induction of positive experiences contributes to establishing an "underlying" positive mental state, or to preventing or even counteracting the development of negative mental states, such a behavioural approach could be proposed as part of an integrated animal health management process.

Conclusion

Animal welfare analysis, brought about by strong societal expectations, has required far-reaching changes in the way we study animal behaviour. It has led ethology to develop new conceptual frameworks inspired by cognitive sciences in order to scientifically understand animals' emotional sentience. The work discussed in this paper refers to new conceptual frameworks borrowed from cognitive psychology. It shows that it is now possible to access the affective states of animals. The study of emotions-cognition relationships is an innovative approach that can be used to better interpret animals' emotions and understand how animals can develop persistent affective states. An animal's evaluation of its environment based on elementary cognitive processes is the origin of the emotions that it feels. The outcome of the evaluation, and therefore the emotion that

the animal feels, is modulated by its own emotional experience. As the definition provided by ANSES (2018) reminds us, it is the way in which the animal perceives its environment, and not the environment *per se*, that determines its welfare.

The demonstration of the close relationship between emotional experiences and cognitive evaluation processes offers new perspectives for better understanding the nature of animals' affective states. The focus will be on identifying acquired cognitive bias and/or cognitive predispositions likely to generate lasting affective disorders that can cause suffering and even lead to greater vulnerability to illness (Destrez *et al.*, 2017). In any case, the recognition and acceptance of animal sentience should help put an end to the concept of "passive or reactive animal" in favour of that of a "sentient being", which acknowledges its capacity to feel emotions, evaluate its environment and act accordingly. It is only by using this concept that we will be able to change the way we are with animals by re(gaining) meaning in our relationship with them. Already it is possible to think of innovative farming practices in which animals play a genuinely active role. While the drafting of animal welfare regulations has led to a reduction in the constraints placed on animals, greater consideration of animals' mental capacities when designing new farming systems should not only limit sources of stress and pain for animals but above all favour positive experiences for them and therefore improve their quality of life. To conclude, the recognition of sentience and mental states in animals largely relies on the acceptance of our empathy, backed by the experimental evidence provided by the study of the relationship between emotions and cognition, among others. Talking of mental states in animals does not necessarily mean that these states are strictly identical to those described in humans. Therefore, we must continue our scientific exploration of the relationship between emotions and cognition to accurately identify the very nature of the affective states in animals with which we are in contact and which we have the responsibility of respecting.

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* This approach consists in defining animal welfare in terms of what humans think animals want rather than letting animals speak for themselves.

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III
Evaluation of animal welfare: the weight of words and the power of numbers

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Why assess animal welfare?

European consumers feel insufficiently informed about the welfare of the animals used to make the products they buy (European Commission, 2005 & 2007). Agriculture and food companies' responsibility now includes the protection of animals (Amos & Sullivan, 2013). A number of European conventions to protect animals have been adopted by the Council of Europe since the 1970s. These have been followed by European Union directives or regulations on the protection of animals. The UK's Farm Animal Welfare Council defines animal welfare in terms of five freedoms: freedom from hunger or thirst; freedom from physical discomfort; freedom from pain, injury or disease; freedom to express normal behaviour; freedom from fear and distress (Farm Animal Welfare Council, 1992). The five freedoms are widely used to make recommendations, set regulations or design certification systems. Economic actors and animal protection associations have developed systems that fulfil animal welfare requirements on this basis and have begun using animal welfare claims (for instance the *Freedom Food* initiative in the United Kingdom and *Beter Leven* in The Netherlands). Most of the certifications are based on obligations of means that can be quite easily measured (minimum surface area per animal, food, enrichment of the environment, etc.). Yet these obligations do not necessarily have a significant outcome for the animal (Main *et al.*, 2007). It was thus necessary to improve and harmonise the evaluation of animal welfare in order to ensure that these types of initiatives are acknowledged by citizens and create fair trading conditions. The European Welfare Quality® project (2004-2009) aimed to propose a tool to assess the welfare of animals in farms and in slaughterhouses (cattle, pigs and poultry); this tool was to be used to provide advice on farming practices and to adhere to certification programmes.

Much has already been written about the Welfare Quality® project. This paper does not aim to detail the Welfare Quality® assessment system in full but rather assess its impact.

Defining welfare criteria

Welfare is a multidimensional concept that includes both physical and mental health as well as other aspects such as physical comfort, the absence of hunger, the ability to express normal behaviour, etc. The five freedoms defined by the Farm Animal Welfare Council provide an operational framework for understanding the various aspects of animal welfare and applying these to various types of animal husbandry. They place relatively precise words on a protean concept. Nevertheless, certain freedoms cover specific functional aspects, such as the absence of hunger or thirst. So that the full scope of animal welfare was taken into account, the Welfare Quality® project partners derived 12 welfare criteria from the five freedoms (Botreau *et al.*, 2007):

1. Animals should not suffer from prolonged hunger, i.e. they should have a sufficient and appropriate diet.
2. Animals should not suffer from prolonged thirst, i.e. they should have a sufficient, accessible water supply.
3. Animals should have comfort around resting.
4. Animals should have thermal comfort, i.e. they should neither be too hot nor too cold.
5. Animals should have enough space to move around freely.
6. Animals should be free from physical injuries.
7. Animals should be free of disease, i.e. farmers should maintain high standards of hygiene and care.
8. Animals should not suffer pain induced by inappropriate management, handling, slaughter, or surgical procedures (e.g. castration, dehorning).
9. Animals should be able to express normal, non-harmful social behaviours, e.g. grooming.
10. Animals should be able to express other normal behaviours, i.e. it should be possible to express species-specific natural behaviours such as foraging.
11. Animals should be handled well in all situations, i.e. handlers should promote good human-animal relationships.
12. Negative emotions such as fear, distress, frustration and apathy should be avoided and positive emotions such as security, comfort or contentment should be promoted.

These 12 criteria were used to identify indicators to consider when assessing a farm or a slaughterhouse.

Animal-based measures to assess welfare

Today, it is widely acknowledged that animals are sentient beings (see for example the European Convention for the Protection of Animals Kept for Farming Purposes (Council of Europe, 1976), the European Union Treaty of Amsterdam (1997), or the recent recognition of animal sentience in the French Civil Code (Article 515-14 of the Civil Code, Act No. 2015-177 of 16/02/2015). This recognition was the starting point for a change in the way the protection of animals is represented: instead of thinking what could be good for animals from our human point of view (meaning good treatment), the question is now asked in terms of what the animals feel. Welfare comes from what an animal feels, even if this is hard to assess.

It is possible to show that animals have preferences and feel emotions (Dawkins, 1983; Boissy *et al.*, 2007; Veissier *et al.*, 2009). Animal-based indicators have been developed to assess what matters to animals: preference tests, stress tests, behaviour, etc. In addition, animal welfare depends on several factors: housing, nutrition, care, etc. These factors can be easily measured but their combined impact on the animal is difficult to predict. Using animal-based indicators (its state, its behaviour, etc.) provides a more comprehensive view of the animal's welfare (regardless of the reasons why this welfare may have been altered or improved). These animal-based indicators can show us how animals perceive their environment and help us assess whether it provides them with good or poor living conditions. This is why the Welfare Quality® assessment system focuses on animal-based indicators. This does not mean always looking at what the animal feels but it means at least considering the impact that its environment (housing, nutrition, care, social environment, etc.) has on it, assuming that what the animal feels largely depends on these impacts. When such indicators are not available, the Welfare Quality® assessment looks at indicators based on the animal's environment (**Table 1**). All these indicators can be measured at a farm or slaughterhouse.

Table 1: The 12 criteria of animal welfare (Welfare Quality®, 2009)

Criteria	Indicators for dairy cows	Type of indicator
Absence of prolonged hunger	Physical state	Animal
Absence of prolonged thirst	Number and cleanliness of water points	Environment
Comfort around resting	Behaviour around resting, cleanliness of animals	Animal
Thermal comfort	No available measure for adult cattle	
Ease of movement	Access to an exercise area (pasture or other)	Environment
Absence of injuries	Lameness, external lesions	Animal
Absence of disease	Clinical observations: cough; nasal, ocular or vulval discharge; diarrhoea Documentation: somatic cell counts, mortality, dystocia, "downer cow" syndrome	Animal
Absence of pain induced by management procedures	Dehorning	Environment
Expression of social behaviours	Aggressive interaction	Animal
Expression of other welfare-related behaviours	Access to pasture	Environment
Good human-animal relationship	Flight distance from humans	Animal
Positive emotional state	Qualitative assessment of behaviour	Animal

Scoring reflects ethical choices

The Welfare Quality® project's goal was to provide a standard for the assessment of animal welfare. To assess an object means making a judgement of that object. Therefore, we needed to summarise data collected from various indicators used on farms (or in slaughterhouses) and be able to make a judgement of this farm or slaughterhouse, namely for each indicator we had to define the values for which the level of welfare could be deemed to be high or low. This exercise raises several ethical questions:

- To judge overall animal welfare at herd level, should we use the herd's average level of welfare or concentrate on the worst-off animals? If we were assessing country wealth, it would be the equivalent of looking at average income in one case and the percentage of the population living under the poverty line in the other.
- Can one aspect of welfare compensate for another? For instance, if the animal is in good health, can we accept that it cannot express normal behaviour?
- Should the judgement be based on what in theory corresponds to a good level of welfare or what can be achieved in practice? In the first case, we would set limits beyond which the level of welfare would be deemed to be unacceptable, and in the other case, we would ask, for example, the farms ranked in the lowest 20% to improve regardless of the level of welfare provided by the other 80% of farms.

These questions have led to much debate between project researchers and external actors (farmers, other economic actors, citizens) (Miele *et al.*, 2011; Veissier *et al.*, 2011) eventually resulting in the following scoring system:

- measurements collected on farms or at slaughter are transformed into scores on a scale of 0 to 100 (0 being a very poor state of welfare and 100 being an excellent state) with a score for each of the 12 welfare criteria;
- these criteria are then integrated into four principles (good feeding, good housing, good health, appropriate behaviour) and the criteria scores are aggregated into principle scores;
- finally, the scores obtained by a farm or slaughterhouse for the four principles are used to place it into one of the four categories defined according to the animals' welfare: excellent, enhanced, acceptable and not classified (**Figure 1**).

Scoring methods are defined so that:

- priority is placed on the worst-off animals; the average level of welfare of the herd has a lesser impact,
- each criterion is weighted but there is very little offsetting between criteria,
- the final classification of a farm reflects not only a theoretical acknowledgement of what can be considered excellent, good or acceptable, but also what can realistically be achieved in practice.

For more details please refer to Veissier *et al.* (2010).

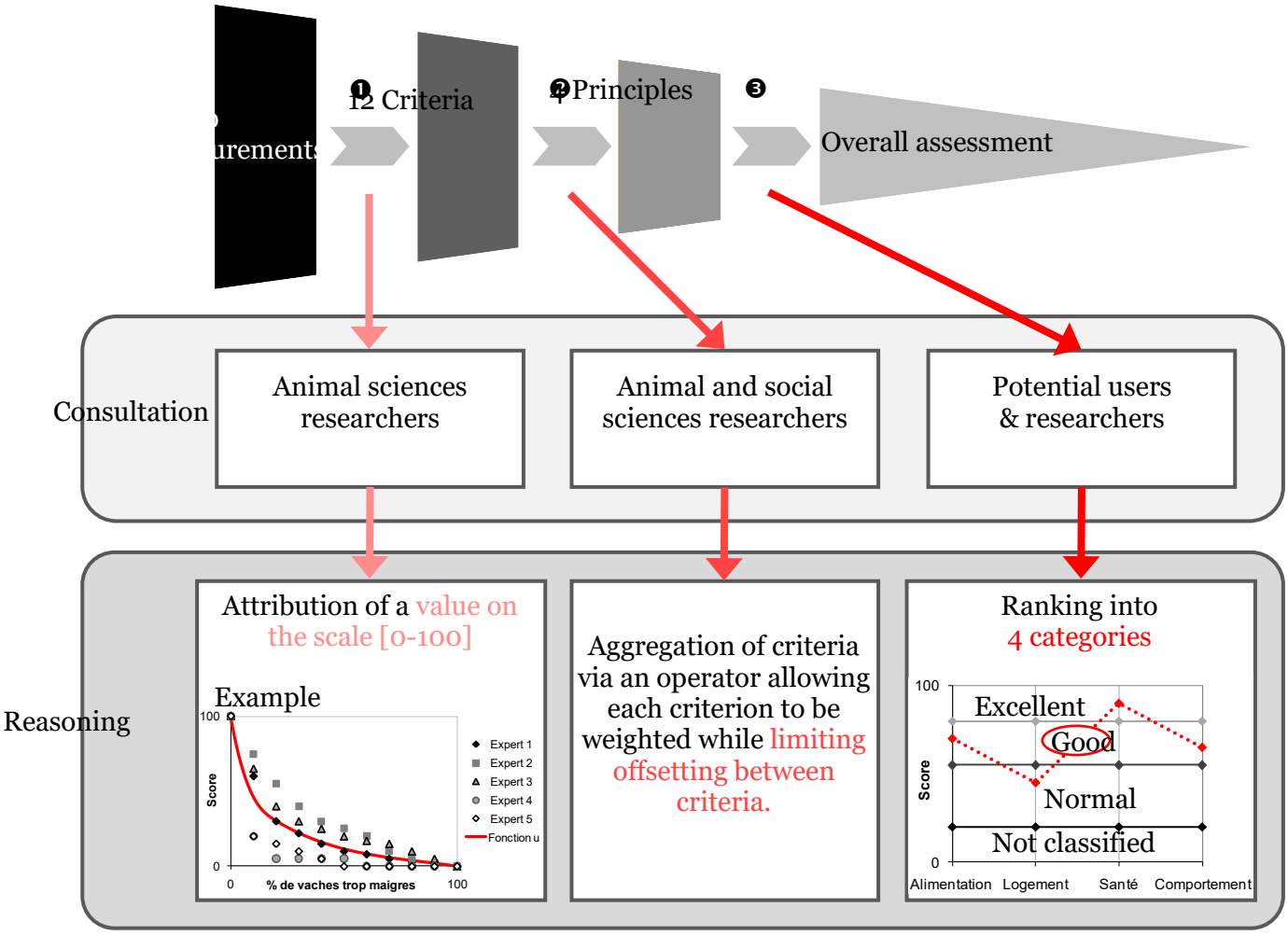

Figure 1: Construction of the Welfare Quality® assessment system (according to Veissier *et al.*, 2010)

Widespread dissemination of Welfare Quality® project outcomes

The principles developed by Welfare Quality® have been adopted by various actors:

- Welfare Quality® has served as a base for the development of other systems to assess welfare in small ruminants, turkeys, equids, dogs and cats, fur animals and even marine mammals (Ahola *et al.*, 2015; AWIN, 2015a and 2015b and 2015c and 2015d and 2015e; Clegg *et al.*, 2015; Møller *et al.*, 2015).
- Welfare Quality® has also led to discussions among various public decision-makers. In its Community Action Plan on the Protection and Welfare of Animals 2006-2010, the European Union expressed its intention to change from a means-based approach (using environmental indicators) to an outcome-based approach (using animal-based indicators) (European Union Commission, 2006). Some animal-based indicators are already used in regulations governing slaughter (EC No. 1099/2009: the efficiency of stunning must be checked before bleeding). The willingness to use animal-based indicators was reinforced in the 2012-2015 community action plan (European Commission DG-Sanco, 2012). Additionally, the EFSA (European Food Safety Authority) has created a programme to list which animal-based indicators can be routinely collected (EFSA, 2015).
- Several firms are interested in the Welfare Quality® project as a tool for creating dialogue between buyers, suppliers and consumers. Danone has thus created an animal welfare programme using Welfare Quality® indicators (Danone and Phyllum, 2012) combined with a self-testing sheet for dairy farmers. In Spain, AENOR (Spanish Association for Standardization, equivalent of AFNOR in France) presented the ATO standard for marketing milk from farms assessed using the Welfare Quality® tool.

These are just a few examples of the impact the project has had. Its impact has undoubtedly been far wider. Welfare Quality® is well known outside Europe, as demonstrated by discussions with researchers from other continents and the OIE's adoption of animal-based indicators.

The reasons for success

Societal expectations regarding the protection of animals existed before research began looking into animal welfare. However, at the end of the 20th century, animal welfare was still a vague concept that needed both a general definition (e.g. mental and physical health or quality of life as perceived by the animal) and an operational definition (e.g. the five freedoms or the 12 Welfare Quality® criteria). These definitions gave more credibility to researchers looking at the issue of animal welfare. In turn, indicators produced by this research made it possible to examine animal welfare in practice. This has encouraged dialogue between stakeholders, scientists and society at large. The first step was to put the ideas into words and then share these words in order to be able to discuss the issue.

The Welfare Quality® project has been very much in the public eye. Admittedly, there was an intensive communication campaign: website, conferences, popular science reviews, focus groups and citizen juries, etc., all orchestrated by a very efficient communication officer. The fact that the 12 criteria offer an operational framework for understanding the issue of animal welfare in terms of their living conditions has facilitated dialogue between citizens and producers, public decision-makers and scientists. The strength of the Welfare Quality® project probably also comes from the fact that it not only produces words but also numbers:

- indicator-related numbers (percentage of lame cows in a herd, frequency of interaction between animals, number of days spent outside, etc.);
- numbers on compliance with criteria and principles (criteria and principle scoring on a scale of 0 to 100) and overall classification of each farm into one of four categories.

In our societies where assessment often relies on quantitative measures, numbers are particularly important. High-school students are graded on their end-of-school exams; the quality of the school is assessed by the percentage of students that pass; researchers are assessed on the number of papers they publish; the police force is assessed by how many cases it investigates, etc. It is evident that we live in a world of numbers. Nothing seems more serious than a number! Welfare Quality® calculations were used by the project's partners as a means to generate an overall assessment, not an end in itself. Even though this was not the original intention, the Welfare Quality® calculations and scores likely added to its credibility. On the contrary, it could have helped its detractors undermine that credibility.

The use of animal-based measures should not exclude the definition of minimal prescriptive norms. The risk of only using animal-based measures would be the (re)introduction of farming systems that, by definition, do not respect animal welfare (e.g. battery chickens or veal calves in individual cages), on the pretext that the level of welfare of the animals living there will be checked at a later stage. This prompted the Welfare Quality® partners to state the need to "ban the bad systems and assess the good ones" (Blokhuis, 2013). This means taking a pragmatic approach by combining any measures that would bring about improvements to welfare, whether by promoting suitable environments or monitoring animal welfare (Main & al., 2014).

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IV
Animal sentience: use and abuse of words Semantic and translatological differences between "*bien-être*" (welfare) and "*bientraitance*" (good treatment) of animals

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"*In animals, there is neither intelligence*
nor souls as ordinarily meant.
They eat without pleasure, cry without pain,
grow without knowing it; they desire nothing,
fear nothing,
know nothing."
Nicolas Malebranche (*De la recherche de la vérité*, 1674)

"*The world is not a factory and animals are not products to be used for our needs, for animals and humans are fundamentally the same*."
Arthur Schopenhauer (*Parerga & Paralipomena*, 1851)

Introduction

Above are the words written about animals by Nicolas Malebranche in the 17th century and Arthur Schopenhauer two centuries later. We have come a long way since the 17th century in terms of scientific discoveries in the field of animal behaviour. However, since Schopenhauer wrote those words, there has been little improvement in animals' conditions.

Yet, today it has been scientifically proven that there are not one but several forms of animal intelligence and sentience: animals cry out because they suffer or because they are scared, they express their welfare when they are happy or feel good.

Nevertheless, when it comes to the reality of practices in farming, slaughterhouses, some zoos and circuses for instance, there are processes and premises where animals are not treated like intelligent, sentient beings that experience emotions, and places where they may be mistreated or deeply unhappy.

For the past 40 years, the French Rural Code has stipulated that "each animal is a sentient [“sensible” in French] being that must be placed by its owner in conditions compatible with the biological imperatives of its species"

Too often the treatment of animals, and the places in which they are kept in farms or at entertainment facilities, do not take into account the biological imperatives of their species, the scientific progress made over the past half-century, or the current legislation (which still does not apply to wild animals).

Animal welfare, and how to generate it and have it recognised, has become an issue of paramount importance to prevent the suffering and mistreatment of animals.

There are several reasons for this suffering: the two most obvious ones are economic reasons and the absence of ethical awareness among some professionals. But another reason, never spoken of – given the very few linguists who study the notion of animal welfare – is the language, vocabulary and imaginary worlds associated with animals. The meanings of the words used and definitions related to the animal world remain vague. As well as being a matter for scientists and lawyers, animal welfare is also and above all an issue that concerns linguists because it is primarily through words that laws become more specific and adjust to new contexts and ethological discoveries. It is through words that we raise public awareness. And it is also through words that things remain ambiguous or not. Therefore, linguistics and more specifically lexicology have a crucial role to play over the years to come in clarifying terms or criticising them when they have been poorly chosen, misunderstood or used inappropriately.

"*Bien-être*" (welfare) *versus* "*bientraitance*" (good treatment)

The focus of this paper, before being a matter of science or law, is one of vocabulary, for words are often misused because of their definitions, which either do not take scientific progress into account, are inappropriate because no adequate term exists in French, or are so poorly defined that there is still ambiguity over the use of expressions as important as "*bien-être animal*" (animal welfare) or "*bientraitance animale*" (good treatment of animals), where each professional sphere has its own understanding depending on personal, practical or economic interests.

Choosing the right words can prevent animal suffering and abuse. But what do these words mean?

In French, the expression "*bientraitance animale*" (good treatment of animals) is mainly used by farmers to show that they *treat* their animals well. However, the idea of "*good treatment*" does not rule out animal neglect, because the words "*traitement*" (treatment), "*bientraitance*" (good treatment) or "*bons traitements*" (good handling) only hold responsible and depend on the person giving the treatment. They do not take into account the direct consequences on the animal receiving the treatment. "Treat well" can sometimes mean simply providing the animal with food, water and shelter and does not necessarily guarantee the welfare of the animal. It is also true of humans, which is why the term *bientraitance* first appeared in hospitals, specialised medical institutions and retirement homes that provide care to a client or patient.

With regard to animals, providing good treatment is one of the first duties of human beings looking after an animal, they must insure that the conditions of the animal's captivity are not causing the animal to suffer. Therefore the complexity of the good treatment of animals lies in assessing whether humans "treat animals well enough" to ensure their welfare. Animals need to feel good, which is seldom the case when they are held in captivity, in cramped conditions, in the dark or in cages. Denying the notion of welfare allows for this type of farming practices to continue.

Animal welfare: definitions

Animal welfare was defined for the first time as an area of priority action as part of the strategic plan of the World Organisation for Animal Health (OIE). The OIE Working Group on Animal Welfare was officially set up in May 2002. Its founding texts include the following **definition of animal welfare**:

An animal is in a good state of welfare (as indicated by scientific evidence) if it is healthy, comfortable, well nourished, safe, able to express innate behaviour, and if it is not suffering from unpleasant states such as pain, fear, and distress.

In addition, Article 7.1.2 of chapter VII.1 of the Terrestrial Animal Health Code sets out eight guiding principles for animal welfare, the second of which quotes **the "internationally recognised five freedoms"**:

- freedom from hunger, thirst and malnutrition;
- freedom from fear and distress;
- freedom from physical and thermal discomfort;
- freedom from pain, injury and disease; and
- freedom to express normal patterns of behaviour.

Also within Chapter VII, under article 7.1.3, of the **four scientific bases** and recommendations, the **third recommendation** states:

Some measures of animal welfare involve assessing the degree of impaired functioning associated with injury, disease, and malnutrition. Other measures provide information on animals' needs and affective states such as hunger, pain and fear, often by measuring the strength of animals' preferences, motivations and aversions.

Finally, again under Chapter VII among the 10 general principles listed in 7.1.4, the **10th principle** stipulates:

The handling of animals should foster a positive relationship between humans and animals and should not cause injury, panic, lasting fear or avoidable stress.

For defenders of the animal cause, words can be used to help promote recognition of animals' emotional experience and "sentience", in order to avoid if not eliminate all forms of suffering and disrespectful exploitation. The OIE's definitions are particularly clear. The use of the expression "*bien-être animal*" in French should be favoured over "*bientraitance animale*" in texts, although it is often the term "*bientraitance*" that is used. It is easy to understand why: "*bientraitance*" does not take the animal's affective states or emotions into consideration at all. When taken literally, it too often consists in merely feeding, watering, sheltering and providing medical care to the animal so that the entire livestock does not need to be killed in the event of contamination.

This is also why people who see it as a constraint to provide more ethical care to animals prefer to use "*bientraitance*" rather than "*bien-être*", which implies an obligation to achieve a visible result on animals and their behaviour.

Although a happy animal is necessarily a well-treated one, a well-treated animal is not necessarily a happy one. All ethologists agree on this.

The scientific progress has shown that animals are *sentient* beings, which justify the idea that, philosophically and ethically speaking, animals have rights and humans have duties towards them.

Linguistics and animal welfare

In addition, recognising the scientific progress that has proven animal *sentience* further accentuates the need to talk of "*bien-être animal*" (animal welfare) and not "*bientraitance animale*" (good treatment of animals).

It is here that the **seven areas of (zoo)linguistics** take on their full meaning:

- diachronic linguistics to understand the history of the word used;
- synchronic linguistics to examine its current use;
- zoosemiotics to understand the signs of animal welfare;
- semantics to interpret a meaning in connection with these signs;
- lexicology to make accurate definitions;
- terminology/neology to create new words currently not in a dictionary;
- translation studies to translate legal texts into the 27 European languages efficiently.

Translation studies also allows us to choose the right word that sometimes comes from other spoken or ancient languages, or even invent new words (*cf. zoocide* by Mathieu Ricard or *humanimality* to describe human-animal relationsand has led on to a *humanimalism*). We need to understand the subtleties of translating these words in legal documents, and above all comprehend the signs made by animals (zoosemiotics) that express their well-being, where each species and each individual has its own ways of expressing its emotions, so that these can be described properly and therefore defined better.

While the two terms "*bien-être*" and "*bientraitance*" do not mean the same thing in French, their translation into Europe's 27 languages is still a subject of debate.

Even though linguistics has always been human-centred – it is not by chance that it is part of Humanities and Human and Social Sciences – it should now examine animals and the vocabulary related to their daily lives. Hence the need to create a cross-disciplinary working group with linguists, biologists, veterinarians and ethologists in order to think about the meaning of the words used and their translation, and even create new terms to better acknowledge animal welfare. This was achieved in 2018 with the creation of the French Society of Zoosemiotics, which has a group of cross-disciplinary researchers who examine all forms of communication (intraspecific zoolanguages, interspecific zoolanguages, the expression of emotions) and reflect on what words need to be created in French and other languages in the fields of zoolexicology and zootranslation studies in order to qualify any behaviour discovered by ethological progress that cannot be expressed due to a lack of terms.

On the importance of the word *sentience* in French in animal welfare

One of the first solutions for avoiding any lexical confusion and, more importantly, the non-recognition of animal suffering, is to more systematically use the word "*sensible*" in French, but above all to use the word "*sentience*", which exists in French but is poorly recognised given that there are few people outside the spheres of science and veganism who know of its existence, and therefore few people understand its meaning in France, whereas it is regularly used in English-speaking countries and various publications on animal protection.

Page 110 of the Treaty of Amsterdam (1997) states that:

The high contracting parties, desiring to ensure improved protection and respect **for the welfare of animals as sentient beings,** have agreed upon the following provision.

Les hautes parties contractantes, désireuses d'assurer une plus grande protection et un meilleur respect **du bien-être des animaux en tant qu'êtres sensibles**, sont convenues des dispositions ci-après.

Sentient beings is translated into French as *êtres sensibles* here. This is an analytical and translation error. It should be translated as "*les êtres sentients*". *Sentience* is not a synonym for *sensibilité* (sensitivity), and *sentient* is not a synonym for *sensible* (sensitive). Animals are admittedly "*sensible au*" (feel) heat and cold, and have emotional responses but also have feelings (joy, sadness, worry, nervousness, apprehension, trauma-related anxiety, etc.). Therefore, they are *êtres sensibles* (sensitive beings) but also and more importantly *êtres sentients* (sentient beings). Various experiments have also demonstrated that animals are aware of their emotions and initiatives, and for good reason; if this was not the case, they would not be able to hunt. Hunting requires the ability to plan a strategy and therefore project a situation in time and space.

The noun *sentience* and its adjective *sentient* have only very recently become part of the scientific vocabulary. Their current translations from English into French are still overly simplistic because they go from "*sensibilité /sensible*" (sensitivity /sensitive) to "*émotion /émotif*" (emotion /emotional), words which obscure their original meaning.

Until now, "sentient being" and "animal sentience" have largely been translated into French as "*être sensible*" or "*sensibilité animale*"; there is however a single word in French, "*sentience*", which covers both an animal's sensitivity and its conscience.

There is an argument, depending on the context, for using this English word of Latin origin in French with knowledge of its various meanings and definitions. Firstly, because it would help with the translation of texts from English into French; then because it would avoid ambiguities and semantic voids; also because the word covers various emotional stages such as sensitivity, emotions and consciousness; and finally, and more importantly, because there is no single word in French that encompasses this semantic spectrum.

The definition of the word *sentience* covers a very wide spectrum; it includes at least five emotional degrees.

If we refer to the work of Professor Donald M. Broom, an eminent biologist at the University of Cambridge, author of *Sentience and Animal Welfare* in 2014 and the 2017 European report "Animal Welfare in the European Union", a "sentient" being is one that has some ability: to evaluate the actions of others in relation to itself and third parties, to remember some of its own actions and their consequences, to assess risk and benefits, to have some feelings and to have some degree of awareness.

These five degrees of emotion mean the word *sentience* presents an interesting polysemy that extends well beyond the French terms *sensible* (sensitive) and *conscient* (conscious), which are often used to translate *sentience*. While *sensible* and *conscient* do hold meaning when we are actually talking about sensitivity and consciousness, the two terms are reductive when attempting to translate all the nuances of the English word *sentience* into French.

Depending on the area of speciality, the word *sentience* in French is associated with various issues.

In biology and veterinary medicine, the word is used to show sensitivity associated with animal consciousness.

In Hinduism, Buddhism, Sikhism and Jainism, *sentient being* is used to qualify most non-human animals; it is deeply rooted in the notion of non-violence because these religions prohibit the use of violence against a sentient being.

In the philosophical and phenomenological world, the word *sentience* is mainly used to qualify the fact of having subjective experiences.

Today, antispecists, who postulate that there is no hierarchy between the species, have added the term to their vocabulary in the context of animal protection:

"Once humans see animals as sentient beings [...] they will no longer be able to commit barbaric acts against them coldheartedly."

The word is therefore already being used. It has yet to be used more widely in practice, with a better-known meaning for all that welcomes various areas of society in its polysemy.

The words *sentience* and *welfare* raise the issue of ethics, to which certain animals have access, largely due to their altruistic behaviour. Denying interspecific and intraspecific animal languages, the emotions expressed by animals and their (hyper)sensitivity, on the pretext that we don't understand them, means turning our backs on a semantic and semiotic treasure worth exploring. There are still many scientific discoveries to be made about animal sentience, whether human or non-human. Using the right words will lead to the development of a new scientific field, zoosemiotics, where semantic accuracy is vital.

Since Antiquity and through the Middle Ages, we have known the extent to which naming animate beings, things, acts and ideas allows them to exist, but inversely, they only exist because they have been named. Refusal to name something means denying its existence. Here, denying the

existence of the word *sentience* means refusing to use and translate a word that lexically acknowledges the scientific progress made during more than 50 years of research into the existence of animal emotions; it means disregarding the scientific arguments put forward by ethologists and zoosemioticians and denying animals the very existence of their emotions. At the same time, it allows for the mistreatment of animals without guilt as it is wrongly believed that they do not have any feelings (*cf.* various scandals reported in French slaughterhouses in recent years).

Recognition and understanding of the adjective *sentient* and the noun *sentience* has already raised public awareness of the intelligence and emotional capacity of animals and can only have a positive impact on their treatment and welfare.

Conclusion

In the beginning there was the Word. Life is scattered with words that create both joy and suffering. The same goes for the lives of animals.

In order to enter the French dictionary, the word "sentience" first needs to become part of our daily lives and vocabulary. The use of "sentience" in French with full awareness of its meaning will help further the recognition and understanding of the faculties of the animals around us, as we are able to better speak and write about this sentience that we share with them.

Above all, animal welfare also comes from the words we correctly use to qualify and describe it. The words currently used in French are often inaccurate or no longer suitable in the face of scientific progress. They need to be (re)defined more accurately, making sure we systematically speak of animals with these definitions (*cf.* the definition of *sensible/sensibilité* in most online dictionaries still only refers to humans and musical instruments, with no mention of animals). New words need to be (re)invented and translated as well as possible in order to spread awareness that animal *sentience* exists, and with it a true *animal welfare* policy.

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V
To which animals does animal welfare apply in law and why?

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Introduction

Over the past 15 years or so, in animal protection legislation nearly everywhere in the world, the notion of animal welfare has been gradually superseding the concept of prevention of acts of cruelty. But it may come as a surprise that the term "animal welfare" has never been defined in the legislation. There is a great risk of creating confusion between "animal welfare" and "good treatment" or the absence of bad treatment. Semantic traps left by presuppositions nearly always lead to misunderstandings.

Welfare is above all an emotional state. It is a state of ease produced by a combination of pleasant feelings for the animal. It not only requires the animal to be in good health and secure but also that its physiological and environmental needs are entirely and unreservedly being met and that the animal is able to express normal behaviour according to its biological rhythms. These needs are specific to each individual's species, gender and age. They can also vary depending on the time of day or year. This is why the general legislation on the protection of animal welfare needs to be broken down into specific regulations.

But can the notion of animal welfare that implies an emotional state be applied to the entire animal kingdom? For a biologist, animals are multicellular living organisms that can move by themselves at least at one stage in their development and feed off other organisms[1]. Therefore, mussels and oysters, which feed off microorganisms suspended in water and have swimming larvae, are animals. Snails and earthworms, which are also farmed, are also animals, as are the millions of other invertebrates. However, can we legitimately have concern for the welfare of these animals with a nervous system that creates motor responses that are purely reflexes? Without an organ with cerebral functions able to store and process sensory information, these invertebrates are probably unable to feel sensations or emotions in the same way as animals such as vertebrates or even some invertebrates (cephalopod molluscs and some arthropods such as crabs, bees or spiders) that also have cognitive abilities[2].

This question led us to examine how animals are defined in the legal texts governing their protection. These general definitions fall into three main categories.

- The **utilitarian** categories are those first used in law.

There are a great many of these definitions, such as "goods" (property, in opposition to "persons"), domesticated animals, companion animals, farm animals, laboratory animals, captive wild animals, etc., to name but a few. It is important to note that all legislation on animal welfare or the prevention of acts of cruelty relates to animals held by man during all or part of their life cycle. It excludes wild animals living freely in nature. Laws governing wild animals do not protect individuals but aim to preserve or control some species' population numbers for ecological, health or food purposes. Only a few countries ban certain hunting, trapping or fishing techniques that produce particularly painful agony.

- A smaller number of **philosophical** categories were introduced into law at a later stage, including "creatures", "beings" and “non-things".

- Finally, **scientific** categories are the most recently introduced into law. These cover:

a) zoological classifications such as vertebrates, meaning animals that have a backbone and a skull containing their central nervous system (namely, mammals, birds, reptiles, amphibians and fish) or invertebrates (e.g. octopuses, crabs);

b) embryological development stages: such as free-living larval forms (able to feed themselves) and foetal forms;

c) forms of neurological sensitivity.

A quick overview of animal legislation around the world reveals the most significant definitions of animals, based on a few examples taken from various legislative texts from some thirty countries[3].

I. Europe

1. *European Union*

The EU texts first defined animals by their zoological category of non-human vertebrates. Then, after drawing attention to their sentience, this definition was broadened to cover certain development stages: free-living larval forms (e.g. tadpoles) or foetal forms in the last third of their development, while certain texts also include a class of invertebrates, cephalopods (e.g. octopuses and cuttlefish).

- Council Regulation (EC) No 1/2005 of 22 December **2004** on the protection of animals during transport and related operations

(Art. 2. a): "'Animals' means live vertebrate animals"

- Council Regulation (EC) No 2009/1099 of 24 September **2009** on the protection of animals at the time of killing

(Art. 2.c): "'Animal' means any vertebrate animal, excluding reptiles and amphibians"

- Treaty on the Functioning of the European Union (TFEU, 2007), consolidated version which entered into force on 1 December **2009**

(Art. 13): "the Union and the Member States shall, since animals are sentient beings, pay full regard to the welfare requirements of animals"...

- Directive 2010/63/EU of 22 September **2010** of the European Parliament and the Council on the **protection of animals used for scientific purposes**

(Art. 1-3): "shall apply to the following animals: (a) live non-human vertebrate animals, including: (i) independently feeding larval forms; and (ii) foetal forms of mammals as from the last third of their normal development; (b) live cephalopods."

(Art. 1-4): "apply to **animals** used in procedures, which are at an **earlier stage of development** than that referred to in point (a) of paragraph 3, if the animal is to be allowed to live beyond that stage of development and, as a result of the procedures performed, is likely to **experience pain, suffering, distress or lasting harm** after it has reached that stage of development."

2. *European states*

The general definition of an animal is either philosophical or scientific, depending on the text or European country. This definition, limited to vertebrates or sometimes extended to invertebrates such as decapod crustaceans (e.g. shrimp), sometimes also refers to their sensitivity, whether it is specified or not as the ability to feel emotions.

Germany

- Animal Protection Act of 24 July 1972 (English)

(Art. 1): "shall serve to **protect the life and well-being of animals** based on the responsibility of human beings towards **creatures like themselves**."

- Civil Code (amended by Art. 1.2 of the Act of 20 August **1990**, pertaining to the **improvement of the legal status of animals** in civil law) (English)

(Division 2, section 90 a): "**Animals are not things.**"

- Decree of 1 August **2013** of the Federal Ministry of Food and Agriculture on the **protection of animals used for scientific purposes** transposing Directive 2010/63/EU of the European Parliament and of the Council[4]

(Art. 14-1):

1) [...] "vertebrates, the larval forms of vertebrate animals, as long as they are able to independently feed, the foetuses of mammals as from the last third of their normal development before birth, cephalopods;

2) "vertebrate animals at a stage of development before birth or hatching other than those mentioned in point 1, if these animals are able to live beyond that stage of development and can predictably experience pain, suffering or harm after they are born or hatched."

(Art. 39) [...] "*decapods*" [...]

Germany is the only country in the European Union to go beyond the guidelines of the 2010 European directive on the protection of animals used for testing. Indeed, it also includes the embryonic forms of birds and reptiles in the last third of their development before hatching, as well as decapod crustaceans, on the list of animals that must not be subjected to painful sensations.

Since 1990, Germany has also been one of the half-dozen European countries whose civil code makes a distinction between animals and things, as France has done since 1999.

France

- Civil Code

(Art. 515-14, created by Art. 2.1 of the Law of 16 February **2015** relating to the modernisation and simplification of law and procedures in the fields of justice and internal affairs)

"**Animals are sentient, living beings.** Subject to the laws that protect them, animals are subjected to the regime of goods."

- Rural and Maritime Fisheries Code

(Art. L.214-1, integrating Article 9 of the Law of 10 July **1976** relating to **the protection of nature,** by Ordinance of 21 September **2000**)

"**Every animal, as a sentient being,** must be placed by its owner in conditions compatible with the biological imperatives of its species.**"**

(Art. R.214-87, transposing by Decree of 1 February **2013** Articles 1-3 and 1-4 of the European Directive of 22 September 2010 on the **protection of animals used for scientific purposes**)

"Living animal vertebrates, including free-living larval forms and foetal forms of mammals as from their last third of their normal development;

- free-living larval forms and foetal forms of mammals at an early stage of development than the last third of their normal development, if the animal is to be allowed to live beyond that stage of development and, as a result of the procedures performed, is likely to experience pain, suffering, distress or lasting harm after it has reached that stage of development;

- live cephalopods."

Indeed, contrary to what has often been stated in the media due to a misinterpretation of the words "*biens meubles*" ("moveable property") where in French the term "*meuble*" should be taken as a synonym for "*mobile*" ("able to move") and not to mean "a piece of furniture", the French Civil Code, following its 1999 revision, already made a distinction between animals and things. It made a distinction between animals and "*corps*" ("bodies") as well as "*objets*" ("objects") such as tables or chairs, which it qualified in this case as "*de meubles meublants*" ("furniture").

By declaring since its 2015 revision in Article 515-14 that "animals are sentient, living beings", the new French Civil Code has the merit of removing this semantic ambiguity by highlighting a biological characteristic that separates animals from things.

Today in France, after the recent amendment to the Civil Code and the earlier one to the Rural Code, the definitions of animals are now based on their general sensitivity or individual sensitivity. Indeed, the two Codes are not entirely consistent with one another[5].

Article 514-4 of the Civil Code means that all animals are sentient beings, while L.214-1 of the Rural Code implicitly means that certain animals are sentient beings while others are not. Is this an implicit reference to a degree or particular form of sensitivity that not all animals share? The ability to experience pain, distress and suffering, is one form among others[6]. It is made explicit in the Rural Code Article (R.214-87), regulating testing, introduced in 2013.

While it is not wrong to say that all animals are sensitive beings, it seems necessary to explicitly clarify the specifically animal form or forms of sentience concerned. Indeed, from a scientific point of view, plants are also considered to be sensitive living beings. While their form of sensitivity is not nerve-based as with animals, they have one nevertheless: plants detect light and react to it by directional growth, and some even have leaves that are sensitive to touch and react with rapid movement[7].

Others would say that the form of sensitivity concerned by the law is implied, or obvious, and does not need to be qualified or defined. However, given the large variations in the meaning of the word "sensitivity" and readers' own sensitivities[6], the law leaves the door open to an interpretation based on assumptions that are not necessarily rational, and not always favourable to the welfare of some animals. For instance, because an animal, a fish for example, is not as close to humans as a mammal, especially a pet mammal, we could justify a denial of its capacity to experience feelings, the form of emotional sensitivity that exists in addition to the simple sensory sensitivity common to all animals including invertebrates like oysters.

In 2013, the experts from the European Enforcement Network of Animal Welfare Lawyers and Commissioners showed that the vagueness of the term "*êtres sensibles*" in French, which does not fully translate the English term "*sentient beings*", qualifies them more as "beings able to experience sensations". Inversely, the French word "*sensibilité*", which is particularly ambiguous, is closer to the English word "sensitivity" than "sentience". These same experts also regretted the absence of a definition of animal welfare.

It also regrettable that in Article L.214-1 of the French Rural Code, which has remained the same for the past 40 years, the expression "**conditions compatible with its biological imperatives**" has not been replaced by a stricter and more suitable one: "conditions that **imperatively ensure its welfare**". Indeed, biological imperatives are not specifically animal any more than sentience. Plants also have biological imperatives: minimum vital needs for water, certain mineral nutrients and light.

Like plants, invertebrate animals reputed to have no emotional feelings, such as shellfish and bees, must not be treated with disrespect or negligence because of that, when all or part of their life cycle is dependent on humans. Even if only for the farmer: out of respect for himself and his work, these animals should be carefully kept in conditions "compatible with their vital needs".

It is important to note that three European countries - the Czech Republic, Greece and Poland - were the first to specify, more or less, the form of sensitivity concerned in their broader legal definition of an animal.

Czech Republic

- Act No. 246/1992 on the Protection of Animals against Acts of Cruelty.

(Preamble): "Animals, like humans, are living beings and are therefore capable of experiencing various degrees of pain and suffering."

(Art. 3 a): "Animal: means a live vertebrate, other than man, excluding foetal or embryonic forms."

Poland

- Act of 21 August 1997 on the Protection of Animals

(Art. 1): "The animal as a live creature, capable of suffering, is not a thing."

Greece

- Law No.4039 of **2012 concerning domestic and stray companion animals** and the **protection of animals** from any exploitation or use for economic profit.

(Art. 1.a): "Animal means any organism that can feel emotions and lives on land, in the air or the sea, or any other aquatic ecosystem or wetland."

In other European states, the legal definition given to animals depends on their zoological classification and depending on the case, extends either to the entire animal kingdom of vertebrates and invertebrates, or only to vertebrates. Here are seven examples of definitions ranked from the most restrictive to the broadest.

Switzerland

- Federal Law on the **protection of animals** of 16 December **2005**

(Art. 2.1): "applies to **vertebrates**. The Federal Council decides to which invertebrates it applies and to what extent. In doing so, it is guided by scientific knowledge on the sensitivity of invertebrate animals."

United Kingdom

- Animal Welfare Act 2006

(Art. 1. 1, 2 and 3): "“animal” means a vertebrate other than man except its foetal, larval or embryonic form. This definition can be extended by decree to include invertebrates."

Finland

- Animal Welfare Act 247/1996 amended 2006

(Art. 2.1): "applies to **all animals.**"

Estonia

- Animal Protection Act of 13 December 2000

(Art. 2.1): "Animal: all mammals, birds, reptiles, amphibians, fish or invertebrates."

Malta

- **Animal Welfare** Act of 8 February **2002**

(Art. 2): "'Animal' means all living members of the animal kingdom, other than human beings, and includes free-living larval and reproducing larval forms, but does not include foetal or embryonic forms."

Norway

- **Animal Welfare** Act of 10 July **2009**, applied on 1 January **2010**

(Art. 2): "The Act applies to conditions which affect the welfare of or respect for mammals, birds, reptiles, amphibians, fish, decapods, squid, octopuses and bees. The Act applies equally to the development stages of the animals referred to in cases where the sensory apparatus is equivalent to the developmental level in living animals."

Ireland

- Animal Health and Welfare Act No. 15 of 29 May 2013

(Art. 2-1): "“animal” means a member of the kingdom *animalae* other than a human being."

North America

1. Canada

It should be noted that on the American continent, the laws of the Quebec province of Canada are modelled on those of France. Indeed, the National Assembly of Quebec recently passed a bill that changes the Civil Code's definition of animals from "things" to "sentient beings with biological needs". This change is directly inspired by Article L.214-1 of the French Rural Code and the new Article 515-14 of the French Civil Code.

An animal welfare and safety act was also passed. In this act, the definition of an animal is utilitarian and restricted to certain mammals, birds and fish. It does specify their biological needs.

Province of Quebec

- Act of 4 December 2015 to improve the legal status of animals and pass a law on animal welfare and safety

(Art. 1): adds to the Civil Code Article 898.1 (2): "**Animals** are not things. They are **sentient beings that have biological needs.** In addition to the provisions of special Acts, which protect animals, the provisions of this Code and of any other Act concerning property nonetheless apply to animals.

(Art. 7)

(1) [...] "'animal', used alone, means: (a) a domestic animal, being an animal of a species or a breed that has been chosen by man to meet certain needs, such as cats, dogs, rabbits, cattle, horses, pigs, sheep, goats and chickens, and their hybrids;

(b) red foxes and American mink kept in captivity for breeding purposes with a view to dealing in fur, as well as any other animals or fish that are kept in captivity for breeding purposes with a view to dealing in fur or in meat or in other food products, and that are designated by regulation."

(5) "**biological needs**: are related to such factors as the animal’s species, breed, age, stage of growth, size, level of physical or physiological activity, and state of health and those related to the animal’s capacity to adapt to the cold or heat."

2. United States of America

Federal law

The American federal rural law's definition covers a very limited list of mammal and bird species kept as pets or used for experiments or entertainment.

- Code (**1998**) USA. Title VII, Chapter 54 A "**Animal Welfare Act**"

(section 2132, g): "The term ‘animal’ means any live or dead dog, cat, monkey (nonhuman primate mammal), guinea pig, hamster, rabbit, or such other warm-blooded animal, as the Secretary may

determine is being used, or is intended for use, for research, testing, or exhibition purposes, or as a pet.

But such term excludes (1) birds, rats of the genus *Rattus*, and mice of the genus *Mus*, bred for use in research, (2) horses not used for research purposes, and (3) other farm animals, such as, but not limited to livestock or poultry, used or intended for use as food or fiber, or livestock or poultry used or intended for use for improving animal nutrition, breeding, management, or production efficiency, or for improving the quality of food or fiber. With respect to a dog, the term means all dogs including those used for hunting, security, or breeding purposes."

As a result, in its chapter on animal welfare, the American federal law explicitly excludes any measure of protection for both birds and mammals used for food and textile production, reptiles, amphibians, fish and invertebrates. It also excludes rats and mice used for research purposes.

We could almost include, on a humorous note, American director Woody Allen's definition of a mouse: "A mouse is an animal that, when killed in sufficient quantities, under controlled conditions, produces a doctoral thesis."

The US federal definition of animals, one of the most restrictive in the world, shows how poorly the protection of animals is presented in American law. The EU should pay particular attention to this when negotiating the Transatlantic Free Trade Agreement[8].

States of the United States of America

However, the criminal laws of the federal capital (Washington DC) provide a very broad definition of animals, and several other states, such as Arizona and Alaska, include vertebrates in this definition except for fish. Oregon's state law is remarkable in that it is the first to refer to a specific form of sensitivity, the capacity to experience unpleasant emotions, as directly inspired by the European directive on the protection of animals used for scientific purposes.

Alaska

- Criminal law (Art. 11.81 900) (December **2007**)

b) 3) "Animal: means a vertebrate living creature not a human being, but does not include fish."

Arizona

- Act 2012 (HB 2870) relating to cruelty to animals

(13-290. Art. H.1): "Animal: means a mammal, bird, reptile or amphibian."

District of Columbia

- Criminal law (2013)

(Art. 22-1013): "The words animals or animal shall be held to include all living and sentient creatures."

Oregon

- Senate Bill 6 (2013) related to animals

(Art. 1. 1): "Animals are sentient beings capable of experiencing pain, stress and fear."

Asia

The definitions of the term "animal" are mostly utilitarian and can cover any domestic or captive wild animal. In certain countries, such as India, they can be philosophical and include the entire living world.

1. Bangladesh

- The Cruelty to Animals Act, 1920

Preliminary (Art 3.1): "Animal means any domestic or captured animal."

2. Myanmar

- Animal Health and Development Law No. 17/93 of 25 November, 1993

(Art. 2. a): "Animal means domestic animal bred by man or captured for a certain purpose. This expression also includes the semen, ovum or embryo of the animal."

3. India

- The Prevention of Cruelty to Animals Act, 26 December 1960

(Art. 2 a): "'animal' means any living creature other than a human being."

4. China (Provinces)

Hong Kong

- Prevention of Cruelty to Animals Act No. 331 of 30 June 1997

(Art. 2): "'Animal' includes any mammal, bird, reptile, amphibian, fish or any other vertebrate or invertebrate whether wild or domesticated."

Africa

While most definitions of an animal used on the African continent are utilitarian and restricted to vertebrates only, Tanzanian law stands apart. It gives a broad scientific definition that includes invertebrates and is one of the only laws in the world to specifically define not only sensitivity but also the five freedoms of animal welfare, taking inspiration from the definition given by the World Organisation for Animal Health.

1. South Africa

- Animal Protection Act of 1 December 1962

(Art. 1): "'Animal' means any equine, bovine, sheep, goat, pig, fowl, ostrich, dog, cat or other domestic animal or bird, or any wild animal, wild bird or reptile which is in captivity or under the control of any person."

2. Zimbabwe

- Prevention of Cruelty to Animals Act 1969

(Art. 2): "'animal' means — (a) any kind of domestic vertebrate animal; (b) any kind of wild vertebrate animal in captivity; (c) the young of any animal referred to in paragraph (a) or (b)."

3. Tanzania

- The **Animal Welfare** Act No. 19 of 6 December **2008**

(Art. 3): "'Animal' means any vertebrate or invertebrate other than a human being."

"'sensitivity' means capability of an animal to be aware of sensations, emotions, feeling pain, suffering and enjoying its species-specific needs."

(Art. 4) ...every person exercising powers under, applying or interpreting this Act shall have regard to: a) ensuring that animals are cared for according to their universally-adopted five **freedoms that include - (i) freedom from hunger, thirst, and malnutrition; (ii) freedom from fear and distress; (iii) freedom from physical discomfort; (iv) freedom from pain,**

injury and disease; and (v) freedom to express normal patterns of behaviour; b) recognising that (i) an animal is a sentient being and **(ii) animal welfare is an important aspect of any developed society**, which reflects the degree of moral and cultural maturity of that society;

Oceania

Oceania uses some of the most advanced general definitions, which are based on science. In some Australian states, the definition is limited to vertebrates other than humans and fish. However, in others, in Victoria for example and in New Zealand, which also recognises animals as "sentient beings", this definition is extended to all vertebrates, including their free-living larval forms and antenatal forms during the second half of their embryonic development. These include two categories of invertebrates: cephalopod molluscs and decapod crustaceans.

1. Australia (States)

Northern Territory

- Animal Welfare Act of 1 May 2014

(Art. 4) "'animal' means: (a) a live member of a vertebrate species including an amphibian, bird, mammal (other than a human being) and reptile; (b) a live fish in captivity or dependent on a person for food; or (c) a live crustacean if it is in or on premises where food is prepared for retail sale, or offered by retail sale, for human consumption."

Victoria

- Prevention of Cruelty to Animals Act 1986, as amended in 2013

(Art. 3): "Animal means (a) a live member of a vertebrate species including any (i) fish or amphibian that is capable of self-feeding; or (ii) reptile, bird or mammal, other than any human being or any reptile, bird or other mammal that is below the normal mid-point of gestation or incubation for the particular class of reptile, bird or mammal; or (b) a live adult decapod crustacean, that is (i) a lobster; or (ii) a crab; or (iii) a crayfish; or (c) a live adult cephalopod including (i) an octopus; or (ii) a squid; or (iii) a cuttlefish; or (iv) a nautilus."

2. New Zealand

- Act No. 142 of 1999 and Amendment of No. 2 of May 2015 relating to the welfare of animals in order to recognise that animals are sentient

(Art. 2.) (a) Animal : means any live member of the animal kingdom that is—(i) a mammal; or (ii) a bird; or (iii) a reptile; or (iv) an amphibian; or (v) a fish (bony or cartilaginous); or (vi) any octopus, squid, crab, lobster, or crayfish (including freshwater crayfish); or (vii) any other member of the animal kingdom which is declared from time to time by the Governor-General, by Order in Council, to be an animal for the purposes of this Act; and (b) includes any mammalian foetus, or any avian or reptilian pre-hatched young, that is in the last half of its period of gestation or development; and (c) includes any marsupial pouch young; but (d) does not include (i) a human being; or (ii) except as provided in paragraph (b) or paragraph (c), any animal in the pre-natal, pre-hatched, larval, or other such developmental stage."

Conclusion

As this overview of international law shows, some countries may still have narrow animal protection laws that only cover the prevention of acts of cruelty or are limited to warm-blooded vertebrates, or even a small portion of these. But thanks to a new and favourable worldwide trend that has developed over the past decade[9], legislation relating to animals living under human care is

moving towards protection of their welfare. This legal shift comes as a result of both new ethical demands from society and accelerated progress in scientific understanding of animal behaviour.

Utilitarian definitions have lost ground. They no longer see animals as things and state that they are living, **sentient** beings. Today, the definitions provided by law in a number of countries (of which some of the best models come from Victoria in Australia, Norway, New Zealand and Tanzania) scientifically describe which living creatures they cover: vertebrates and several stages of their embryonic or larval development as well as cephalopod and decapod invertebrates. These are animals whose capacity to experience emotions has been proven or is possible, according to current scientific data. Which in this case, comes down to adopting the ethical principle that Pr. Jean-Claude Nouët rightfully qualifies as the principle of presumption (Nouët, 2013).

Is it possible to ensure the welfare of animals, sensitive beings or capable of sensitivity, globally if these three terms are not given an accurate, scientific definition in law? Let us consider the question. When we talk about good levels of animal welfare, are we not using the reassuring terms of positive communication? Would it not be best to talk about tolerable levels of "animal suffering"? And if so: tolerable where, for whom and why? Should we not bear in mind, to paraphrase Albert Camus' famous quote, that "*to misname animals, their sensitivity and welfare, is to add to the misery of the world*"?

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PART 2
Animal welfare as taken into account by law around the world: globalisation and disparities

VI
The European Union legislation on animal welfare: state of play, enforcement and future activities

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The views expressed in this article are purely those of the writers and may not in any circumstances be regarded as stating an official position of the European Commission.

Abstract

The European Union (EU) has since 1974 established a wide range of legislative provisions concerning animal welfare. Under the EU treaties, animals are recognised as sentient beings, and in consequence, the EU and the Member States must pay due regard to the welfare requirements of animals when preparing and implementing EU policies in for example, agriculture or internal market. Today EU legislation on the welfare of farm animals covers with specific provisions the farming of poultry, calves and pigs as well as, for all species, transport and slaughter operations. This legislation is one of the most advanced in the world. In particular the EU has banned traditional cages for laying hens and requires group housing for pregnant sows.

While Member States are primarily responsible for the daily implementation of these rules, the Commission monitors the implementation of the legislation. Experts from the European Commission perform regular audits to check that the competent authorities are performing appropriate official controls. Non-compliant Member States may be brought to the Court of Justice of the EU. The Commission also contributes to raise awareness of animal welfare through training programmes, scientific advice and legal interpretations.

The European Commission adopted an EU strategy for the protection and welfare of animals for the period 2012-2015. Some actions remain to be completed and the present priority is therefore to achieve all the actions listed in the strategy before considering new ones. In parallel the Commission will continue to prioritise enforcement, strengthen and broaden dialogue with stakeholders and better valorise animal welfare at global level.

Introduction

The European Union (EU) has progressively built legislation on animal welfare over the last 40 years. The first, concerning the slaughter of animals, was adopted in 1974. It was progressively extended to the transport of animals and different types of animal production. Most of the EU legislation on animal welfare refers to farm animals but the Union has also adopted legislation to protect animals used for scientific purposes as well as in other areas such as animals kept in zoos and aquaria or regarding the use of leg hold traps. Some legal texts also restrict the trade of certain products (seal products or cat and dogs fur) on ethical grounds.

It is worth mentioning that animal welfare is also present in various EU legal texts of the Common Agriculture Policy (cross-compliance and single payment, subsidies for rural development, organic farming and the marketing standards for eggs) although this aspect will not be developed here.

In this article we will provide detail of the EU legislation on farmed animals which constitutes, in term of number of legal acts, the most important and comprehensive body of legislation in the

EU. We will then present the main ways in which the European Union ensure enforcement of this legislation, and conclude on the future possible actions at the level of the Union.

A. EU legislation on animal welfare: 40 years of experience

At the end of the Second World War, many countries in Europe had food shortages and modernisation of agriculture was considered as one of the priorities of the European Economic Community. The Common agriculture policy was developed in the sixties with the main objective of providing enough food at an affordable price. It was with the entrance of the United Kingdom into the Economic Community in 1973 that animal welfare became an issue dealt at European level. The European Union adopted the first legal text on the protection of animal in 1974.

1. Article 13 of the Treaty on the Functioning of the European Union

Article 13 of the Treaty on the Functioning of the European Union (TFEU) is under a section of the Treaty which contains provisions having general application such as gender equality, the fight against discrimination or environmental protection.

Article 13 of the Treaty on the Functioning of the European Union
In formulating and implementing the Union's agriculture, fisheries, transport, internal market, research and technological development and space policies, the Union and the Member States shall, since animals are sentient beings, pay full regard to the welfare requirements of animals, while respecting the legislative or administrative provisions and customs of the Member States relating in particular to religious rites, cultural traditions and regional heritage.

There has been some misunderstanding of this provision which needs to be clarified here.

First, like similar articles under this section of the Treaty, it does not constitute a legal base for the EU to act on animal welfare. It is an obligation to consider this aspect within the framework of a list of specific EU policies. Therefore, all pieces of EU legislation on animal welfare are based on one of these EU policies such as agriculture for farmed animals or the internal market for laboratory animals where the EU has a legal base to act.

This explains why the scope of EU action on animal welfare is limited and some areas are not within EU competence (like stray animals for example).

Secondly, this article contains explicit limitations with regard to areas where Member States may have provisions which may limit EU actions (in relation with religious rites, cultural traditions or regional heritage). Some issues that are often raised by European citizens including bullfighting or the use of animals in shows or competitions are therefore excluded from the scope of EU action, either because they are not linked to a defined EU policy and/or because they belong to a particular exemption laid down in Article 13 TFEU.

Finally, it should be noted that Article 13 TFEU identifies specific EU policies where the obligation applies but certain EU policies areas are not mentioned (like environment). This does not limit the EU to consider the welfare of animals into these policies.

2. Legislation on the welfare of farmed animals

Legislation on the protection of farm animals covers all the different steps of production from farming itself, to transport and killing.

Farming activities are covered by five *directives* which impose minimum standards while the transport and the killing of animals are covered by *regulations* which set up similar requirements for all Member States.

Directives vs. regulations in the EU legal order

In the European Union's legal order, *directives* are applicable to Member States which have to transpose them into their own national legal system, with the possibility to go beyond the minimum rules laid down in an EU directive. By contrast, *regulations* are directly applicable to citizens and businesses, without being transformed into national laws. They usually establish common standards and restrict the possibility for the Member States to adopt standards other than those laid down in a regulation. Member Sates however, still have to establish sanctions in their national legal order.

The legislation on farming activities is provided by one general umbrella directive which covers all farmed species and four specific directives that cover respectively calves, pigs, laying hens and chickens for meat production (broilers). This body of legislation was built progressively to address at the time of adoption the most intensive systems of animal production.

By comparison, the two regulations on transport and killing cover all farmed species even those not subject to specific farming legislation such as adult bovine animals or small ruminants.

2.1. Directive 98/58[1]: All farmed animals

This directive contains general provisions applicable to all vertebrate farmed species but the annex to the directive does not apply to fish, reptiles and amphibians.

This annex contains very general requirements (staff, record keeping, freedom of movement, accommodation, equipment, feed and water, mutilations and breeding procedures) which tend to reflect the principles of the five freedoms initially developed in the United Kingdom.

The directive refers to the conclusion (i.e. the ratification) by the EU of the *European Convention on the protection of animals kept for farming purposes*, an international convention elaborated under the aegis of the Council of Europe[2]. The EU is a contracting party of this convention, which contains itself a series of general requirements as well as twelve specific recommendations (see Annex). The recommendations cover a larger range of farmed species that the ones covered by the EU legislation (like for example farmed fish, turkeys, fur animals, ducks, geese, ostriches, cattle, sheep and goats).

The link between these recommendations and the EU legal order (the Union being a contracting party of the convention as well as all Member States) is subject to legal debate. However, each Member State being a contracting party of this convention (this is a condition to access to the status of Member State of the EU), has to put it into effect under its national legal order as any international convention that a country ratifies.

2.1. Directive 2008/119[3]: Calves

This directive was actually adopted in 1991 (Directive 91/629/EEC) then consolidated in the present legal text. The requirements focus on accommodation standards, in particular by introducing group housing for calves older than eight weeks of age.

This directive was mainly designed in response to intensive systems of rearing dairy calves for "white" veal meat. At that time, dairy calves were kept in individual stalls for all their life, often in complete darkness and under restricted diet in order to keep the meat as "white" as possible.

For these reasons, the directive forbids keeping calves in permanent darkness and tethering. It also requires a balanced diet adapted to the needs of the calves by providing progressively fibrous food and sufficient iron. Muzzling is also forbidden.

2.3. Directive 2008/120[4]: Pigs

Similar to the one for calves, this directive was initially adopted in 1991 (Directive 91/630/EEC) and later consolidated into the current version.

The directive addresses the various steps of production from breeding sows to fattening pigs. In addition, even though accommodation remains one of the key areas of the text, operational aspects are also considered in details.

As regards accommodation, the directive requires for all holdings from 1 January 2013 the obligation of group housing of sows and gilts for certain period of their breeding lives. Previously, breeding females could be kept their whole lives within individual stalls, without being able to move or turn. Group housing is now compulsory for an important part of their lives, individual stalls being still permitted to allow the service (natural service or artificial insemination and the necessary time to check if it has succeeded), the farrowing (one week before the expected time of farrowing) and the lactation period.

Like the ban on battery cages for laying hens (see below), the group housing of sows represents a major change for the lives of many animals (estimated at 12 million sows in 2013).

The directive also contains detailed space requirements for all pig categories.

The directive requires for all pigs the provision of manipulable materials such as straw, hay, wood, sawdust, etc. in order to allow pigs to express their normal behaviour for rooting.

The directive limits the use of certain procedures such as tooth clipping, tail docking, castration and nose ringing. For example, tail-docking is not permitted routinely but only where there is evidence that injuries have occurred. Minimum weaning age is also regulated.

2.4. Directive 1999/74[5]: Laying hens

This directive defines three different farming systems: unenriched cages, enriched cages and alternative systems.

Unenriched cages are cages without *enrichment materials*[6] and very little space for the hens to move (a minimum of 550 cm^2 per hen so less than an A4 page). From 1 January 2012, such a system was banned in the EU after a long transitional period for the industry to adapt. The ban brought a dramatic change in the life of the approximatively 360 million laying hens kept in the Union.

Enriched cages are cages that are equipped with enrichment materials and which provide hens a bigger space (a minimum of 750 cm^2 per hen).

Alternative systems are non-cage systems like barn or free range (including organic production) that provide even larger space than enriched cages.

In addition, the annex to the directive contains some operational requirements (inspection, sound level, light levels, etc.).

This directive is also linked to EU legislation on the marketing of eggs[7] which established the obligation of marking the eggs based on the production system (0 for organic eggs, 1 for free range eggs, 2 for barn eggs and 3 for eggs from caged hens). This link between animal welfare standards and labelling has probably increased the demand for alternative systems of productions in the EU. This is today the sole mandatory system in the EU informing consumers on the welfare conditions under which animals are kept.

2.5. Directive 2007/43[8]: Chickens for meat production

This directive is the last adopted piece of EU legislation on the welfare on farm and introduces for the first time the concept of animal-based indicators.

The directive establishes a maximum stocking density of 33 kg/m^2 with a possibility of extension up to 39 kg/m^2 and 42 kg/m^2 depending on the quality of the management and the results of the monitoring on the animals. Member States are expected to establish a system of monitoring on farms and at slaughterhouses (based on the lesions observed after slaughter).

2.6. Regulation 1/2005[9]: Animal transport

This Regulation represents a comprehensive piece of legislation which applies to all live vertebrate animals transported in connection with an economic activity. Most technical requirements however are designed for terrestrial farmed animals even if some administrative requirements remain applicable to other species (wild animals, dogs and cats, experimental animals, farmed fish, etc.). Certain rules (handling of animals) also apply to livestock markets and assembly centres.

The administrative requirements include the obligation for transporters to be authorised and drivers to obtain a certificate of competence. Vehicles used for transport over eight hours and livestock vessels have to be approved. For the main livestock species, journeys over eight hours between two Member States have to follow a certain administrative procedure (journey log).

The technical rules include various aspects of the transport: the fitness for transport (for example the following animals are considered unfit for transport: weak or sick animals, animals not able to walk unassisted, females at the end of their gestation, etc.), the quality of the means of transport and transport practices (loading, unloading, handling of animals, space allowances and travelling times).

Minimum space allowances and maximum travelling times are subject to precise rules for certain species which have both an important economic impact. For example, pigs and horses are not allowed to be transported more than 24 hours without a stop and beyond this time must be rested for at least 24 hours after being unloaded, fed and watered before they can be transported again.

Additional rules exist for journeys beyond eight hours ("long journeys") since they represent a higher risk for the welfare of animals. Vehicles transporting the main livestock species (horses, cattle, sheep, goats and pigs) are required to be equipped with a ventilation system (in order to control temperature), watering devices and a satellite navigation system.

2.7. Regulation 1099/2009[10]: Killing of animals

This regulation applies to various situations where animals are killed in context of production. It applies mainly to slaughterhouses but includes farm killing which occurs for different reasons (fur animals, depopulation for disease control or other purposes, culled animals, emergency slaughter).

Under the regulation, stunning animals before killing is compulsory, with a list of authorised stunning methods, depending on the species and contexts concerned (human consumption or not). The stunning methods are described and in some cases specific requirements are attached to the method like minimum currents for electrical methods of stunning.

Slaughter without stunning is however permitted in a context of ritual slaughter (for the production of halal or kosher meat) provided that it takes place in a slaughterhouse. Member States may however adopt stricter rules in this context.

As for the directive on chickens for meat production, this regulation puts more emphasis on the responsibility of operators. In addition, it requires standard operating procedures on animal welfare. Slaughterhouses are expected to establish and implement a monitoring procedure to verify that the stunning process is efficient. Staff handling animals have to prove their competence. Slaughterhouses must designate an animal welfare officer to assist them in ensuring compliance with the regulation. Rules apply for the lay out and the restraining and stunning equipment in slaughterhouses as well as for the operational aspects (handling, restraining and bleeding).

In addition, the regulation requires for meat imported into the EU to be accompanied with an attestation certifying that requirements at least equivalent to those of the EU have been met.

B. Enforcement

1. Member States' role

The competent authorities of the Member States are responsible for the daily implementation of EU legislation. Whatever the EU legal text is a directive or a regulation, Member States have to provide the technical instructions and logistical arrangements necessary for appropriate implementation as well as setting up an appropriate system of sanctions.

The role of the Member States in implementing EU rules is therefore essential and implies important activities such as informing stakeholders on new rules, providing technical and legal instructions as well as training their officials. They should also develop a proper reporting system in order to monitor progress in implementation.

Member States' competent authorities are therefore primarily responsible for carrying out proper checks by dedicating the necessary human and financial resources for the purpose.

2. European Commission's role[11]

2.1. Audits of the Food and Veterinary Office

As regards EU legislation on the welfare of farm animals, the Commission has developed a system of regular audits performed by experts from the Food and Veterinary Office (FVO)[12] of the Commission's Health and Food Safety Directorate General. The FVO audits cover various areas of EU legislation, mainly related to food safety, animal and plant health.

The purpose of the audits is to verify that Member States have planned and applied the necessary measures to implement EU rules. The role of the Commission's experts is therefore to check that the competent authorities are able to detect and identify non-compliances and take the appropriate remedial action. They have no legal competence to directly inspect individual establishments or sanction them. Their audits include visits of establishments but not to judge an individual case but to use it as a sample that could reflect a general situation.

For this purpose, the FVO has a particular team of experts dedicated to EU animal welfare legislation which performs around one audit a month. In addition, other FVO expert teams also check some animal welfare rules in the context of other audits (like audits on food safety in slaughterhouses will also check the stunning of animals). The FVO reports are publicly available on the Internet.

When the Commission's experts find failures in the inspection system of a Member State, there are a series of follow up actions in order to address the issues through a continuous dialogue. In case there is a persistent failure of the Member State to address certain issues, the Commission may decide to trigger a legal procedure (see below).

With time, the FVO has diversified its activities regarding enforcement on animal welfare by in particular performing study visits, organising meetings to improve coordination and dialogue between the competent authorities.

2.2. Member States reports on inspections

EU legislation on animal welfare requires Member States to report to the Commission on their inspection activities on farms and on transport.

In addition, the Commission may also require the Member States data needed for checking the implementation of particular EU rules. This has been the case for the implementation of the ban on traditional cages for laying hens and the group housing of sows.

2.3. Non-compliance reported by individuals or non-governmental organisations

The European Commission regularly receives complaints on animal welfare. Those referring to individual cases of non-compliance are not considered since they have to be first addressed to the competent authorities of the Member State concerned. As previously stated, the Commission has no legal competence to intervene in individual cases since this matter is under the responsibility of the competent authorities of the Member States concerned.

However, the Commission may also receive allegations of systematic breach of the EU legislation due to consistent failure of a Member State to implement certain EU rules. In this case the Commission requests further information from the Member State competent authorities and possibly proceed to further action in order to reach compliance.

2.4. Legal proceedings and sanctions

If it appears that a competent authority of a Member State fails to apply EU rules, the Commission may consider opening an infringement procedure under Article 258 of the Treaty against the Member State concerned. The Commission may initiate an infringement procedure based on consistent, sufficient and reliable data. Information concerning the failure of a Member State to apply EU rules can originate from the services of the Commission as an official mission report from the Food and Veterinary Office or from complaints by organisations or individuals.

Article 258 of the Treaty on the Functioning of the European Union

If the Commission considers that a Member State has failed to fulfil an obligation under the Treaties, it shall deliver a reasoned opinion on the matter after giving the State concerned the opportunity to submit its observations.

If the State concerned does not comply with the opinion within the period laid down by the Commission, the latter may bring the matter before the Court of Justice of the European Union.

It is also important to note that the Commission has discretionary power to open infringement proceedings against a Member State since it may consider it more efficient to use other ways to achieve compliance. Legal proceedings require substantial resources from both parties and usually take a long period of time (could be up to two years before going to the Court) which could sometimes be better used to solve the issue. Most issues are therefore resolved before this final step. It may however happen that a Member States is brought to the Court of Justice and possibly sentenced to financial sanctions.

3. Supporting role of the Commission: Education, scientific opinions and interpretations

3.1. Education and awareness

Raising awareness among stakeholders and officials is essential to ensure proper enforcement of EU animal welfare rules. This role is mainly under the responsibility of the Member States since performing efficient communication and education requires important national, regional and local networks, various supports and good knowledge of the specific culture and language of the targeted audience.

Nevertheless, despite these limitations, the Commission has taken a number of initiatives in order to raise awareness on animal welfare.

The programme *Better Training for Safer Food (BTSF)* is an important Commission training programme related to food and feed law, animal health and welfare and plant health rules. It trains the staff involved in these official controls coming from Member States and candidate countries.

Training sessions are also organised specifically for countries outside the EU, particularly developing countries to familiarise them with EU requirements.

From 2006 to 2013, the BTSF programme provided around 30 training sessions with more than 1,500 participants in the EU on various pieces of animal welfare EU legislation. Some training programmes were performed in third countries in a context of international cooperation (Thailand and Brazil in 2014, South Korea in 2012, etc.). Attendance figures alone do not reflect the wider impact of the training sessions - the "train the trainer" approach ensures that participants disseminate their newly acquired knowledge among control inspectors in their own country.

In 2014 the BTSF programme made available a first e-learning module on animal welfare which was viewed by more than 1,000 people. This programme is still under development. Subject matters and linguistic versions will be progressively extended. This e-learning module is designed to be accessible in the future by up to 5,000 people per year, with the potential of increasing considerably access to training for officials.

In addition, the Commission, in cooperation with the Federation of Veterinarians of Europe, has developed dedicated initiatives to raise awareness on animal welfare among veterinary practitioners in Europe. The difference with the BTSF programme is that it is targeted to a regional audience of veterinarians (not only officials). The programme has been developed between 2011 and 2015 with 9 workshops in various European countries and attracted around 1,200 veterinarians.

Finally, the Commission regularly organised major conferences in order to increase awareness on animal welfare among stakeholders on various issues[13]. Each event generally attracted between 150 and 200 people, with key EU stakeholders, having significant dissemination effects among the organisations concerned (farmers, traders, transporters, slaughterhouse operators, veterinarians, scientists, animal welfare organisations, etc.)

More recently, in association with the World Veterinary Association, the Commission arranged in 2013 and 2014 two Global Webinar on animal welfare[14], attended each time with around 300 veterinarians or students from more than 50 countries.

The Commission is also associated through active participation to many events where animal welfare is one of the core topics.

3.2. Scientific opinions

The European Food Safety Authority (EFSA) has been created to provide independent scientific advice to the EU decision makers who regulate food safety in Europe. It provides scientific opinions on animal welfare following requests from the Commission. Scientific opinions contribute indirectly to better implementation of EU rules on animal welfare in a variety of ways.

First, most EU legislation has been prepared based on scientific data. The regular scientific opinions of the EFSA allow stakeholders to update their technical and scientific knowledge in order to understand and find optimal solutions to comply with the legislation.

Secondly, the EFSA plays an increasing role in involving stakeholders in their work, contributing to widening the debate on animal welfare beyond the scientific community and consequently, raising awareness on the issue among the various players (farmers, food industry, veterinarians, etc.).

Thirdly, the EFSA is also questioned on matters related to the implementation of EU rules such as for example the monitoring procedure for the stunning animals or the validation of possible animal-based indicators in various species.

In all these aspects, the role of science advice is essential in not only shedding light on the way EU rules should be understood but also in giving the necessary direction to stimulate further research and innovation[15].

3.3. Legal interpretations and guidelines

The Commission regularly replies to stakeholders and the competent authorities regarding the interpretation of some particular provisions of EU legal requirements. While the views of the Commission have no legal effect[16], the contribution will harmonise and clarify some aspects of the legislation.

In addition, the Commission may in some instance develop guidelines in order to also address issues that are particularly problematic to enforce. This approach has not yet been fully exploited for the welfare of farmed animals but starts to be used with ongoing initiatives on the welfare of pigs as well as on animal transport.

C. Future EU actions on animal welfare

1. Complete the EU animal welfare strategy 2012-2015

The Commission adopted in 2012 an EU animal welfare strategy for the period 2012-2015[17] which includes a list of actions. Some actions remain to be completed and the present priority is therefore to achieve all the actions listed in the strategy before considering new ones.

Some of the outstanding actions are directly related to enforcement of EU law. This is the case for the guidelines on the welfare of pigs which will target issues such as the provision of manipulable materials or the end of routine tail-docking, two legal requirements that remain insufficiently implemented in many Member States. The Commission has also initiated a pilot project to develop best practices on animal transport that is expected to contribute to a better implementation of the rules in this area. Finally, the Commission will develop guidelines on the protection of animals at the time of killing.

Other outstanding actions are studies and reports that will contribute to design the future actions of the Commission. This concern in particular areas where today the Union has little or no activities such as the welfare of dogs and cats or farmed fish. Other studies and reports relate to broader issues like animal welfare education and information or animal welfare international activities.

The completion of all these actions is therefore essential as it will provide the necessary information to identify potential new activities.

2. Prioritise enforcement

In parallel, the Commission will continue to work towards better enforcement. As previously stated in this article, the Commission has an important role in helping Member States in better enforcing EU rules. For this purpose, Commission's services have started to innovate by developing new mechanisms to further contribute in improving the level of implementation. Examples are the organisation of regular meetings of national experts on animal transport and the compilation of procedures for official controls (so called "network documents"). The preparation of various guidelines or best practices (as outlined previously) will have to be accompanied with measures to ensure wide access and dissemination of such knowledge.

The ban on traditional cages for laying hens in 2012 and on the group housing of sows in 2013 provided successful experience of enforcement. Based on these achievements, the Commission and the Member States need to develop clear methodology to establish benchmarks and to monitor

results based on specific indicators. Such methodology could be further developed and extended in other areas where enforcement is needed.

3. Strengthen and broaden dialogue with stakeholders

There is also a need to establish and widen the dialogue on animal welfare with the various stakeholders. Animal welfare is not a stand-alone issue and needs to be connected with related subjects like sustainable food production or antimicrobial resistance. Relationships with other EU policies such as agriculture, trade or research are also important and need to be better considered in the future development of animal welfare activities. Stakeholders' dialogue could also be a forum where the outcomes of strategic studies deriving from the EU Animal Welfare Strategy 2012-2015 could possibly be debated.

4. Better valorise animal welfare at global level

The EU has one of the most comprehensive and advanced animal welfare legislation in the world. This leading position is an asset in the long term but importation of cheaper products from third countries with sometimes lower animal welfare standards could jeopardize the progress made by EU producers as well as mislead EU consumers. In addition, EU producers have to compete at global level and consumers outside the EU are not necessarily aware of the high animal welfare standards of EU products.

It is therefore important that the Commission continues and reinforces its international activities on animal welfare. They take place at the level of international organisations such as the *World Organisation for Animal Health* (OIE) which has adopted a series of international standards on animal welfare. The Commission also negotiates free trade agreements with individual third countries[18] where animal welfare is included. Other forms of dialogues may also exist with third countries on animal welfare, in order to exchange experience and expertise.

In the future the Commission could explore how the potential market value of EU animal welfare can be better valorised at global level.

Conclusion

The European Union has adopted in the last 40 years a very comprehensive and advanced set of legislation on animal welfare. The Union has developed animal welfare legislation quite extensively for farmed and laboratory animals. Some other areas of animal welfare remain under the sole competence of the Member States.

This body of EU legislation contributes to the sustainability of the EU food chain. Respecting production animals addresses the ethical concerns of citizens and consumers but also helps to develop production systems that are innovative and economically viable in the long term.

While Member States are primarily responsible for implementing EU rules in the field of animal welfare, the Commission has built a series of instruments to ensure a harmonised enforcement, through audits, training, scientific expertise and advice.

Enforcement remains an important challenge since animal welfare is sometimes perceived as an economic hurdle rather than an opportunity for better and more efficient production.

Against this background continuous stakeholders' dialogue, information and education are essential to create a positive dynamic for animal welfare and to improve enforcement through better understanding of the underlying animal welfare principles.

Stakeholders' dialogue is also crucial in order to better integrate animal welfare within a general context of sustainable production, considering its integration within other societal issues such as public health, environment and global competitiveness.

Scientific opinions and research play also an important role in providing the necessary understanding of the legislation as well as the innovations to make animal welfare an economic opportunity.

The Union is one of the major world importers of food products and the globalisation of the food market has an impact on the applicability of EU rules including those on animal welfare. The Union has so far been successful in advocating and promoting its food standards in the international arena, showing that consumers beyond EU borders also appreciate and value high quality standards. Such a policy should be therefore continued in order to consolidate the credibility of the EU food sectors in external markets.

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2. The Council of Europe is not an EU institution.
3. Council Directive 2008/119/EC of 18 December 2008 laying down minimum standards for the protection of calves (OJ L 10, 15.1.2009, p. 7).
4. Council Directive 2008/120/EC of 18 December 2008 laying down minimum standards for the protection of pigs (OJ L 47, 18.2.2009, p. 5).
5. Council Directive 1999/74/EC of 19 July 1999 laying down minimum standards on the protection of laying hens (OJ L 203, 3.8.1999, p. 53).
6. Enrichment materials are equipment inside the cage which provide for the normal behavioural needs of the hens like a nest, a perch and a litter for pecking and scratching.
7. Council Regulation (EC) No 1234/2007 of 22 October 2007 establishing a common organisation of agricultural markets and on specific provisions for certain agricultural products (Single CMO Regulation) (OJ L 299, 16.11.2007, p. 1).
8. Council Directive 2007/43/EC of 28 June 2007 laying down minimum rules for the protection of chickens kept for meat production (OJ L 182, 12.7.2007, p. 19).
9. Council Regulation (EC) No 1/2005 of 22 December 2004 on the protection of animals during transport and related operations and amending Directive 64/442/EEC and 93/119/EC and Regulation (EC) No 1255/97 (OJ L 3, 5.1.2005, p. 1).
10. Council Regulation (EC) No 1099/2009 of 24 September on the protection of animals at the time of killing (OJ L 303, 18.11.2009, p. 1).
11. For readers who are not familiar with the EU, the *European Commission* is one of the key EU institutions established by the EU treaties, with the *European Parliament* and the *Council*. While the Commission proposes pieces of legislation, the Parliament and the Council adopt them. The Commission has also a role of guardian of the Treaties making sure that they are properly implemented by the Member States.
12. Editor's note: the name of the "Food and Veterinary Office" has been replaced in 2016 by "Directorate F Health and food audits and Analysis".
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14. April 2014: "Veterinary leadership: "Empowering tools for vets in the field of Animal Welfare"; December 2014: "The importance of new technologies to empower vets in the field of Animal Welfare"
15. See for example the EU research project Precision Livestock Farming.
16. Only the Court of Justice of the European Union can interpret EU law authoritatively.
17. EU strategy for the Protection and Welfare of Animals 2012-2015 COM(2012)6 final.
18. Third countries are countries that are not EU Member States.

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Annex

Recommendations of the European convention on the protection of animals kept for farming purposes

The European Union concluded the European convention on the protection of animals kept for farming purposes (under the aegis of the Council of Europe) through Council Decision of 19 June 1978 concerning the conclusion of the European Convention for the protection of animals kept for farming purposes (OJ L 323, 17.11.1978 p. 12).

- Recommendation concerning farmed fish (adopted by the T-AP on 5 December 2005, entry into force on 5 June 2006)
- Recommendation concerning Pigs (adopted by the T-AP on 2 December 2004, entry into force on 2 June 2005) (Replacing the previous Recommendation adopted on 21 November 1986)
- Recommendation concerning Turkeys (adopted by the T-AP on 21 June 2001)
- Recommendation concerning Fur Animals (adopted by the T-AP on 22 June 1999) (Replacing the previous Recommendation adopted on 19 October 1990)
- Recommendation concerning Muscovy Ducks and hybrids of Muscovy and domestic Ducks (adopted by the T-AP on 22 June 1999)
- Recommendation concerning domestic Geese (adopted by the T-AP on 22 June 1999)
- Recommendation concerning domestic Ducks (adopted by the T-AP on 22 June 1999)
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- Recommendation concerning Goats (adopted by the T-AP on 6 November 1992)
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VII
Legal standards and animal welfare in European countries

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Introduction

Throughout the centuries, animals' status has evolved from being seen as things to being regarded as sentient living beings. This change in outlook is largely due to progress in science leading to a greater and more accurate understanding of animal species. Animal protection law in Europe has kept abreast of these changes and animal welfare is now recognised in some countries.

Although it is difficult to define as a notion, given the diversity of species and specific characteristics of each individual within a single species, it has been firmly established that animal welfare is the result of several combining factors (physiological, environmental, health, social and psychological)[1]. It is now widely accepted on a national, European and international level that animal welfare is ensured by five freedoms:

- Freedom from hunger and thirst (by ready access to fresh water and diet to maintain health and vigour).
- Freedom from discomfort (by providing an appropriate environment including shelter and a comfortable resting area).
- Freedom from pain, injury or 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).

While the first three freedoms aim to protect the animal's bodily integrity, the meaning of the last two is entirely different because the aim is to guarantee a quality of life for the animal. An examination of various pieces of national legislation on the protection of animals shows that while various provisions prohibit physical harm to animals, very few take into account concern for its welfare. Indeed, very few European lawmakers have passed laws that recognise and protect the five freedoms.

Protection of bodily integrity

The 19th century saw the beginnings of animal protection in Europe in England, followed a few years later by France[2]. However, these basic laws did not ensure full protection of animals. They did not extend beyond shielding young children from shows they found difficult to bear and/or offensive. It was not until the second half of the 20th century that the first general laws were passed, which, for the most part, introduced general provisions against acts of cruelty. Some, however, have included exemption clauses.

1. Principle

The first general laws on the protection of animals appeared in the 1960s[3]. This legislative movement continued on throughout the 20th century, but for most European countries the 1990s were a turning point. In the space of ten years, no fewer than 12 countries passed general laws[4].

This trend has continued on through the 21st century[5]. All European countries now have protective provisions. Four countries have also incorporated animal protection into the highest law of their legal system: Switzerland (1992), Germany (2002), Luxembourg (2007) and Austria (2013). Luxembourg is unique in that it is the only country to have given animal welfare constitutional value. Since the 2007 constitutional reform, Article 11*bis* of the Constitution stipulates that "[the State] *promotes the protection and welfare of animals*."

These national provisions, by prohibiting all forms of physical harm, implement the first three freedoms outlined to protect animals against physical harm (freedom from hunger or thirst, from discomfort, pain, injury or disease). However, it took several stages to achieve this result.

The first legislative phase saw the adoption of laws punishing cruel treatment of animals. Originally, this only covered acts committed in public but was then extended to any cruel treatment in private. Poor treatment is characterised as any form or physical harm done to the animal, whether voluntarily or involuntarily, sometimes even through neglect. This means any situation that could harm the animal such as an ill-fitting restraint, lack of water or food, absence of care if sick or injured, or exposure to harsh weather conditions. The final phase led to the prohibition of any act of cruelty defined as a wilful act intended to harm the animal.

French legislation is a perfect illustration of these three phases. On 2 July 1850, the Grammont Act imposed penalties against those displaying cruelty to animals in public. Then in 1898, the prohibition was extended to private premises but omitted to adopt any corresponding criminal provisions. It was not until 7 September 1959 that a criminal provision was added to punish poor treatment of animals, whether in public or private, by a fine. In 1963, the notion of an act of cruelty appeared in French legislation and then in 1976, lawmakers made abandonment and serious injury a crime. It took until 2004 for sexual abuse to become a criminal offence.

As it stands, mistreatment and cruelty are punishable as a minor or major offence depending on the nature of the harm to the animal:

- unintentional harm to the life or integrity of the animal: €450 fine;
- mistreatment: €750 fine;
- intentional harm to the life of an animal (needless): €1,500 fine;
- acts of cruelty, serious injury, sexual abuse, and abandonment: €30,000 fine and/or two-year jail sentence.

The comparative study of national legislations shows great disparity in the penalties applied for mistreatment of animals. Depending on the country, an act of cruelty may be punished by a five-year jail sentence (Ireland) down to a €500 fine (Bulgaria).

In some countries, it is at a local level that provisions for the protection of an animal's bodily integrity have been adopted. Before Italy ratified the European Convention for the Protection of Pet Animals in 2011, in 2005, Rome City Council had already banned onyxectomy (removal of the claws of cats), electric collars, ear cropping and tail docking in dogs for non-therapeutic purposes, and required that dogs were given daily walks. Along similar lines, the town of Monza became the first community in Italy to prohibit its inhabitants from keeping goldfish in bowls.

2. Limits

These national provisions do not always ensure total protection of the bodily integrity of animals given the various exemptions included on the one hand, and the level of sanctions applied on the other.

Several European legislations contain exemptions that authorise the violation of the bodily integrity of animals. This is the case in France where provisions of the Penal Code[6] penalising acts of cruelty do not apply to bullfighting and cockfighting where these are done as part of a continued

local tradition. Cultural traditions are also used to legitimise the practice of bullfighting in Portugal and Spain[7].

Other than these widely contested practices, there are a number of situations that are still authorised despite the suffering they cause. Thus, it is legal to hit a dog or horse in order to train it or to use an electric collar, to watch greyhound racing as entertainment[8], or, in animal husbandry, to commit intrusive acts such as castration, tubal ligation, beak-trimming or dehorning.

Sexual abuse is still possible without penalty in three European countries (Finland, Hungary and Romania).

The second limit results from the absence of dissuasive sanctions. In many countries, the fines are relatively low and prison sentences either non-existent or short[9]. For countries that do have relatively harsh sentences[10], there is a wide berth between the sanctions that are applicable and those that are passed. So in France, where the penalties in principle seem severe[11], judges very rarely hand out prison sentences. They only do so when the act of cruelty is committed under particular circumstances. This was the case for the sinister case of Oscar the cat, who had been subjected to violence and whose suffering had been filmed and then posted on social media[12].

The protection against bodily harm is a necessary but nonetheless insufficient condition for ensuring the welfare of an animal. So that this goal can be achieved, the social and psychological dimensions must be taken into account.

Protection of quality of life

The protection of animals, other than their physical protection, needs to include the prevention of any form of psychological distress and the preservation of the social life of gregarious animals. Every animal should enjoy these two freedoms.

1. Principle

The adoption of European standards has led to a minimum level of protection for the welfare of livestock. However, these regulations are still patchy and do not cover certain species[13] or certain situations such as transport or slaughter. Because there are no general European regulations, only a few species' welfare appears to be ensured from birth to death. To make up for this regulatory deficiency, several European states have adopted higher standards, which are more restrictive than the European standards. Legislative provisions explicitly refer to welfare in Norway (1974), Luxembourg (1983), Belgium (1986), Sweden (1988), Germany (1998), Malta (2002) and the United Kingdom (2006). Some bodies of law go as far as to specify what animal welfare entails. This is the case of Switzerland, Greece and the United Kingdom. The UK Act of 2006 explicitly refers to the five freedoms as the base for animal welfare, the recent Greek Law (2012) takes this a step further by incorporating an obligation to provide daily walking or exercise, depending on the species. The Greek lawmakers must have been inspired by their Swiss counterparts, who adopted similar measures in 2008 (OPan, 2008[14]).

Other legislations set minimum standards for living conditions. Some indicate a minimum amount of space that the animal must be given or a number of hours in a day the animal must be able to move freely in an outdoor area suited to the needs of its species. The majority of animals concerned by these provisions are pet dogs and cats. Some countries also have provisions regulating cages for some types of rodents, size of decorative aquariums or even compliance with a day/night cycle for fish (Switzerland).

It is also important to note that several countries have acknowledged the gregarious nature of certain species. In Bulgaria and Switzerland, owners are barred from keeping certain animals

alone. While the Bulgarian law states a general principle, the Swiss provisions specify which species are concerned[15] (OPAn, 2008).

Finally, given that respect for an animal comes from a deeper understanding of its nature and needs, both physiological and behavioural, several laws require that owners are taught certain biological and/or ethological aspects[16].

The acknowledgement of the sentient nature of animals has led to a positive change in European and national regulations. However, there is still progress to be made in order to remove barriers blocking the recognition and validity of animal welfare.

2. Limits

Welfare will become tangible, particularly for livestock, only on the double condition that the existing provisions are respected and certain animal husbandry practices are abolished.

The effectiveness of various European and national measures largely depends on how indicators used to measure animal welfare are implemented. While these indicators are created by animal scientists (biologist, ethologists, veterinarians, etc.), European and national procedures need to be put into place to ensure compliance with these regulations. This is why Member States can be penalised by the European Union Court of Justice if they fail to fulfil their obligations[17]. For instance, a court case was brought by the European Commission against Italy for failure to implement the EU directive laying down minimum standards for the protection of laying hens (Directive 1999/74/EC[18]).

National court cases tend to be the result of public outcry, by individuals or associations, at deplorable situations[19]. In Switzerland, an NGO was tasked to carry out certain checks so that they were as transparent and objective as possible[20]. Other countries have implemented mechanisms to facilitate the detection and resolution of situations that are harmful to animals. For instance, Wallonia (Belgium) set up an Animal Welfare Council so that complaints of abuse or cruelty can be filed online, and in Austria each of the nine *Länder* has an ombudsman. This mediator, who is specialised in animal welfare, is authorised to plead in all cases related to the protection of animals.

Finally, for animal welfare to shift from being a concept to reality, practices need to evolve to phase out intensive farming and prohibit situations that cause suffering. Several European countries have already banned the production of foie gras[21], fur farms[22] and the sale of animals in pet shops[23].

Despite the number of existing European and national regulations, for animal welfare to be possible for each animal, there needs to be an obligation for each animal owner or handler to ensure that welfare. Today, humans are not obliged to treat animals well, they are banned from mistreating them. Treating an animal well means respecting the subject by ensuring its welfare. This needs a new legislative phase to take place.

References

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2. Martin's Act (1822); Grammont Act (1850).
3. Particularly in Austria and Norway (1974), followed by France in 1976.
4. Denmark (1991); The Netherlands (1992) ; Cyprus (1994); Portugal (1995); Finland (1996); Germany, Spain, Hungary, Poland (1998); Croatia, Estonia, Slovenia (1999).
5. Then Italy (2004), the United Kingdom (2006) and Bulgaria (2008). Greece was the last country to adopt a general law on the protection of animals in 2012.
6. Article 521-1 of the French Penal Code.
7. Subject to provisions adopted by autonomous communities, such as Catalonia, which has banned bullfighting since 2012.
8. Frequently practised in Spain and England, where there are many fans of this type of "entertainment".
9. Fines: Austria = €7,500; Belgium, Luxembourg = €2,000; Bulgaria = €500.

No prison sentence: Austria, Bulgaria, Croatia, Spain.

10. Fines: Ireland = €250,000; Spain = €100,000; Germany = €50,000; France €30,000.
Prison sentence: Ireland = 5 years; Finland = 4 years; Switzerland, Germany = 3 years; France = 2 years; Belgium, Luxembourg = 6 months.
11. The severity of the penalties is relative given that in France, the theft of an animal is more severely punished than an act of cruelty to that animal. There have been several law proposals to enforce greater sanctions so that they reach the same level as those applied to theft (3 years imprisonment and a €45,000 fine). None of these have been passed.
12. This was the first time in France when a person convicted of committing an act of cruelty was given a prison sentence.
13. Laying hens, broiler chickens, calves and pigs.
14. Swiss Federal Council, Ordinance on animal protection, 23 April 2008 /Ordonnance sur la protection des animaux (OPAn)
15. Mainly llamas, fish, guinea pigs and horses.
16. In Switzerland, any person wanting to become a dog owner must hold a dog owner's licence. This licence is also required for owners of pigs, horses, sheep, laying hens, pullets and broiler chickens when the owner owns several animals of the same species.
17. For example, see CJEU, September 19, 2009, Commission of the European Communities/Hellenic Republic (Case C-416/07).
18. Council Directive 1999/74/EC of 19 July 1999 laying down minimum standards for the protection of laying hens, Official Journal L 203, 3 August 1999, pp. 53-57.; Court of Justice of the European Union, 22 May 2014, European Commission vs. Italian Republic, Case C-339/13.
19. This was also the case in France, during the recent Alès slaughterhouse scandal.
20. Spot checks are made particular during livestock transport and at slaughterhouses.
21. This is the case for Germany, Austria (6 provinces out of 9), Denmark, Finland, Ireland, Italy, Luxembourg, Norway, the Netherlands, Poland, the Czech Republic, the United Kingdom and Sweden. Several European member states produce foie gras: Belgium, Bulgaria, France, Spain, Hungary, and others.
22. Germany (2022), Austria, Belgium, Croatia, Denmark (partial ban), the Netherlands (for 2024), the Czech Republic, the United Kingdom, Slovenia, Sweden (partial ban).
23. Malta 2014.

VIII
Why American Animal-Protective Legislation Does Not Always "Stick" and the Path Forward

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In the United States, it is difficult to enact federal legislation, and legislation to protect animals is no exception. Since states have sovereignty over the property within their borders and animals are legally the property of humans, animal law reform generally occurs at the state or local level, if it occurs at all. However, not only is it difficult to pass animal-protective legislation at the state level, especially in the farmed animal context, many animal-protective laws do not "stick" after enactment. As a result, in addition to pursuing traditional legal reform in the form of legislative and regulatory reforms, lawyers in the US who are interested in animal protection have pursued alternative routes to reform, including corporate campaigns to encourage retailers to voluntarily embrace more rigorous animal husbandry standards in their purchasing policies. They have also begun representation of businesses that are attempting to provide alternatives to animal-based products.

Animal cruelty has long been recognized as a crime in the United States and, indeed, all fifty states have enacted criminal animal anticruelty statutes[1]. However, every one of those states is the home to factory farms that are largely unregulated, on animal cruelty grounds, regarding the methods of production that have been banned elsewhere as cruel[2]. How is this the case? American anti-cruelty statutes generally prohibit the infliction of unnecessary suffering on animals. They are not regulatory statutes and therefore are interpreted not through the promulgation of regulations by an administrative agency. Instead, they are enforced case by case by prosecutors, who decide which cases to bring; by judges, who decide which charges to sustain; and by juries, who decide which defendants to convict. To date, they have been interpreted in such a way that they are applied only to the infliction of intentional, severe suffering and only in cases where that suffering is inflicted gratuitously. Starving a cow or brutally beating a dog in anger, for instance, serve no justifiable purpose and thus may give rise to charges.

On the other hand, suffering experienced by animals in the service of what is considered a legitimate human goal is treated quite differently, and will not be subject to prosecution. Thus, confinement of a pig in a gestation crate, or forcing a calf to run at high speed and then roping her in a way that will slam her on to her back to provide entertainment at a rodeo, will not give rise to charges. Although some additional protections are provided to animals in some industries by the federal Animal Welfare Act (the efficacy of which is subject to sharp debate between those industries and animal advocates) the real point here is that not *all* animals are covered by that law, most notably, those that are raised for food[3]. Since 98 % of the animals used for any purpose in the US are raised for food[4], this is a very substantial exemption.

Because anti-cruelty laws are often the only laws regulating the treatment of animals raised for food in most jurisdictions, the legal allowance within those laws for the "necessary" infliction of suffering and death and the very, very broad interpretation of "necessary," means that the treatment of such animals is subject to very few legal constraints[5]. Moreover, in a majority of states, animals raised for food are also specifically exempted from the statutes in a very particular way[6]. In these states, the treatment of such animals is statutorily exempt from anti-cruelty laws as

long as it is the sort of treatment that is customary in the industry. Much of the suffering experienced by these animals is caused by housing systems, and husbandry practices, that are still entirely customary in the industry in the United States, such as the use of the gestation crate for pigs or the densely stocked battery cage for laying hens, or castration or tail docking without anesthesia[7].

Even in the minority of states that do not have such statutory exemptions and where, theoretically, anti-cruelty laws could be open to interpretation to apply them more broadly, as criminal statutes, they are only enforceable by local prosecutors[8]. There is no civil enforcement, and animal advocates who are interested in pursuing such arguments are left with the daunting task of persuading a prosecutor in a rural county to bring a potentially precedent-setting case against a local business seeking to expand protections for animals.

For all these reasons, legal advocates for animals have needed to develop strategies other than pursuit of anticruelty statutory enforcement. Such advocates have, in some instances, turned to legislative efforts in various states to expand criminal anticruelty statutes with very specific provisions banning the use of certain practices or to enact non-criminal animal welfare laws doing the same. These efforts have met with some limited success. Subsequent to passage however, such state laws are readily challenged, often successfully.

Why is it that these laws, frequently seeking modest protections for animals that have been implemented in the E.U. for a number of years, do not always "stick?" We would posit that the answer to that question lies in the intricacy of the interaction between federal and state law, certain constitutional limitations on the power of the states, and, perhaps most importantly, a very American resistance to limitation of rights in private property, even in the name of progressive change, by way of legislation and regulation, rather than through market forces.

One major type of challenge to state legislation banning a certain practice is the claim that the law conflicts with one or more federal laws. Under the US federal system, states have a great deal of power to pass laws on a wide variety of matters, but if a federal law has been passed regarding the same subject, it may, as a matter of constitutional law under the Supremacy Clause of the US Constitution, preempt the state law and render it invalid. Stated very simply, the circumstances under which such preemption will occur are when Congress has expressly stated that the federal law will preempt state law, when there is an actual conflict between federal law and state law, and when federal regulation is so pervasive regarding the subject matter of the state law that it may be concluded that Congress intended to "occupy the field" of regulating this particular endeavor[9]. As one can imagine, due to the nature of the US legal system, in which the federal government and the state governments have robust bodies of law in wide-reaching areas of interest, preemption is a much-litigated area of law.

California's ban on foie gras production and sale is a recent example of an animal protection law that has been the subject of a preemption challenge[10]. In 2004, California enacted California Health & Safety Code § 25981, which prohibits the production of foie gras by force-feeding birds. In the early days of farmed animal advocacy, foie gras was seen as a particularly attractive target for animal protection advocates in the US. It is a luxury food, not eaten by the vast majority of Americans, who by and large have not only never heard of it, but cannot even pronounce it. It is produced by a method, force-feeding, that is not used for the production of other foods and which evokes a visceral distaste in many people. Moreover, the question of whether force feeding violates principles of animal welfare seems to many Americans to be a relatively simple, yes-or-no issue that is less prone to opening up the difficult discussions involved in, say, stocking density – how much space is enough space? Although the law ostensibly allowed producers to find a way to produce foie gras in a different way, which, had they done so, might have opened up the issue to arguments regarding where to draw the line between humane and inhumane, in reality, the

problem, and the requisite solution, appeared simple. If force-feeding is inhumane, then foie gras is inhumane, and should be banned.

Although the Code section was passed in the early days of farmed animal advocacy in the US, it did not take effect until 2012, after an 8 year delay, which, as noted, had been built into the law in order to give foie gras producers the opportunity to find a less inhumane way of producing foie gras[11]. In 2012, the State's only foie gras producer ceased production and began looking for another state in which to produce foie gras. Another Health & Safety Code section prohibited the sale in California of any foie gras product produced by force-feeding birds[12]. Since all foie gras (or, perhaps, virtually all foie gras[13]) is currently produced by way of force-feeding, the ban means that foie gras produced outside of California cannot be sold in California. The facial effect of both Code provisions is that foie gras produced anywhere in the world by way of force-feeding cannot be sold in California. Although the ban on *production* of foie gras was not challenged, the ban on *sale* was challenged in 2012 by vendors and restaurants seeking to protect the right to sell foie gras made outside of California. Chefs and restaurateurs defied the ban even as they challenged it legally by, for example, "giving away" foie gras on the top of an expensive salad or hamburger[14]. It is worth noting that independent of the delay before the law went into effect and the constitutional challenge discussed herein, during the time when the law was putatively active, it appears the sales ban was never enforced, even against those selling it outright.

In January of 2015, U.S. District Judge Stephen Wilson decided that California's ban on foie gras sales is pre-empted by the federal Poultry Products Inspection Act and barred its enforcement[15]. Judge Wilson's decision turned on whether a sales ban on a poultry product produced in a particular manner is an "ingredient requirement" under the Poultry Products Inspection Act. He found that Congress expressly intended to preempt state law as to "[m]arking, labeling, packaging, or ingredient requirements… [that] unduly interfere with the free flow of poultry products in commerce."[16] He decided that in this case, federal law preempts California's sales ban because the ban has to do with the force feeding of birds, which is within the meaning of an "ingredient requirement" because the sales ban affects only foie gras made in a particular way. Judge Wilson rejected animal advocates' counter-argument that the ban "regulates a process rather than an 'ingredient' because it regulates the manner of producing the fattened bird livers rather than the use of a particular ingredient."[17]

The 9th Circuit reversed this decision on appeal in September of 2017. The three-judge panel found that there was no express preemption, no implied preemption, no preemption based on the "ingredient requirement" position taken by the lower court, and also that the California law was not preempted by the federal Poultry Products Inspection Act even if it functioned as a complete ban on foie gras[18]. This was certainly lauded as a victory by those seeking greater protection for animals, and justifiably so. However, the district court's decision still stands in practice, and foie gras still legally able to be sold in California as of the time of this writing. This is because the 9th Circuit decision does not take effect until a mandate is issued vacating the district court's injunction on the enforcement of the ban, and the petitioners are entitled to a stay of that mandate while the appeals process is ongoing. On October 10, 2017, the producer and restaurant petitioners submitted a petition for a rehearing on banc with the 9th Circuit, and then in December, the 9th Circuit stayed the order while the petitioners appeal to the U.S. Supreme Court.

This is not the first time federal preemption has played a prominent role in challenges to laws designed to improve animal welfare. In fact, Judge Wilson explicitly refers to the 2012 United States Supreme Court decision in *National Meat Association v. Harris*, which considered whether the Federal Meat Inspection Act preempted California's laws prohibiting the slaughter of nonambulatory animals for human consumption purposes and producing or selling meat from nonambulatory animals for purposes of human consumption[19]. While federal regulations prohibit

the slaughter of nonambulatory cattle, primarily because of fears of mad cow disease, California wished to extend that protection to other animals brought to slaughter and thus required humane euthanasia of such nonambulatory animals. These animals can be suffering from debilitating illnesses or unable to walk because of inhumane treatment and circumstances during confinement. The rationale behind the law was that prohibiting their slaughter and sale would potentially keep products from diseased animals out of the human food system and would incentivize better treatment of animals so that they would be ambulatory at the time of slaughter. For instance, raising animals on slatted floors makes it somewhat easier to hose down the facility but induces lameness, sometimes to the point that animals cannot walk. Inability to slaughter or sell the meat from such nonambulatory animals could have resulted in different, more humane flooring.

The law was challenged by pig producers, who claimed that California's laws were preempted by the Federal Meat Inspection Act ("FMIA")[20]. Pig producers may have felt particularly aggrieved by the law since, because of their size and the minimal movement that they are afforded in standard pig production, pigs are particularly subject to lameness by the time they are sent to slaughter and the law had the potential to limit the slaughter of a significant number of pigs who were lame, but not necessarily diseased, and thus have a notable financial effect on the industry. The pig producers received an initial victory when the Federal District Court agreed with them[21], but that decision was overturned on appeal to the 9th Circuit appellate court. The 9th Circuit decided that the California law was not regulating inspection or slaughter, which are regulated by the FMIA and therefore cannot be subjected to contrary regulation by the states[22]. Instead, the court found, the law merely addressed "the kind of animal that could be slaughtered," which was not regulated by the federal law and thus subject to regulation by the states.

The case was then accepted for review by the Supreme Court, which duly rejected the 9th Circuit's characterization of the law, deciding that the Federal Meat Inspection Act, "sweeps [so] widely" that preemption applies even when state laws are merely additional or different, even though not actually inconsistent with, the FMIA requirements[23]. The Supreme Court noted that the FMIA regulates the production and distribution of meat products and expressly allows for the slaughter, distribution, and sale of nonambulatory animals in defined circumstances. The FMIA also contains an "express preemption" provision, which explicitly prohibits states from creating additional or different requirements from FMIA requirements.

The Supreme Court rejected other arguments that would have kept the California laws alive. One argument, that California's laws were directed at humane treatment and not food safety or slaughter provisions, was rejected because the FMIA contains some provisions that pertain to humane treatment[24]. The Court also rejected the argument that California's laws deal with animals who are *not* going to be turned into meat while the FMIA regulates animals who *are* going to be turned into meat[25]. As an illustration, the Court pointed to an instance where the FMIA did, in fact, regulate animals who were not going to be turned into meat, i.e., the FMIA prohibition of sales of meat from pigs infected with hog cholera. In other words, the combined effect of a broad express preemption clause with statutory provisions and regulations that affect meat production processes, food safety, and humane treatment resulted in an invalidation of California's laws.

It should be noted that, while federal preemption arises frequently as a challenge to animal-protective state laws, it is not always a successful argument. For instance, it arose in the context of a California law prohibiting the sale in California of products made from kangaroo skin or meat[26]. The law was challenged by Adidas, which sought to import shoes made with kangaroo skin[27]. The law was defended by an animal protection organization, which sought to prevent harm to kangaroos by, among other things, further development of a market in kangaroo skins. Adidas argued that California's law was preempted by federal wildlife laws. The California Supreme Court upheld the ban, holding that federal laws in that instance were meant to create incentives for other

countries such as Australia to protect certain species but also left room for states to further protect species of wildlife[28].

While this litigation was successful for animal advocates, and for kangaroos, they nevertheless ultimately lost when Adidas prevailed on legislators to change the law such that its products would not be prohibited for sale in California[29]. Prevailing on a preemption challenge may be necessary but not sufficient for protecting animals. Successes in the courts are often vulnerable to being overturned in legislatures, where agricultural or commercial lobbies frequently have more sway than animal advocates.

Similar results may occur when changes favoring animals are made at a regulatory level, as well as at a legislative level. For many years, the United States Department of Agriculture, which administers the federal Animal Welfare Act[30], interpreted the word "animal" to simply exclude rats, mice and birds[31]. Since these animals constitute the overwhelming majority of animals used in research, this exclusion had the effect of vastly reducing the number of research animals regulated by the Act's provisions[32]. A lawsuit was brought by animal advocates in which the court indicated, in a preliminary decision on a motion to dismiss, that it was disposed to hold that it was not within the agency's purview to interpret the statute to exclude whole species of animals from the definition of "animal".[33] The USDA, perhaps realizing that its argument was a weak one and that it was unlikely to ultimately prevail, decided not to litigate any further and agreed to commence rulemaking regarding a modification of the definition that excluded rats, mice and birds. As in the kangaroo case, however, this victory for the plaintiffs was a Pyrrhic one. Congress immediately attended to the voices of the pharmaceutical and medical research lobbies and modified the Animal Welfare Act itself to exclude rats, mice and birds bred for research[34].

Another type of federal/state controversy involving animals arose in the aftermath of voter approval of a ballot measure in California affording certain agricultural animals a defined minimum space allotment and thereby intended to effectively prohibit veal crates, sow gestation crates, and battery cages.[35] Ballot measures, which are permitted in about half the states, allow advocates for a particular cause to place a proposed law directly on the ballot for voter approval, thus bypassing the legislature. The requirements for doing so vary from state to state, but generally provide that advocates must gather a very large number of signatures in support of the measure before it will be put before the voters. Advocates generally use ballot measures when they have not been successful in achieving reform through state legislatures but believe that they have the support of the general population.[36] Animal advocates were under the impression that state legislatures were unduly influenced by powerful agricultural lobbies regarding better treatment of farmed animals and that the average person would agree that the most intensive confinement systems should be eliminated.

In 2008, farmed animal advocates were successful in gathering the requisite signatures for the proposed law regarding housing and the measure went on the ballot to be voted on by the electorate at large.[37] It was duly approved by 63.5% of California voters.[38] Proposition 2, as it was known, was worded in a positive fashion, rather than as a prohibition, and thus required, with exceptions that are not relevant here, that confined animals have enough room to fully stand up, turn around, lie down, and spread their wings (in the case of egg-laying hens) or fully extend their limbs (in the cases of veal calves and gestating sows). While such language appears to effectively prohibit gestation crates and veal crates, the egg industry asserted that this language was unclear as to whether cages were prohibited for laying hens and, if they were not, how densely stocked a cage could be in order to allow the hens within it to stand up, turn around, lie down and spread their wings. Thus, in 2012 litigation was brought by egg producers regarding whether Prop 2 was unconstitutionally vague, specifically regarding what type of caging would be adequate to comply with the law.[39] Animal advocates prevailed in that litigation on February 4, 2015, when a federal

appellate court found that "a person of reasonable intelligence can determine the dimensions" of Prop 2-compliant housing.[40] However, that did not end the controversy or litigation connected to Prop 2.

After the ballot initiative had passed in 2008, a law was passed by the California legislature in 2010 that prohibited the sale in California of eggs laid by hens housed in a way that was not compliant with the standards set forth in Prop 2 even though those hens were housed in *other* states where there were no requirements regarding the stocking density of laying hens.[41] According to the Pew Charitable Trusts, about 95% of eggs produced in the United States come from hens confined in cages that provide less space per hen than an 8 ½ " by 11" piece of paper.[42] California consumes approximately 9 billion eggs per year but produces only about 5 billion.[43]

California legislators were no doubt concerned that California's regulation of the space that must be provided to laying hens would harm in-state producers, since they would be forced to compete with out-of-state producers, who would be able, through their use of crowded cages, to produce eggs more cheaply for sale in California than could California producers. Thus, the rationale for the law was to prevent California's egg industry from being put out of business or forced to move to other states by an inability to compete. The ban on out-of-state eggs produced from battery-caged hens removed the advantage that out of state producers would otherwise hold. It was also presumably in accord with the wishes of California voters, who, in voting for Proposition 2, surely had no reason to want to fill California supermarkets with eggs laid by hens who were not subject to its protections merely because were not housed within California.

Six states filed suit in 2014, claiming that this law regulating the production method for eggs imported into California is unconstitutional because the Commerce Clause of the United States Constitution prohibits states from unduly burdening interstate commerce, even in the absence of any federal regulation of the specific challenged commercial activity.[44] Egg producers in Missouri, one of the states challenging California's law, export to California about 1/3 of the eggs produced in Missouri. The argument was that being forced to comply with California's requirements in order to continue those transactions was a violation of the constitutional rights of Missouri's egg farmers.

The States lost at the federal District Court level, though not on the merits.[45] Instead, the judge decided that the States lacked standing to pursue the claim, i.e., they were not the appropriate injured party. In the Court's view, the States could not bring a lawsuit on behalf of egg farmers doing business in their state because they were actually representing only those egg producers that intended not to comply with California's laws and were not representing all egg producers in the State. That decision was appealed to the 9th Circuit, which in 2016 upheld the district court's decision finding the plaintiffs lacked standing, but dismissed the complaint without prejudice in order for the plaintiffs to have the opportunity to allege post-effective-date facts to support a standing argument.[46] In early 2017, the 9th Circuit filed an order and amended opinion largely consistent with the 2016 opinion. In March of 2017, the petitioner states sought review by the U.S. Supreme Court. Two additional lawsuits of note were filed in 2017. In December 2017, 13 states, five of which are also plaintiffs in the *Missouri v. Harris* case, filed a complaint seeking direct Article III original jurisdiction review by the U.S. Supreme Court as a conflict between states.[47] This complaint makes very similar arguments to *Missouri v. Harris*, but appears to focus more heavily on economic impact, and uses detailed economic research to do so. Second, a week later, on December 11, 2017, 13 states, ten of which are also plaintiffs *in Missouri v. California*, filed a complaint also seeking direct Supreme Court review, also making a similar Article III original jurisdiction argument.[48] The defendant here is the state of Massachusetts, and the claim is over a Massachusetts law that is similar to the California law at issue in the other actions. It passed as part of a voter-approved ballot measure in late 2016 but is not set to go into effect until 2022. The

Massachusetts law covers calves and pigs as well, but otherwise is an analogous sales ban requiring certain space restrictions. The arguments made in this case also closely parallel the other cases.

As is clear from these examples, legislation to protect animals exploited for commercial purposes is subject to constitutional challenge in the federal courts. Accordingly, progress in passing legislation that will actually "stick" is slow.

Although, as noted, there are federal laws regulating slaughter (although these laws exclude poultry, which have been the subject of many of these legal actions), there are no federal laws regulating the amount of space that animals raised for food must be afforded during their lives and, therefore, when such laws have been enacted in the states, they have not been subject to federal preemption. The first few of these laws, in Florida, Arizona and, as described above, California, affording more space for either gestating pigs, veal calves or laying hens, or some combination of those three, were passed by ballot initiative.[49] Following these successes, the Michigan, Washington, and Oregon legislatures enacted laws that require more space for egg-laying hens,[50] and Ohio has banned the adoption or use of newly constructed battery cages.[51] Other states, including Colorado, Kentucky, Maine, Michigan, Ohio, Oregon, and Rhode Island, have passed laws that effectively ban the gestation crate or the veal crate.[52] As each state passes state laws that track other states' laws, which have been tested through constitutional challenges, the United States as a whole could develop a more animal-protective legal environment. These efforts continue – animal advocates are currently seeking to put a measure on the ballot in California in 2018, which would add to and strengthen the requirements of Proposition 2, and which would be similar to the Massachusetts law discussed *supra*.[53] However, there are roadblocks for this approach. Even in states that have passed such laws through state legislatures, it has often been under threat of a ballot initiative, and half the states do not have such a ballot initiative process. The laws are not necessarily identical, creating problems for the industry, which may have to deal with a patchwork of varying requirements. Moreover, some of those in the industry that do not want to comply with such laws have moved to states that are considered safe from progressive animal laws, such as Idaho,[54] or they were already located there to begin with, such as Iowa and many southern states. It is also worth noting the successful items of state legislation have all been production bans within the relevant states. When states attempt to enact sales bans within their states, which are much more impactful for the animals, these bans draw legal challenges, as discussed *supra*.

Moreover, attempts at federally regulating the welfare of farmed animals have not been successful. Even with the support of the egg industry, a federal bill that would have adopted an enriched cage system nation-wide was repeatedly unsuccessful in Congress, apparently due to strong opposition from other sectors of animal agribusiness, who quite openly admit that they fear that federal regulation of space requirements for the egg-laying hen will lead inexorably to federal regulation of the housing systems for other animals.[55]

Therefore, while animal advocates have seen some progress, there have also been many frustrations, and, as a result, animal advocates have developed alternative approaches to legislation to advance animals' interests. The most successful approach to date has been the active pursuit of private agreements with food retailers, such as grocers and fast food restaurants. In these agreements, these retailers commit to requiring, or at least strongly encouraging, their suppliers to adopt increasingly humane standards. Interestingly, one of the areas in which this approach first began was the sale of foie gras, which was the subject of a number of agreements with restaurants to refrain from selling it. Most notably, in 2007, chef and restaurateur Wolfgang Puck agreed not to sell it in his numerous upscale restaurants.[56]

Since then, private agreements have arguably become the primary focus of welfare reform efforts for farmed animal advocates in the US. For instance, The Humane Society of the United States entered an agreement with McDonald's that its suppliers would phase out gestation crates.[57]

Since big retailers such as McDonald's already conduct regular audits of their suppliers, the existence or absence of gestation crates in violation of such agreements at the suppliers' facilities should be easy to detect. Getting such agreement from big retailers whose market share would make a difference to large numbers of animals is important and sometimes difficult.

These types of reforms are also reaching chickens. Recently, McDonald's followed the lead of Burger King, Nestle, Sodexo, Aramark, Heinz, Starbucks, and Compass Group, in agreeing to require that their suppliers would phase in the use of cage-free housing for their egg-laying hens.[58] McDonald's announcement included a firm timeline of 10 years. Considering the paucity of cage-free eggs produced in the US currently, and the enormous buying power of these retailers, this will mean a sea change in the way that egg producers do business.

While such agreements could make important and significant changes in the housing systems used by animal agriculture if retailers actually comply with the agreements they make, such agreements are unlikely to achieve all of the improvements that animal advocates seek regarding the treatment of farmed animals. Inhumane practices that are more difficult to detect, such as castration without anesthesia, may be less amenable to policing by retailers. Moreover, the agreements will only reach those sectors of animal agribusiness that are governed by these particular retailers, whereas legal changes would cover the industry as a whole. However, in the difficult legal environment of the US, changing the practices of existing large-scale businesses that impact a large number of animals can not only have a faster positive effect than attempting to pass laws, it can also prepare the ground for subsequent legislation. If suppliers are no longer invested in keeping gestation crates, for instance, they will be less likely to contest legislation that strictly limits or eliminates them. In this way, the law would follow the lead of industry, and perhaps make sure that progressive changes were applied industry-wide, rather than just by a few major suppliers.

Moreover, by encouraging retailers, and therefore producers, to adopt less inhumane practices, advocates may have found an additional legal opportunity. While some retailers and producers will enter into agreements and abide by them, there is an inevitable temptation, as humane treatment becomes more important to the consumer, to exaggerate the extent of their compliance and humane treatment of animals. Thus, in addition to procuring agreements that retailers' suppliers will use more humane methods, animal advocates have used truth-in-advertising laws to address falsely advertised claims of humane treatment of animals. For instance, United Egg Producers ("UEP") was sued when member producers labeled their cartons "Animal Care Certified" and advertised that hens received care they did not receive.[59] Compassion Over Killing, an animal protection organization focused on farm animals, conducted laborious investigations to uncover the real condition of hens owned by "Animal Care Certified" producers.[60] Ultimately, a settlement was reached between the UEP and the 16 state attorneys general offices and the District of Columbia attorney general's office, which had brought the claim.[61] According to Compassion Over Killing, March 31, 2006 was supposed to be the last day that cartons could be labeled "Animal Care Certified." Yet on February 20, 2008, Compassion Over Killing and a New Jersey consumer (of eggs) filed suit against UEP and an egg producer in New Jersey for continuing use of the "Animal Care Certified" cartons.[62] Unfortunately, even successful lawsuits have limited value, if reducing misleading consumer information is important.

Other consumer protection litigation includes two lawsuits brought against Perdue, one of the United States largest poultry producers, by the Humane Society of the United States regarding a label on some of its chicken packaging stating that its birds were "humanely raised."[63] After preliminary decisions were issued in the cases, the case was settled with Perdue agreeing to remove the wording from its label.[64]

Another recently filed consumer protection lawsuit involves an action against the upscale grocer, Whole Foods, asserting that its claims regarding the improved welfare of its meat and poultry products were deceptive, such as a sign posted in the poultry department stating that the animals were "cage free."[65] While there is no dispute that that is true, the lawsuit points out that all chickens and other birds raised for meat are raised in crowded warehouses, not in cages. To imply that "cage free" is an improvement over standard practice is, the plaintiffs argue, deceptive to the consumer who is paying a premium for what he or she believes is humane treatment.

As it becomes more accepted that humane treatment is a marketable feature for animal-derived foods, it is likely that such lawsuits will become an increasingly important part of the legal landscape shaping the treatment of farmed animals in the US. Their effectiveness in bringing the truth to consumers, however, is limited. The likely resolution in these cases is that the producer will be required to remove the deceptive label but not required to actually inform consumers of how the animals were raised. Indeed, as part of the settlement in the egg case, UEP members may label their cartons "United Egg Producers Certified," even though it would be a mistake for consumers to believe that the hens who laid those eggs were treated more humanely than hens were treated previously.[66] Labels have become increasingly confusing and misleading, making this strategy for protecting animals less likely to result in significant gains in humane treatment of animals.[67]

In addition to these time-consuming, problem-filled strategies, a large number of animal advocates in the US work to promote veganism rather than to regulate animal agriculture. This is due not only to the aforementioned difficulties in enacting legislation, withstanding challenges to enacted legislation, procuring agreements with food retailers, and contesting misleading labeling, but to sometimes sharply differing attitudes amongst advocates regarding the most effective strategy in reducing animal suffering. It may also be due to a particularly strong American enthusiasm for market-based, rather than regulatory, solutions.

As a result, one role for attorneys interested in protecting animals is the representation of vegan businesses. The rationale for such attorneys is that, if vegan businesses gain greater market share, the number of animals exploited in agribusiness should decrease. Such businesses are often sorely in need of legal help in negotiating a regulatory landscape that was constructed to protect consumers from adulterated food, but did not take into account the potential for alternative foods that are formulated or produced in ways that were not anticipated when the regulations were written. This type of legal work has many applications and will be keeping more lawyers busy as more vegan replacements for traditional products enter the market.[68]

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were kept intentionally underfed due to their genetic propensity for extreme growth. After the investigation and its publicity, many major broiler corporations, including Tyson, agreed to either end the practice of boning or said they already did not engage in it. The case was prosecuted by a specialized prosecution department in the Virginia Office of the Attorney General called the Animal Law Unit. Among the prosecutor's animal cruelty charges in this case was one on boning, which was resolved by a guilty plea. This is despite Va. Code Ann. §3.2-6570, which exempts animals involved in "farming activities" which are activities consistent with standard husbandry practices. *VICTORY: COK Video of Cruelty to Chickens Prompts Groundbreaking Charges & Convictions*, Compassion Over Killing, August 29, 2017.

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IX
Animal welfare in Central and South America: What is going on?

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Introduction

Animal welfare (AW) is a relatively new scientific and professional field. As such, it is expected that it be in an initial phase of development in many places. As a reference point to this understanding, we may consider the fact that AW was taught for the first time in a Veterinary School in 1986, as a course organized by Donald Broom in Cambridge University. Even though there is scarce information on the teaching of AW in Central and South America (CSA), it seems that there is a time gap of at least two decades compared to Cambridge University. In Brazil, for example, the first time an animal welfare course was taught to veterinary students was in 1999, at Universidade de Brasília (Molento and Calderón, 2009); few AW research groups started somewhat earlier, in the 80's (Tadich *et al.*, 2010). Thus, it is expected that major actions and regulations directed to AW are currently in their initial steps, yet to achieve robust, well-defined and stabilized scenarios in CSA.

Together with the research and teaching developments in Europe, important norms have been put forward. In 1978, the European Economic Community (EEC) approved the European Convention for the protection of animals kept for farming purposes, which was created mainly due to disparities between animal protection laws in different countries (European Economic Community, 1978). Updated regulations are:

- protection during slaughter, Council Regulation 1099/2009/EC (previous regulation Directives 74/577/EC and 93/119/EEC);
- protection of laying hens, Council Directive 1999/74/EC (previous regulation Directive 88/166/EC);
- protection of calves intended for slaughter, Council Directive 2008/119/EC (previous regulation Directive 91/629);
- protection of pigs, Council Directive 2008/120/EC (previous regulation Directive 91/630/EEC amended by Directive 2001/93/EC);
- protection of chickens kept for meat production, Council Directive 2007/43/EC. For further details, please see Veissier *et al.*, 2008.

Globally significant efforts may be understood from some World Organisation for Animal Health's (OIE) significant achievements:

(1) Since 2003, the publication of twelve global AW standards, covering issues such as transport, slaughter, control of stray dog populations and welfare in farm animals including fish;

(2) Organization of three OIE Global Conferences on Animal Welfare, in Paris, 2004, Cairo, 2008 and Kuala Lumpur, 2012;

(3) The publication of three special issues on AW, volumes 24, number 2, in 2005 and 33, number 1, in 2014 of the OIE Scientific and Technical Review, and volume 10 of the OIE Technical Series, in 2008 on the Scientific assessment and management of animal pain.

If changes in real life are related to developments in teaching and scientific research, what is the situation in CSA, where both activities are more recent in the field of AW? The question seems especially relevant due to the high number of farm animals used in CSA. It is also an intriguing question, since AW is a field where science is intertwined with cultural contexts (Fraser, 2008). In other words, the baseline from which knowledge and changes in AW may be built are likely not the same in different geographical regions. Thus, our aim was to study AW policies and initiatives in CSA, in order to improve our understanding of the current situation and to suggest strategies to overcome eventual obstacles for the development of better living conditions to farm animals in this geographical region.

Material and Methods

Our main method was a questionnaire sent to specialists in CSA countries. First we sent a questionnaire to professionals related to animal welfare issues in 20 countries, being them professors and researches in universities, OIE national focal points on animal welfare and professionals from governmental bodies on the livestock production sector. The questionnaire was built based on four main issues:

(1) current state of AW,

(2) social and cultural specificities that impact on AW,

(3) political will to improve AW and

(4) importance of European demands and directives for AW in CSA countries. We received replies from one respondent from each Argentina, Colombia, Suriname and Venezuela, and two respondents from both Chile and Ecuador; we added Brazilian data.

Of total CSA animal production, responding countries represent 85.5% of cattle, 77.3% poultry and 81.4% pigs, as calculated considering the statistics in the Food and Agricultural Organization of the United Nations website (FAO, 2014). The distribution of farm animal population per country, in absolute numbers, is shown in **figure 1**. This high percentage of the total CSA animal production represented in only six respondents is due mostly to the high number of animals involved in the main production chains in Brazil.

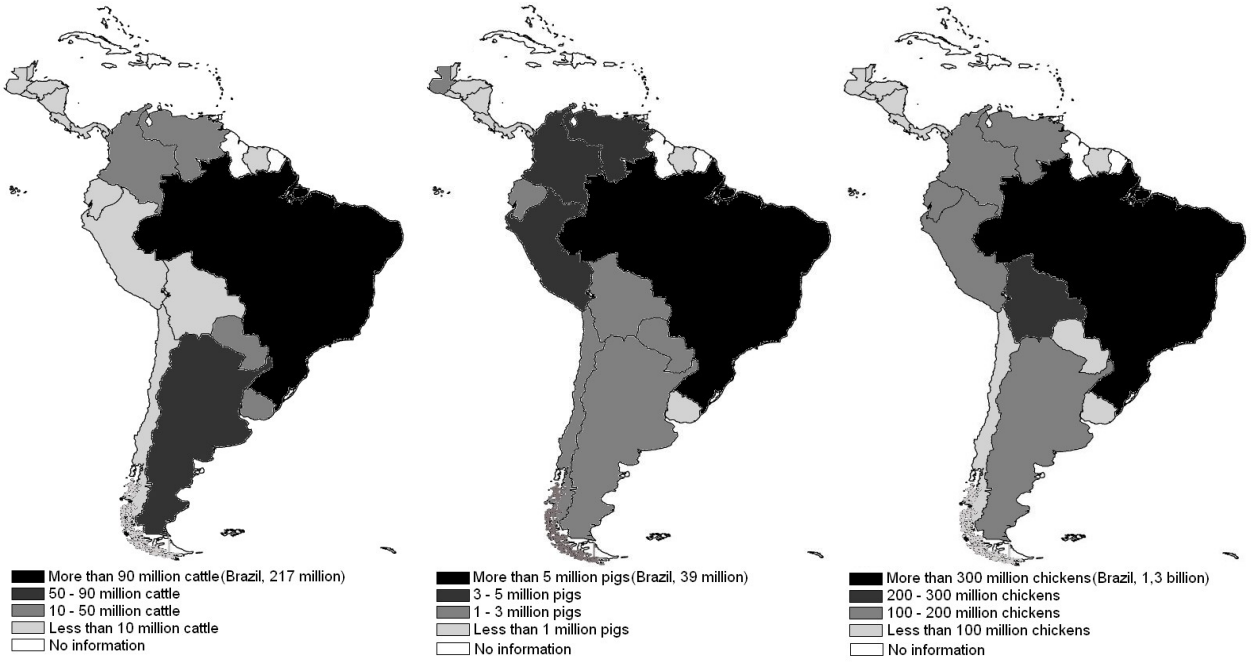

Figure 1. Population density of cattle, pig and poultry in Central and South Americas, based on estimations of the Food and Agricultural Organization of the United Nations (FAO, 2014).

Due to the fact that out of 20 countries contacted only six responded, we additionally searched AW regulation on governmental websites and on the websites of Animal Protection Index by the World Animal Protection (WAP, 2014), Global Animal Law (Global Animal Law, 2015) and Legal Office FAOLEX by the Food and Agriculture Organization of the United Nations (FAO, 2016). According to the information available, data was organized in the following three main categories of regulation: transport, slaughter and general animal protection law. To present as main results on **Table 1**, we also selected regulations that seemed to present a federal legislative identity, as opposed to lower level norms and good practice guides, which were abundant and to which it was difficult to ascertain a reasonable pattern for a balanced inclusion regarding all countries. The lower level regulations found are discussed in the text.

Additionally, we identified the five main countries in terms of number of animals involved in animal production according to FAO (FAO, 2014), considering beef cattle, poultry and pig statistics. These countries were Argentina, Bolivia, Brazil, Colombia and Peru. In order to get a view about current AW issues relevant to local societies within these five countries, we searched for information regarding AW and animal protection on the two main newspapers of each country, between 2010 and 2015. The importance of each selected newspaper was based on national circulation numbers, and the words used to search information were animal welfare, animal protection and animal abuse, using the language of each country.

Data was analyzed by descriptive statistics.

Results

Results are organized according to the four main issues addressed in the questionnaire.

1. Current state of animal welfare

A historical view of animal protection laws in CSA is presented on **Table 1**. In South America, most countries maintain some reference to legislation on AW topics. We did not find information for French Guiana and Suriname, thus results are presented for 11 countries in South America (SA) and seven countries in Central America (CA). Animal protection regulation was found in 18 countries in CSA, representing at least minimum protection against animal abuse. The eldest legislation was found in Argentine, dating from the 19th Century. For Central America, the history of animal protection law seems more recent. In most countries, transport, slaughter and other issues directly related to farm animals are regulated by recommendation guides and regulations other than laws. It was difficult to gain access to specific regulations and we discuss here a combination of those mentioned by respondents and others we were able to find online. As a consequence, our presentation of farm animal welfare regulations is not exhaustive.

Respondents reported different levels of regulation for farm animal protection, transport and slaughter and the discussion is presented in alphabetical order. In Argentina, the Resolution 97/1999 regulates vehicles intended for animal transportation. In addition, according to the respondent from Argentina, the SENASA (Servicio Nacional de Sanidad y Calidad Agroalimentaria) developed a guide for animal welfare procedures, based on good agricultural practices.

In Brazil Regulation No. 575/2012, Ministry of Agriculture, Livestock and Food Supply (MAPA), regulates road transport of animals, with the production of technical material to qualify the actors involved in this production chain, and a corresponding Manual of Good Management Practices in Transport is currently available online (MAPA, 2016). Other guidance is provided by MAPA in Manuals covering Equine Welfare in Competitions, Care to Newborn Calves, Good Practices for Vaccination Procedures, for Animal Identification and for Milking Cows. As for slaughterhouses, regulations in Brazil, Chile and Argentina make stunning mandatory; however, there is exemption for religious slaughter in Brazil and Chile, employed to supply external market

with this specific requirement. In Brazil, the Humane Slaughter Regulation 03/2000 includes mammals and birds; fish are not included. Even though the regulation is under review, fish will not likely be included due to lack of scientific knowledge regarding proper stunning for the most commonly produced fish species. The exclusion of fish species from humane slaughter regulations is probably the most common situation for CSA countries.

Table 1. Countries maintaining federal animal protection laws and year of publication; partial information as obtained online and complemented with information from respondents, 2015; other types of regulation are not included (please refer to text).

Continent	Country	Regulation	Year
South America	Argentina	Law 2786, prohibiting animal abuse	1891
		Law 13346, abuse act and acts of cruelty to animals	1954
	Brazil	Decree 16590, public entertainment houses, prohibiting animal abuse	1924
		Decree 24645, for animal protection	1934
		Law 9605, for environmental crimes	1998
	Bolivia	Law 4095, for animal protection	2009
		Law 700, for the protection of the animals	2015
	Chile	Law 20380, for the protection of animals	2009
	Colombia	Law 5, on Animal Protection Groups	1972
		Law 84, for the protection of animals	1989
	Guiana	Criminal Law Act	1998
	Paraguay	Protection and Animal Welfare Act 4840	2013
	Ecuador	Ecuadorian Criminal Code	1999
	Peru	Protection Act 27265- pets and wild animals kept in captivity	2000
		Legislative Act 635, Criminal Code	2004
		Decree 1449, reorganize the Ecuadorian Agricultural Health Service	2008
	Uruguay	Law 18471, for the responsible possession of animals	2009
		Decree 62, regulation of Law 18471	2014
	Venezuela	Criminal Law for the protection of livestock activity	1997
		Law 39338, for the protection of free and captive domestic animals	2010
Central America	Belize	Cruelty to Animals Act	2000
	Costa Rica	Law 7451on Animal Welfare	1994
	El Salvador	Decree 661, Law for citizens and administrative contraventions	2011
	Guatemala	Decree 22, Law for the control of dangerous animals	2003
	Honduras	Law on Protection and Welfare of Domestic Animals, free and in captivity	2015
	Nicaragua	Law 747 for the protection and welfare of pets and domesticated wild animals	2011
	Panamá	Act 70, protection of domestic animals	2012

Brazilian government, through MAPA initiatives with the collaboration of World Animal Protection, has been funding the development of material and courses around the country on humane slaughter of cattle, poultry and pigs, in a program that became known as STEPS (MAPA, 2016). This initiative has reached mostly abattoirs within federal inspection, which tend to be the biggest and technically most advanced ones and which sell to both domestic and external markets; those inspected by individual states or by municipalities have not been reached with the same intensity yet. Although other norms regulating organic production include AW topics, there is no specific regulation for on-farm AW in Brazil.

In Chile, there are two norms regarding farm animals: Decree 240/1993, on beef cattle transportation, and Decree 94/2008, on slaughterhouse operation. Based on Law 20,380/2009, three decrees were approved in 2013, by the Ministry of Agriculture, to regulate the protection of animals reared for the production of meat, skin, feather and other products (Decree 28/2013), the protection of animals during production and commercialization (Decree 29/2013), and the protection of beef cattle during transport (Decree 30/2013).

In Colombia, Decrees 1500/2007 and 2270/2013 establish standards of animal welfare during cattle and buffalo pre-slaughter operation. Resolutions 2341/2007, 3585/2008 and 2240/2007 are in place for the protection of cattle, buffaloes and pigs on farm and during transport. Additionally, Resolutions 240/2013, on humane slaughter of cattle, buffaloes and pigs, and Resolutions 241/2013 and 242/2013, on humane slaughter of broiler chickens, are in effect.

In Ecuador, between 2014 and 2015, there was a proposal to establish an Organic Animal Welfare Act (Ley Orgánica de Bienestar Animal – LOBA), which was included in the Organic Environment Code approved in 2016. According to the respondent from Suriname, the National Ordinance for the prevention and control of Animal Diseases, 1954, is in place for farm animals. It includes species such as cattle, horses, sheep and goats, pigs and poultry. Draft concepts of Animal Health Production and Welfare Act, and of a Slaughterhouse and Meat Inspection Act, are in preparation in this country, with FAO collaboration. In Venezuela, the general Law 39338 (**Table 1**) refers to municipal rules on slaughter and use of domestic animals for human consumption.

Respondents from all countries, except Argentina and Venezuela, considered animal transport and slaughter as priorities to be addressed. Transport and slaughter may be of concern for most respondents due to specific characteristics of a region or a country, such as long transport routes, roads with poor infrastructure and poor slaughter conditions (von Keyserlingk and Hötzel, 2014). In addition, concerns about the welfare of animals during slaughter is also motivated for economic reasons. Respondents also considered as priorities to be addressed the intensive poultry and pig production systems (Argentina, Brazil and Colombia), animal handling (Colombia and Ecuador) and consumer awareness of farm animal welfare issues (Brazil, Colombia and Venezuela). In general, these answers seem to be a consequence of the low level of development and specificity of animal welfare regulations in CSA. Answers may also reflect increased demand from segments of society for the protection of farm animals, as well as the discussion on protection of animals in other contexts such as companion and laboratory animals.

2. Sociocultural specificities regarding the treatment of animals

According to Coleman and Hemsworth (2014), low qualification of workers that handle live animals may lead to reduced levels of animal welfare and productivity, which suggests the importance of considering educational and training attention received by those who directly interact with animals in CSA. Some countries in South America have developed training programs on animal welfare through private initiatives, governmental and non-governmental organizations (NGO). In Brazil, the already mentioned STEPS Program aimed to train governmental inspectors, professors and slaughterhouse workers in animal welfare at pre-slaughter and slaughter. More than 5,800 people were trained between 2009 and 2013 (MAPA, 2013); the next plan is to reach people involved in live animal transport. Other Brazilian initiatives, such as the National Service for Rural Learning (SENAR), provide training on good agricultural practices to farmers and have potential in terms of animal welfare training, due to the infrastructure already in place. In Chile, respondents informed that there are regulatory requirements for training on production, transport and slaughter of animals; and there are accredited institutes to perform those trainings. According to the respondent from Colombia, there are several initiatives, such as the National Service for

Learning (SENA) that is developing a national capacitation program, the National Cattle Producer Association (FEDEGAN), that developed a farmer qualification program, and the Pig Producer Association (ASOPORCICULTORES), that is developing training for transport. The group of Veterinary Science Investigation (CIENVET), from Caldas University, has trained employees from slaughterhouses and developed specific teaching materials. The respondent from Ecuador informed that there are trainings on good agricultural practices performed by a governmental body (MAGAP) and national producer associations. Additionally, the government of Ecuador is organizing an animal welfare committee, with representatives from government, producer associations and universities, to establish basic principles of animal welfare that will help on the development of specific regulation in that country. The respondent from Suriname informed that most trainings are organized by the Ministry of Agriculture; however, no specific training was mentioned.

Although many initiatives were mentioned by respondents, major challenges remain. In some countries, as mentioned by Argentinean and Venezuelan respondents, there is no official training program. Also, it is probable that in most CSA countries training to deal with contingency situations is urgent. For example, two facts in Brazil caused extreme animal suffering. In August 2015, 110 live pigs that were in transit to the slaughterhouse remained seven hours on the truck after it was involved a road accident. In October 2015, 5,000 beef cattle drowned when a foreign ship that was transporting the animals sank during a stop at a Brazilian port. On-farm regulations for contingency plans for situations such as lack of power, for instance, are also in need of improvement. Additionally, according to Chilean respondents, training is not diffused, there are few people officially trained and there is a lack of governmental training program for small farmers. This is likely the case in most CSA countries.

The OIE recommends that animal owners and handlers should have sufficient skills and knowledge to ensure that animals are treated in accordance with minimum principles of animal welfare (OIE, 2014). Those countries in CSA where efforts in terms of farm AW improvement were reported seem to have started actions in the areas of animal transport and slaughter. This may be related to the convergence between AW and economic benefits in these areas, in most cases. One major exception is the long-distance transport of animals by sea, which is characterized by extremely low welfare for the animals but seems to be profitable. The developments related to animal sea transport require attention for the intrinsic cruelty involved. On-farm AW improvements, where some changes may involve increased farming costs, seem to be a necessary follow-up.

Table 2 shows a summary of responses to the question *What are characteristics of your country that you consider either positive or negative to AW?* Some characteristics were commonly mentioned by respondents, such as pasture systems, long distances for animal transport and increased societal concern with AW and animal abuse. Respondents identified potential AW restrictions and perceived many positive factors.The respondent from Ecuador cited specifically the political will to improve AW, which is a major positive characteristic, since it may affect animals in varied ways. As is the case in Brazil, it is likely that a relevant weakness in most CSA countries is the difficulty with enforcement of laws and recommendations.

It is important to discuss results bearing in mind the low number of respondents. Thus, it is expected that issues raised on **table 2** are not exhaustive. For instance, even though this issue was not raised by the Colombian respondent, it is known in AW literature that Colombia and Brazil are suitable countries to introduce high welfare farm systems in terms of their climatic scenarios and burgeoning specific research. This is the case with silvopastoril systems for beef cattle production (Broom *et al.*, 2013; FAO, 2013). Additionally, it is known that at least in Chile and Uruguay, as well as Brazil, there are active farm animal welfare teaching and research groups. Finally, the

participation of Chile and Uruguay in the OIE Collaborating Centre for Animal Welfare and Livestock Production Systems provides an opportunity of supranational structure to foster more organized and more significant AW developments in CSA.

Table 2. Positive and negative characteristics of each country in terms of farm animal welfare, according to respondents from seven countries in Central and South America, 2015.

Country	Characteristics relevant to animal welfare	
	Positive	Negative
Argentina	Beef cattle mainly reared on pasture	Only beef cattle reared on pasture; people either uninformed or not interested in other farm species
Brazil	Beef cattle mainly reared on pasture Climate adequate for free-range systems in most production areas Climate in Southern Brazil favorable to open-sided poultry houses, with natural lighting Broiler chickens and pigs are reared in vertically integrated systems, facilitating dissemination of animal welfare concepts and procedures through farmers Broiler chickens are reared in concentrated areas, closer to slaughterhouses Increase on society demand for action against animal abuse Animal welfare teaching and research groups	Bad road conditions Long journeys for beef cattle Drought in Northeast Farmers and industries fear of sudden and unilateral enforcement of AW regulations by MAPA Variety of difficulties regarding the enforcement of regulations Cultural characteristics involving animal abuse, such as cock fighting (which is illegal for the whole country), different forms of rodeos, urban draught horse use (which is illegal in some municipalities)
Chile	Broiler chickens and pigs are reared in vertically integrated systems, facilitating dissemination of animal welfare concepts and procedures through farmers Broiler chickens and pigs are reared in concentrated areas, closer to slaughterhouses Consumer concern about AW have increased Increased development of AW regulations	Bad road conditions Land extension, leading to long journeys and the need of sea transport of beef cattle Low educational level of workers that handle live animals Low perception of animal sentience by general population
Colombia	Increasing concern about AW Increasing rejection of animal abuse practices	Long journeys Bad road conditions Lack of training for workers who handle live animals
Ecuador	Political will to improve AW	High altitude Resistance to alternative production systems Resistance of organized groups, like cock fighting organizations Farmer associations afraid of sanctions due to animal welfare regulations Low educational level of workers that handle live animals
Suriname	Short distances to transport animals by land	Rainy and dry seasons, high temperatures Remote areas need transport by water
Venezuela	High percentage of literate people in rural population	Lack of education and information about AW issues

In general, respondents informed that labels do not provide information about production systems and are deficient in conveying information regarding AW issues. This is increasingly important because ethical concerns about how farm animals are reared are increasing among consumers. Label can take different formats to inform about animal rearing conditions (Kehlbacher *et al.*, 2012), since the majority of consumer is distant from animal production. In Brazil, MAPA approves and supervises product label in relation to compliance with the identity and quality standard specific for each animal product, but there is no obligation to inform about

production system. Recently, the Brazilian Association of Technical Standards published the NBR 16,389:2015, on requirements for free-range chicken production (ABNT, 2015). Although this NBR includes information about the rearing system, slaughter and labeling, it has no legal effect; thus, additional action is still needed to enforce its application. According to Schnettler *et al.* (2009), 49.2% of respondents in Chile informed that they would like product labels to include information about feeding, transport conditions, slaughter, traceability and production system. The respondent from Suriname informed that consumers are becoming more aware about AW, and that there is an annual book festival were children from kindergarten to high school are informed about where their food comes from, focusing on AW. As this type of education moves forward, refined labeling becomes central. Evidences suggest that the rejection of animal products from intensive low welfare industrial systems increases as consumers become aware of animal life conditions in these systems (Bonamigo *et al.*, 2012). Recent work in Brazil has also revealed inaccurate product information and inappropriate welfare-related information observed on regular products (Franco *et al.*, submitted). Thus, there are different levels of complexity to the challenges related to AW, which will require a variety of planned actions to be improved.

Vanhonacker and Verbeke (2014) observed that, since individuals are more interested in avoiding the bad than seeking out the good, communication about low animal welfare standards of regular products tends to be effective to increase the market for welfare-friendly products. In this regard, activism plays an important role to increase animal welfare standards. In Brazil, activism regarding farm animal welfare issues appears meager (Maciel, 2015), but recent campaigns aiming to inform consumers have been developed by NGOs. Two advertising campaigns have been supported by the Brazilian Vegetarian Society, "Why love one and eat the other?" and the "Meat-free Monday". The Humane Society International, that has published news about animal use in laboratory and food production, recently started a new campaign on social networks to inform about battery cages used for most laying hens in Brazil. A common reaction to animal protection campaigns in Brazil, especially amongst people involved in animal production, is to try to disqualify their actions as radicalism. However, it is our perception that these campaigns have been important to change society views. Most defenders of common sense or so-called non-extremist approaches to animal protection may not realize how campaigns are important in shaping this perception of the reasonable way to act. It seems that there is a net effect in AW improvement as a result of the accumulation of activism and animal protection campaigns (Figure 2), and this may be observed both through tuning up discussions in each society as well as fostering law proposals and publications.

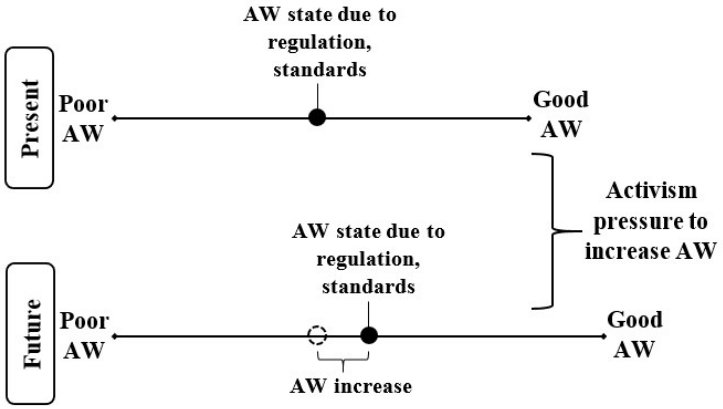

Figure 2. Schematic representation of activism effects to increase average animal welfare by increasing upper limit; AW means animal welfare.

Low availability of welfare-friendly products is yet another important factor preventing consumers from performing their ethical choice on purchasing behavior (Franco *et al.*, 2018). Most

likely, availability of higher welfare products is a field to be explored in all CSA countries. All respondents considered alternative products, such as organic and free-range, scarce. In Brazil, according to Figueiredo and Soares (2012), the estimated annually organic production is 550,000 meat chickens, 720,000 dozen eggs, 13,800 beef cattle and 6,8 million liters of milk. According to one respondent from Chile, organic production has been developed there for 20 years and became regulated by Law 20089 in 2005, which set standards for organic production and the obligation of a certification seal, monitored by a governmental body (Servicio Agrícola y Ganadero de Chile). In Chile, few animals are organic certified, being them 624 meat sheep, 500 dairy sheep, 431 beef cattle and 22 dairy cattle (ODEPA, 2014). Free-range chicken products are also available in Chile, but lack specific regulation. According to the respondent from Colombia, alternative products have been developed as an opportunity to differentiate products, but this initiative remains marginal in the perception of producer associations. In Ecuador, animal production for subsistence is common practice, more common than industrial systems.

In order to consider the types of AW issues discussed in different CSA countries, newspaper information about AW in the five leading countries on animal production in CSA is summarized on figure 3. Absolute numbers are to be interpreted with caution, since the higher number of AW news in Brazil is probably due to the fact that the authors are more knowledgeable of Brazilian media than of the regular media in the other countries studied. If percentages of AW news regarding farm animals are observed, it is clear that this topic is present in the media in all five countries, in a significant proportion, standing as an issue close to companion AW news. The exception seems to be Bolivia, where news regarding farm AW appear in the highest proportion. Gonçalez (2015), studying the presence and type of approaches of animal welfare issues in Brazilian media specialized in rural journalism, observed that AW texts are increasingly frequent in rural technical magazines. However, most reports approached AW scientific developments and economic issues; topics related to animal ethics and AW policy were scarcely touched (Gonçalez, 2015). This fact suggests that within the environment of producers, field veterinarians and animal science technicians, the ethical questions that support the movement towards better lives for animals are borderline. Accordingly, it is our experience in participating in farm animal welfare committees in Brazil that there may be AW discussions where the interests of animals are overlooked. This situation could improve should animal ethics gain more visibility.

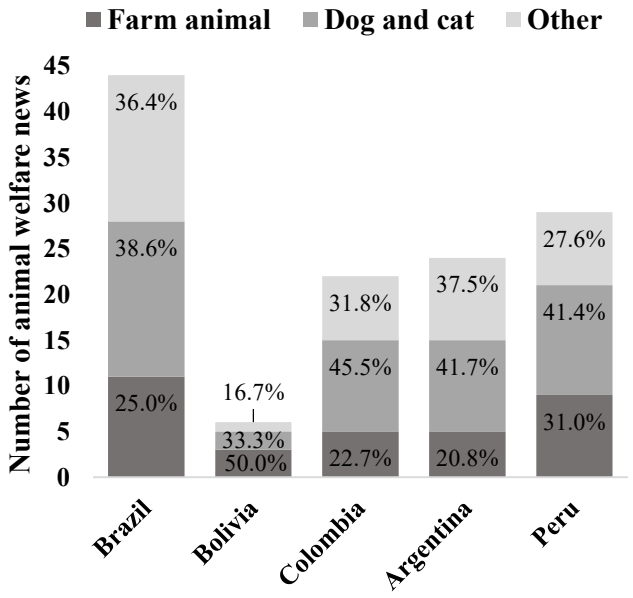

Figure 3. Newspaper information about animal welfare by animal categories from 2010 to 2015; the five leading Central and South American countries in terms of number of animals used for production were selected according to international statistics (FAO, 2014); percentages refer to the proportion of themes in each country.

3. Political will to improve animal welfare

All respondents cited initiatives to improve animal welfare, specifically in terms of animal handling. According to Paranhos *et al.* (2012), in Latin America there are several initiatives being done to improve livestock animal welfare, with emphasis on the development of training programs and best practices. Respondents mentioned federal governmental bodies related to agricultural and rural affairs, except in the case of Venezuela, as responsible institutions for animal welfare regulation and inspection. In Brazil, the MAPA claims this responsibility. Further, this Ministry considers the AW recommendations set by the OIE as a standard basis to be followed by producers. Based on this, the *Permanent Technical Committee* on *Animal Welfare* has been working on the translation of the OIE Terrestrial Code to Portuguese. The standards on animal slaughter, beef and dairy cattle welfare are available on the official MAPA website (MAPA, 2015). In Venezuela, municipal authorities are responsible for animal welfare, according to articles 34 and 35 of the law for the protection of wild and captive domestic fauna (Venezuela, 2010); this fragmentation to municipalities may render it difficult to enforce animal welfare issues (WAP, 2014).

According to respondents, animal welfare committees have been implemented in different levels and with different participants. In Argentina and Venezuela academic groups have started discussions on animal welfare. In Brazil, the Permanent Technical Commission on Animal Welfare, MAPA, was created in 2008 and it has established animal welfare focal points in each one of the 27 Brazilian States. The Commission aims to coordinate the development of animal welfare policies in the country. In the State of Paraná, Southern Brazil, the Farm Animal Welfare Committee was established in 2014 to support the development of animal welfare policies for the animal production chains. Companies, farmers, cooperatives, universities, non-governmental organizations and continuing education institutions are represented. In Chile there are committees composed by industry, governmental and non-governmental bodies. In Ecuador there are some organizations (El Observatorio de Bienestar Animal, Comité de Bioética de la Universidad San Francisco de Quito) and the animal welfare advisory board of Agrocalidad (agency of agricultural quality assurance of Ecuador). In Suriname, the government organizes meetings with non-governmental organizations and private initiative. In Brazil, scientific groups working with AW seem a major power in the history of the developments in this area. The ETCO group at UNESP (São Paulo State University) and the LETA group at UFSC (Federal University of Santa Catarina) were pioneers in implementing some AW teaching and research around 30 years ago. Thereafter, other groups were formed, such as NUPEA and GEBEA at different campi of USP (University of São Paulo) and LABEA at UFPR (Federal University of Parana).

All respondents, except that from Argentina, informed of some level of farmer inclusion on political discussions about animal welfare, mainly through meetings. This approach seems to have superior chances of success, since it favors the consideration of these important stakeholders in the decision-making processes. In terms of the position of producers and the industry, some resistance to AW developments is apparent. Brazil, Chile, Colombia and Ecuador respondents informed that there is some funding, either governmental or private, to improve AW. It is probable that in most cases this funding is modest; however, its existence is a sign of the perception of AW as a relevant area for local development.

In addition to political will to improve animal welfare, demands from private sector about minimum animal welfare standards for food suppliers have also played an important role worldwide. According to Maciel (2015), large corporates are the main actors involved in the mobilization of resources for the establishment of new policy, through market laws. This is possible due to the emergence of standards for private schemes or product quality assurance schemes. The power of large retailers in demanding stricter standards of animal welfare is clearly visible in the United Kingdom (UK), where the Assured Food Standard scheme covers 82% of beef and dairy

cattle producers and 90% of pig and poultry producer (AFS, 2012). Those numbers are in part explained by retailers demand in UK (Veissier *et al.*, 2008). On the other hand, poultry welfare certification at farm level is scarce in Brazil, reaching only 2.1% of farms (Souza and Molento, 2015). It is likely that AW certification schemes in other CSA countries are scarce as well.

From a scientific point of view, when assessing AW in the current systems in Brazil, some priorities emerge in terms of policy. First, there are natural welfare advantages in farm animal welfare due to the characteristics of local production systems, so the lack of proactive regulation cannot be assumed to mean that AW is lower as compared to countries were regulations are in place (for example please see Souza *et al.*; 2015; Tuyttens *et al.*, 2015). This, in turn, does not mean that farm AW is high; just the opposite, it may mean that the requirements included in European AW regulation are modest and would not represent real AW improvements elsewhere. The need for more information on local farm AW levels as well as local AW critical points is clear; only with this information strategies that will effectively improve the lives of animals in CSA countries can be planned and implemented. However, does this mean that the developments in Europe do not affect AW in CSA countries?

4. Importance of European demands and directives

How can we think about the importance of European demands and directives? There are, of course, direct effects due to the importance of the European market to CSA countries. All products sold from CSA countries to the European Union must comply with some European regulations, as the case of Regulations 2004/854/EC and 2009/1099/EC, for example. On the other hand, the adoption of European AW standards by CSA countries is showing some limitations and making the need for local AW research. Animal welfare-friendly certification schemes also slowly make their way to CSA countries, bringing welfare requirements higher than those in governmental baselines. The activities of European and other international animal protection NGOs also bring relevant changes to the life of animals in CSA countries. Many NGO proposals are sustained by the approval of European regulations.

According to respondents from Argentina, Brazil, Chile and Venezuela, the European Union is an important market. It is not the main export market of Brazilian broiler chicken meat; however, Brazil is the main supplier to the European Union (Van Horne and Bondt, 2013). About 60% of Brazilian beef meat exports go to European Union (Malau-Aduli and Holman, 2014). In Chile, beef and sheep meat were considered the main traded products, with mention to pork and poultry meat as well. According to Brazilian and Chilean respondents, companies authorized to export to European Union have adopted the European regulations that are required by the economic bloc. One clear example is the European regulation 2009/1099, which established requirements for the protection of animals during slaughter and demanded employees to be trained in humane slaughter procedures. In Brazil, the implementation of regulation 1099/2009/EC triggered off a series of training about humane slaughter, developed by the Ministry of Agriculture and World Animal Protection as mentioned above. In the same direction, Maciel (2015) observed that the development of farm animal welfare policies in Brazil resulted from external influence, mainly from the European Union and OIE. Similarly, one respondent from Chile informed that the government is working to harmonize the national slaughter regulation with the European regulation 1099/2009/EC, to facilitate international trade. In Colombia, the OIE recommendation was also mentioned as a standard to the development of animal welfare regulation.

Few respondents knew if there was any European animal welfare certification scheme implemented in their countries. One respondent from Chile informed that there are certification schemes in other areas, but not related to animal welfare. In Brazil, there are broiler chickens and beef cattle certified GLOBALG.A.P®, which is a farm assurance certification that includes

sustainability, food safety, worker and animal health and welfare. Other certifications in this country are not from the European Union, as the case of the North American certification scheme Certified Humane®, which is implemented in broiler meat chicken, laying hen and dairy cattle farms in Brazil. However, North American certification schemes were not developed in isolation from European actions, so there is an evident indirect effect of European actions also in this case. In Suriname, GLOBALG.A.P.® is implemented for pig production.

As cited above, the adoption of foreign standards may have limitations to improve animal welfare. As an example, Souza *et al.* (2015) compared broiler chicken welfare in GLOBALG.A.P.® certified and non-certified farms in Southern Brazil and observed that farms complied with minimum welfare standards proposed by the certification scheme regardless of certification. Based on this, it seems that it is important to develop animal welfare protocols based on local characteristics of each country. The risks of assuming animal welfare effects of any regulation are also evident; animal welfare assessment is essential. Additionally, researchers in Brazil and Chile have applied the Welfare Quality® protocol, the former in broiler chickens and the latter in beef cattle, and both efforts led to the conclusion that the protocol should be reviewed to be suitable for production systems in these countries. There were difficulties to assess broiler chickens welfare in Brazil using the protocol, mainly on measures of plumage cleanliness, breast blister assessment, qualitative behavior assessment (Federici *et al.*, 2015) and good human-animal relationship (Tuyttens *et al.*, 2015). Respondents from Chile informed that the protocol was applied during its validation, in 2009, and as it was developed for confined animals, adaptations are needed to assess the welfare of animals reared on pasture. Thus, it may be concluded that refinements are needed. However, the possibility of having this discussion is due to the important investment in animal welfare assessment made by the European Union. It is clear that the European funded Welfare Quality project (Welfare Quality®, 2015) was a major asset for advancements in animal welfare assessment, has been the AWIN project (AWIN, 2015).

Advancements also stem from interactions between animal protection NGOs and the industry, through changes in consumer knowledge and opinion. Recently, BRF, JBS and Aurora, the three largest pork producers in Brazil, announced the abolition of gestation crates for sows in 2026, 2025 and 2026, respectively. Arcos Dorados, the largest McDonald's franchise in Latin America, announced it will require its pork suppliers to submit documented plans in 2016 to limit the use of gestation crates for sows with plans for alternative group housing (Arcos Dorados, 2014). These changes are in line the Directive 2001/88/CE, setting off requirements relating to the welfare of pigs. The National Project for the Development of Pig Production (PNDS) and the National Fund for the Development of Pig Production (FNDS) were created to support pig producers in Brazil (ABCS, 2015) and may collaborate to transitions related to AW. This type of effort is welcome, since it recognizes producer vulnerability and offers viability for change to occur, which in the end tends to bring overall improvements and long-term strength to both producers and the production chain. Most importantly, when these efforts make change viable, they touch the lives of billions of animals.

Other example is the interaction between animal protection NGOs and the egg industry worldwide. As result, important groups have committed to eliminating the use of eggs from battery cages, such as Unilever, Nestlé, Starbucks and Grupo Bimbo. This international movement is reaching CSA. For example, in Brazil, the HSI created an online petition in 2015 to mobilize people to help end the confinement in battery cages. This initiative is in line with Directive 1999/74/EC for the protection of laying hens. Currently, the discussion on banning battery cages in CSA is not as highlighted as the one on banning gestation crates for sows. Local egg industry in Brazil remains more distant and perhaps resistant to this dialogue, a situation that seems similar to the case in the United States. However, from 2017 onwards the pressure for cage-free eggs has markedly increased

in Brazil and it has succeeded in bringing together the industry, producers and animal protection, in a clear movement for change.

Maciel (2015) stated that external pressure started the development of AW policies in Brazil, but the actions tend to reach all markets, foreign and domestic. This is evident from field observation. Neighboring farmers do not remain untouched by changes when one of them adopts AW-friendly practices, be they due to a new certification scheme or a contract to sell to Europe. It is also not likely that a slaughterhouse will revert its practices back to a less efficient stunning practice because the next batch of animals is not meant to the European market. As AW improvements usually rely on training, they come to stay. The need for training also means giving more value to people, which tends to improve human welfare.

5. Moving forward

The intrinsic complexities of AW are logical, considering the scientific, ethical and legal dimensions of the field. In order to plan effective strategies for improvement, it seems interesting to employ the decision tree proposed by Ingenbleek *et al.* (2012). Each branch constitutes possibilities for developments and should thus be given consideration. The fact that certification may help in only specific knots deserves attention, since sometimes it is proposed as the major way forward. The tree also points out the importance of AW teaching, especially for veterinarians and other professionals involved with animals. If veterinary services are not well informed, the efficacy of regulations tends to be very limited. To the recommendations of importing knowledge, suggested by Ingenbleek *et al.* (2012), we add the development of a local network of teaching and research. The importance of this investment in local solutions lies in many factors. Minimally, people relate better to proposals when they were involved in their development, and their efforts to achieve goals are likely more genuine. Second, even though AW is an animal-centerd concept, there may be geographically localized specificities. For instance, when an outcome based thirst indicator was tested in Belgium and Brazil, it became clear that the results meant different things in each climatic condition and, consequently, should not be interpreted in the same way (Vanderhasselt *et al.*, 2014). Scores of body dirtiness, an indicator of good housing in both Welfare Quality and AWIN protocols, may mean different welfare scenarios whether they are measured in indoor enclosures, and thus are related most likely to excreta or faeces, or on pasture situations, and thus potentially related to mud. Last, we can never overestimate creativity, and it is a good idea to invite researchers in different cultural contexts to think on solutions. The initiatives in South America on silvopastoral systems (Broom *et al.*, 2013; FAO, 2013) are good examples. They constitute also another example of the importance of the interaction, as stated by the co-authorship of Donald Broom.

Lastly, we would like to repeat once again a very frequent statement in this text. The difficulties in gathering information were evident during the preparation of this work; they limit the generalization of our results, which may not be understood as a complete picture of AW in CSA countries. These difficulties are an obstacle to the development of AW actions and their tackling should be a priority if the goal is to achieve continental improvement. It is urgent to support the organization of information, as well as interaction to foster exchange of current status and of results obtained with different initiatives. Such interaction may create faster development, especially considering that there may be similarities in both characteristics and AW bottlenecks within CSA countries. Perhaps the existence of the OIE Collaborating Centre for Animal Welfare and Livestock in Latin America represents an advanced option to install a data collection infrastructure uniting the information, monitoring of AW regulations and initiatives and collaborating to strategic planning for the continental area.

Conclusion

It was difficult to obtain information about AW in the continental level; however, data obtained shows a real portion of farm AW status and initiatives in CSA countries. Animal welfare discussions, initiatives and norms are present in CSA, mostly in initial phases of development. Knowledge of local characteristics is highly relevant to understand animal living conditions and to create opportunities for improvements. A structure to constantly monitor information and support planned strategies to improve AW is welcome, including AW higher education and mechanisms for regulation enforcement. Central and South American AW issues other than those in farm scenarios remain to be studied.

To conclude, we acknowledge that we did not answer one initial question posed during the preparation of this paper: What is the importance of Europe demands and directives? It is difficult to quantify their importance to AW in CSA countries because all CSA developments are part of a chain of events and ideas that will, either directly or indirectly, connect to the European developments. We hope that Europe will propose increasingly higher AW requirements, for the good of animals in European and CSA countries. We also hope that the interactions across different geographical areas become closer and more frequent, and that CSA research and policy initiatives may increase their collaboration to make the world a better place for animals.

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X
Animal welfare in Africa: strength of cultural traditions, challenges and perspectives

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Background

Cultural traditions involving animal sacrifice are common among many cultures, including Africans, and have been practised for generations (Thorpe 1993, Ben-Jochannan 1991). These are often called "traditional religions" as they are often not officially recognised, and have no sacred written scripture but passed orally from generation to generation. Furthermore, traditional religions have no apparent historical relation to one another, or to world religions such as Christianity, Islam, Hinduism or Buddhism. Traditional religions play an important role in some communities (Thorpe 1993), helping define tribes and clans and being part of the identity of communities (Flower 2010). Ceremonies where an animal is slaughtered include: to seek help for personal problems, to show respect for the ancestors, to celebrate important events such as weddings, births and also for funerals (Thorpe 1993, Michel *et al.* 2004). The choice of animal or species to be slaughtered often depends on the type ceremony and affordability. The animal to be used for sacrifice, its characteristics, and the extent in which a community can be involved are determined by the type of ceremony to be performed. For examples the slaughter of chicken requires only a single family to be involved. Whereas, the slaughter of a goat requires the involvement of extended families, community members or religious leaders (De Heusch 1985).

Cultural traditions and laws

In high income countries such as the USA and low to middle income African countries, the right to practice religion is protected by the laws and regulations (Council of the European Union 2009, Shaddow 1991, Mutangi 2008, Assembly 1996). For example, the constitution of the Republic of South Africa states that: "Everyone has the right to freedom of conscience, religion, thought, belief and opinion." Furthermore, that: "Persons belonging to a cultural, religious or linguistic community may not be denied the right, with other members of that community, to enjoy their culture, practise their religion and use their language; and to form, join and maintain cultural, religious and linguistic associations and other organs of civil society" (Assembly 1996). Similarly, the constitution of Zimbabwe states that "Except with his own consent or by way of parental discipline, no person shall be hindered in the enjoyment of his freedom of conscience, that is to say, freedom of thought and of religion, freedom to change his religion or belief, and freedom, whether alone or in community with others, and whether in public or in private, to manifest and propagate his religion or belief through worship, teaching, practice and observance (Mutangi 2008)." It is interesting to note that, in many African countries no reference is made to animal welfare within their constitution or legal framework; this is in contrast to high income countries which typically protect animal welfare. However, several African countries do have legislation for animal welfare that seeks to prevent abuse or cruelty. The Tanzania Animal Welfare legislation is recognised as one the most modern and comprehensive animal welfare Act in Africa. Nonetheless, in almost all

African countries, the implementation of animal welfare regulations is limited (World Organisation for Animal Health 2011).

Animal welfare challenges

The perceptions of animal welfare in Africa differ by region, culture and customs. Although everyone has the right to practice their culture or religion, the lack of understanding or tolerance of African culture has resulted in a conflicts between traditional slaughter practitioners and animal welfare advocacy groups in South Africa. The resulting outcome is a number of animal welfare court cases between 2007 and 2009:

In 2007, a case of a traditional African ritual thought to appease the ancestors was scheduled to be performed by a prominent member of the South African parliament. However, this resulted in outcry by the public and the animal rights activists who considered the sacrifice an act of unnecessary cruelty to the animal. Criminal charges were laid against the perpetrator in the Johannesburg High Court (Behrens 2009, Amoah, Bennett 2008). In 2009, Animal Rights Africa Trust filed a case to prevent sacrificing a bull in the Zulu annual celebration of the First Fruits. However, in both cases the court found in favour of those wishing to conduct the sacrifice.

Global definition of animal welfare

Broom (1991) defines animal welfare as "the welfare of an individual is its state as regards its attempts to cope with its environment". The last decade, has seen a significant increase in animal welfare. In particular, definitions for animal welfare and standardization of indicators for animal welfare (Fraser 2003, Wemelsfelder *et al.* 2000, Blokhuis *et al.* 2003). However, much of this research has focused on modern agri-food chain operations, such as abattoirs. Slaughter without stunning is controversial area a welfare standpoint (Grandin 2014, Grandin 2010). Grandin (2014) raised two separate animal welfare issues related to slaughter without stunning: distressing restraint of the animal during slaughter and painful cutting the throat. In African countries, the lack of infrastructure is a major constraint to animal welfare. For example, during the traditional slaughter of an animal in South Africa, the most common method of restraint is tying the animal to a tree or a pole. The method of restraint chosen is determined by the size of the animal, and with small animals often restrained by people. Therefore these methods have the potential to negatively affect the welfare of animals for traditional slaughter purposes. It is important that the socio economic factors are taking into consideration when animal welfare indicators are developed as often these factors are the drivers of animal welfare issues in African conditions.

Stunning during slaughter has been known to improve the welfare of animals by reducing pain and stress during handling (Grandin, 1992). There is scientific consensus that stunning of animals before slaughter reduces pain (Grandin 2001). This conflicts with African traditions that considers bellowing of the animal during slaughter as an indicator of the sacrifice been accepted by the ancestors (Buhrmann 1987, Twala, Hlalele 2012). Moreover, bellowing indicates compromised animal welfare. Therefore, there is a clear conflict between traditional slaughter and science-based slaughter.

Strength of cultural tradition in Africa.

Many Africans depend on livestock for food, income and other socio-economic benefits (Masiga, Munyua 2005). The relationship between livestock and their owner in African conditions is often deep and complex. For example, cattle are commonly given names and may be kept longer than is economically justified because owners consider them as part of the household. Welfare of animals is often linked to the wealth of their owners, with lack of food and exposure to preventable

diseases being major causes of impaired welfare. Therefore, ensuring the well-being of animals can contribute to the well-being of the people who keep them.

In modern, intensive farming systems, there is often a weaker relation between farmers and their animals due to the high number of animals, their rapid turnover, and an economic mind set to livestock rearing... In African religions animals are sacred and are offered to gods and ancestors (Braker, *et al.* 2002, Jackson 1977). The sacrifice of animals or the spilling of blood, is not something that is taken lightly among traditional slaughter practitioners, as an animal's life becomes a substitution for a human life, a concept known as 'one life for another'(Jackson 1977). Therefore, the responsibility of slaughtering (exsanguination) an animal is given to an adult or a well-respected member of the community. This ensures that only responsible and skilled people are used during slaughter to minimise unnecessary pain and suffering on the animal. (Thorpe 1993).

Many tribes and clans in Africa recognise certain animals as totems, that is, guardian spirits and helpers. The clans or tribes are obligated not to kill, eat or destroy the totem that they associate with (Asare, Howard & Peligah 2014). For example, in South Africa, the Bataung tribe or clan is not allowed to kill or eat a lion and the Bafokeng are not allowed to kill or eat rabbits. Similar observations have been made in Zimbabwe where the Shona people considered as lions as mediums of Shona ancestors, the guardian of the land (Taringa 2014).

Animal welfare in challenges in Africa

Animal welfare issues in Africa are often complex and linked to cultural, social, religious, political and economic factors (Bayvel *et al.*, 2005). This is further complicated by difference in people's beliefs and understanding of what is meant by 'welfare' (Bayvel, 2008). There are variations in practices between regions, tribes and sometimes among practitioners themselves. This diversity in cultural practices and species of animals involved creates a unique challenge for animal welfare policy in Africa. The lack of resources or lack of knowledge is also contributing to some of animal welfare challenges in Africa. Furthermore, current protocols on good animal welfare are not suitable for African conditions.

Awareness of animal welfare

Animal welfare challenges in Africa seems to be prominent in the small-scale and pastoralist farming systems and rural areas where access to resources as well lack of knowledge exists (Lee, Gereffi & Beauvais 2012). Other welfare problems are more typical of intensive, modern systems. This problem is not only exclusive to Africa, but most developing countries. Countries such as South Africa and Zimbabwe have made significant progress in educating their citizen on animal welfare. The involvement of a number of non-governmental organizations (NGO) in animal welfare issues in the South African Development Community (SADC) region has resulted in a significant increase awareness on animal welfare (World Organisation for Animal Health 2011). However, more still needs to be done to make practitioners and communities aware of animal welfare problems that may arise on farm.

Veterinary service

In almost all countries in Africa, veterinary service is largely provided and funded by the state. This service is affected by a number of factors among those are availability of funding and the prioritization of human related disease over veterinary related diseases (Leonard 1993, Leonard *et al.* 1999). Therefore, veterinary related problems such as animal health and welfare take a back step. With the recent focus on Ebola, Malaria, HIV and Tuberculosis, funding of many public veterinary services has significantly decreased. The result is a decrease in quality and availability of public veterinary services to address animal welfare issues in affected countries.

Economic factors

Poverty, unemployment and ongoing climate change continue to be a hindrance in addressing animal welfare problems in Africa. Prescribed methods of restraint, methods of transport and methods of treatment of sick animals are often expensive and inaccessible. Therefore, people are forced to use alternative methods which are not welfare friendly. This emphasises that the welfare of animals is directly link to the welfare of humans. Therefore, in trying to address animal welfare issues in Africa, the welfare of humans must also be taken into consideration.

Cultural norms

Africa is rich in diversity and culture, and addressing animal welfare issue is a challenge due to difference in traditional customs and beliefs. In addition, the welfare of humans in the majority of African countries takes priority over animal welfare. However, this is changing as more countries are adopting policies that address animal welfare problems. In order to move forward scientists together with traditional leaders and practitioners need to develop animal welfare systems that do not infringe on the right to freedom of religion.

Conclusion

There is a tension between the current universal definition of animal welfare and the reality of applying to African traditional and cultural ceremonies. Moreover, many low and middle income countries, have multiple, important societal objectives and obtaining optimal animal welfare may be in conflict with these. In many African countries, infrastructure, economic, cultural, and political factors, as well as access to veterinary services have a significant impact on animals and their owners. There is a need for raising awareness and generating evidence on possible animal welfare issues during traditional slaughter. In the absence of stunning, there are available options to reduce the severity of pain during slaughter, such as the use of sharper and longer knives similar to the one used during kosher slaughter.

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XI
Animal welfare in Asia: specific flaws and strengths, future trends and objectives

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Abstract

The Asian continent with many developing nations with half the world's population and animals had in the past been regularly reporting many cases of pets, livestock and wildlife being treated cruelly. This includes animals suffering from malnutrition, overloading, ill-treatment and animals not being slaughtered in a proper manner. This condition prevailed due to the lack of knowledge and understanding of animal welfare amongst most stakeholders. Several countries already have laws related to animal welfare but suffered poor implementation or enforcement. Others were lacking in policies and regulations. In many countries the priorities, funding and personnel are lacking to ensure improved animal welfare. Non-governmental organisations have been playing an important role where there is nascent or little emphasis from the government. Poverty, starvation, disease and environmental disasters remain as potential welfare threats to animals.

Lately concerns on animal welfare have been gaining traction. The inclusion of animal welfare in the third strategic plan (2001-2005) by the World Organisation for Animal Health (OIE) recognised the increasing public awareness and the need for governmental leadership in the development of animal welfare policies and guidelines. In 2008, Australia spearheaded the development and formation of the Regional Animal Welfare Strategy for Asia, Far East and Oceania (RAWS) based on the Australian Animal Welfare Strategy to improve animal welfare.

RAWS with membership from several countries like Malaysia, Bhutan, China, Indonesia, Republic of Korea and Thailand lead the changes and improvements on animal welfare. Malaysia for example had laid down a National Strategic Plan for Animal Welfare since 2012 and the Animal Welfare Act 2015 has successfully been gazetted on 29 December 2015. Other countries have also improved through new or improved legislation, training and public awareness program. Experiences from these countries are shared with other countries through direct interactions and through digital media. All these efforts have proved to be positively reinforcing with tangible improvements in animal welfare in the region.

In moving forward there needs to be further concerted efforts to deliver clear goals. These strategies must be shared through each country's OIE Animal Welfare Focal Point. The strategies include improving communication, education, training, skills, knowledge, improvement of legislation, obtaining high-level support, sustainable improvements on animal welfare, cooperation with NGOs, international organisations and key trading partners.

Introduction

Asia is the largest and most populous continent in the world. It covers almost 30% of Earth's land area. The population in 2018 stood at 4.55 billion people (www.worldometers.info/world-population/) which accounts for 60% of the world population. Animals whether as pets, for food

production, as work animals, strays and wild animals are found in large numbers in this continent. In addition the number of people involved with animals is also large. Hence ensuring high standards of animal welfare in this context will be a daunting task.

Animal welfare issues

If one were to travel in this continent one would be able to notice a number of different kinds of animal welfare issues in each country whether from poor animal ownership to abusing animals arising from cultural and perceived religious practices and lack of care for animals when used for pleasure/entertainment/work.

Food producing animals are an important source of protein and many countries are giving emphasis and priorities to feed their people. Organised farming is becoming important but the vast majority are still farmed in a traditional manner where there are deficiencies with respect to how the animals are reared or farmed. Animals are poorly housed or in many instances not housed and subjected to the vagaries of the climate from high to low temperatures, high humidity, draught and floods. Poor feeding of animals results in the animals being in poor condition and lowered productivity. Animal health services are lacking for the animals with frequent disease occurrence which causes death and zoonoses. Poor management practices often compound it further and this arises from the lack of knowledge. For the purpose of identification, animals are marked cruelly. When they are ready to market they are transported in cages or vessels which are cramped and cause suffering. Cattle break their legs while being moved into lorries or made to walk long distances to the slaughterhouse. Poultry die from suffocation. Once they arrive at the slaughterhouse the animals are handled poorly and are slaughtered in violation of animal welfare consideration, examples being the slaughter of animals in front of other animals, blunt and short knifes being used for slaughter. Most of the time stunning is not practised.

Stray animals cause huge problems to humans. Animals as well die when stray animals are involved in accidents. Rabies and a host of other zoonotic diseases are present in stray dogs. In India, it is estimated that there are 30 million stray dogs roaming the street. Strays arise from poor understanding of animal ownership and responsibility. It can also be attributed to low knowledge level of animal welfare (knowledge that animals can suffer as humans when not properly cared for) and business interest (not housing animals for food production).

Work animals like bullocks, horses, camels, mules and donkeys are routinely used in developing countries where mechanisation is not fully adopted due to its cost. Animal power is used for ploughing, carrying goods and pulling equipments/vehicles. Often the animals are not well fed as many of themhave poor body scores and are over worked beyond their capacity.

Cruelty in wildlife occurs when wild animals are used for entertainment. They are beaten and harmed to perform various tasks like riding a wild animal (elephants), swimming with a captive wild animal, petting, holding (sea turtles) and hugging a wild animal, watching a wild animal dance (monkeys), play sport (elephants), perform tricks (bears). Wildlife are also poached and hurt to harvest body parts for supposedly medicinal values and as trophy.

Animals like horses are also used for recreational purposes in some parts of the continent. Some of these horses are over-used, under-fed and have poor feet due to bad farriery.

Animals used for research, testing and teaching benefit from few or no welfare standards as many countries still lack the proper regulation.

Challenges

What then are the challenges facing the various countries in improving animal welfare standards?

The literacy level as reported in the Oceanic region was 71.3% and in South and West Asia at 70.2%. These low levels can contribute significantly to the poor understanding of animal welfare. Even countries with higher level of literacy rate suffer from poor knowledge of animal welfare evidenced by the number of non-conforming practices still prevailing.

A number of countries do not have a clear policy with defined strategies to undertake animal welfare activities and in some smaller countries even legislations are absent. This situation does not bode well for good animal welfare practices in these countries.

On the other hand, there are countries with legislation but which suffer from poor implementation due to limited resources, be it a lack of people to regulate or a lack of funding required for this purpose.

Most religions require that animals are treated well and their welfare is ensured. However, the religious requirements are perceived and poorly understood, which results in the animals being treated poorly, especially when animals are slaughtered for consumption.

Cultural practices in some countries may be seen as in contradiction to accepted animal welfare values. This is evident from the eating preferences (dog meat) of some communities.

The condition of working animals can be improved with better designed implements as well as ensuring the animals are properly fed. Better fed animals will be able to work more efficiently.

Poverty and low income can contribute to poor animal welfare practices when people's own welfare is threatened.

Many of these challenges can be overcome. Some countries can improve quickly with the right intervention but others may require longer period of time for improvements to take place.

It is important that fundamental changes be made to their economic wellbeing and this must be prioritised. In addition literacy and educational level needs to be tackled and when this happens it is often easier to influence the understanding on animal welfare with the right knowledge.

The wrong mindset or beliefs regarding animal welfare can be changed with education and training as seen in many countries which have embarked on such approaches.

Some countries require that more personnel and funding are committed to provide sufficient clout for the animal welfare standards to be regulated.

Catalyst for change

Role of OIE

Office International des Epizooties (OIE) or the World Organisation for Animal Health (OIE) realised that animal welfare must be given importance as it is crucial for the wellbeing of animals. So since 2000, it became an important component of animal health. Following this, animal welfare was recognised as a strategic priority in the 3^{d} OIE Strategic Plan (2001-2005). In 2002, the General Assembly of National Delegates adopted a resolution leading to the creation of the Animal Welfare Working Group (AWWG). This was followed up with the adoption of the General Principles in Animal Welfare in 2003.

The 1st Global Conference on Animal Welfare was held in 2004 in Paris and 450 participants from 70 countries attended. The objective of the first conference was to share these values and practical realities in the field in order to make recommendations and establish international standards on animal welfare.

The first animal welfare standards were published in 2005 and since then, 14 standards have been published. It is regularly updated based on new information or knowledge. The OIE guiding principles on animal welfare is based on the universally recognised "Five Freedoms" published in 1965 which include freedom from hunger or thirst, freedom from fear and distress, freedom from

physical and thermal discomfort, freedom from pain, injury, disease, and freedom to express normal patterns of behaviour.

The OIE animal welfare standards are science-based standards which are agreed globally (currently 180 member countries).

The 2nd Global Conference on Animal Welfare was held in 2008 in Cairo. The goal was to support the worldwide implementation of the OIE standards for sea and land transport of livestock, livestock slaughter for human consumption and killing for disease control. The conference was also intended to raise the profile of animal welfare and to encourage veterinarians and Veterinary Services to take greater responsibility for animal welfare. Nearly 400 participants were involved.

The 3rd Global Conference on Animal Welfare was held in 2012 in Kula Lumpur. This conference provided a global forum for discussion of the needs and priorities of the OIE Members with respect to the development and implementation of animal welfare standards in the five OIE regions. The aim is to improve animal health and welfare globally. This conference was attended by over 400 participants.

OIE Animal Welfare Standards

Since May 2005, the World Assembly of OIE Delegates (representing the 180 Member Countries and Territories) has adopted ten animal welfare standards in the Terrestrial Code and four animal welfare standards in the Aquatic Code. Some of these standards are for assessing the degree of impaired functioning associated with injury, disease, and malnutrition. Other measures provide information on animals' needs and affective states such as hunger, pain and fear, often by measuring the strength of animals' preferences, motivations and aversions. While some others assess the physiological, behavioral and immunological changes or effects that animals show in response to various challenges.

- Introduction to the recommendations for animal welfare

Animal welfare as defined in Article 7.1.1 of the OIE Terrestrial Animal Health Code means how an animal is coping with the conditions it lives in. An animal is in a good state of welfare if it is healthy, comfortable, and well nourished, safe, able to express innate behaviour and not suffering from pain, fear and distress. Good animal welfare requires disease prevention and appropriate veterinary treatment, shelter, management and nutrition, handling and humane slaughter and killing. Animal welfare refers to the state of the animal; the treatment the animal receives such as animal care, animal husbandry and humane treatment.

- Transport of animals by land, sea and air

These standards describe various aspects which need to be taken into consideration before moving animals. It states the responsibilities, competence, on planning of the journey, documentation required, pre-journey period, loading, the travel, unloading and post-journey handling, actions in the event of refusal to travel and species-specific issues.

- Slaughter of animals

In Article 7.7.1 of the OIE Terrestrial Animal Health Code, it is stated that the need to ensure welfare of food animals during pre-slaughter and slaughter processes until they are dead in the slaughter houses. Animals slaughtered outside of slaughterhouses should be managed to ensure their transport, lairage, restraint and slaughter is carried out without causing undue stress to the animals.

- Killing of animals for disease control purposes

Killing of animals in a disease or emergency situation require that the welfare of the animals be given due consideration with respect to the handling, restraining and employing the appropriate method of killing.

- Stray dog population control

It is important that the strays are controlled to ensure that they do not pose human and animal health issues and specifically disease like rabies. In controlling the population, unnecessary animal suffering should be avoided. Different control measures can be employed to control strays.

- Use of animals in research and education

When animals are used for research and education it should be based on a set of requirements to ensure welfare. The regulatory framework must be in place with an oversight committee to scrutinise the need for animals for research and ensuring if animals are used to follow guidelines which are universally acceptable.

- Animal welfare and beef cattle production systems, broiler and dairy cattle production systems

These recommendations are specific for beef cattle rearing and covers various aspects like biosecurity and animal health, environment(heat and cold stress, lighting, air quality, noise, nutrition, flooring/bedding, social environment, stocking density and protection from predators), management (genetic, reproduction, colostrum, weaning, husbandry procedures, handling and inspection, personnel training, emergency plans, location, construction and equipment and humane killing).

Regional Animal Welfare Strategy for Asia, the Far East and Oceania (RAWS)

In addressing the issue of implementing OIE standards with respect to animal welfare a focussed effort was undertaken and the RAWS was conceptualised in 2008. Since then, the RAWS implementation plan was developed and approved in 2009 followed by a planning workshop.

The first RAWS Coordination Group (RAWS CG) meeting was held in April 2011. The RAWS CG members were from Australia, New Zealand, Malaysia, China, Korea, Thailand, Indonesia and Bhutan. The Australian Department of Agriculture, Fisheries and Forestry (DAFF) has supported the activities undertaken by RAWS CG.

The RAWS agreed vision is: “A region where the welfare of animals is respected, promoted and incrementally advanced, simultaneously with the pursuit of progress and socioeconomic development”. This vision presents both significant challenges and opportunities.

The factors driving the region’s approach to improving animal welfare is based on science, values, ethics, culture, education and awareness, economics and livelihood, research and development and regional and international developments.

Since its inception, RAWS CG has provided a number of recommendations to the OIE. In addition, other activities include the establishment of a secretariat within DAFF (Australia), translation of RAWS (Edition 1) into four languages and on the OIE website, establishing a RAWS newsletter circulated on a quarterly basis which reports on country status, NGO and industry initiatives, development of Action Plan and track activities, animal welfare training courses, establishment of national animal welfare committees in the region, actively working with the OIE’s national animal welfare focal points to promote RAWS initiatives, supporting OIE’s implementation of standards and networking with OIE Collaborating Centres, twinning of regional universities and research centres.

All these efforts are expected to:

(1) increase the level of awareness on animal welfare through effective coordination, communication, education and training,

(2) ensure the coordinated regional approach on the implementation of the OIE animal welfare standards,

(3) achieve sustainable improvements in animal welfare and

(4) develop sustainable mechanism to coordinate and promote animal welfare programs and priorities.

Animal welfare initiatives in selected countries in Asia

Malaysia

Historically, there has been written laws on animal care since the 15th Century as in the *Malacca Code* (1489-1511) and *Pahang Code* (1590-1614). Modern law on animal care was enforced since 5th December 1910 which was known as the *Enactment for the Prevention of Cruelty to Animals, 1910*. Malaysia had banned bull and cock fighting since 1953. Meanwhile state enactments were introduced. Subsequently all these legislations were consolidated into the Animals Act 1953 aimed for the prevention of cruelty to animals. Meanwhile the Penal Code (Section 377) gives protection by law to animals with a provision against buggery (carnal intercourse) with animals constituting a punishment of 20 years imprisonment, fine or whipping.

Malaysia has taken firm steps to improve animal welfare. When reviewing the legislation and from stakeholder feedback the imposition of fines under the Animals Act 1953 was deemed low. It was the equivalent of USD50 for cruelty offences. Hence, efforts were undertaken to rectify this low penalty and since 2013 the penalty for cruelty offences have been increased to USD 12,000 and the prison sentence enhanced from 6 months to one year.

Malaysia needs to inculcate a culture of caring and concern for animal welfare, like any other developed countries in line with the vision of attaining developed nation status by the year 2020. Hence, a clear national approach to ensure animal welfare can be upheld effectively has to be in place.

The National Animal Welfare Strategic Plan (NAWSP) was launched during the 3d OIE Global Conference on Animal Welfare in 2012. This document is comprehensive with thorough planning on animal welfare strategies to meet the needs of the country until 2020.

The vision of the plan states “Malaysia a Developed Nation with A Caring Society Concerned For The Welfare of Animals”. It aspires to execute international animal welfare standards, reinforced by universal human values. The NAWSP aims to establish a national animal welfare framework for each sector, ensures a comprehensive and consistent approach to various aspects of animal welfare to be implemented in an integrated manner, determines that the animal welfare needs are met by those responsible for it based on science, societal culture, values and religious obligations, ensures transparent and impartial information on animal welfare is accessible and sufficient, and ensures the governance of national animal welfare is carried out efficiently and effectively.

In strengthening the governance of animal welfare, the government had embarked on introducing a comprehensive Animal Welfare Act. The Animal Welfare Act 2015 was finally gazetted on 29th December 2015. It is an important milestone as this Act covers a wider scope to implement animal welfare requirement in the country. . The Act has provided important provisions for the purpose of promoting animal welfare and implementing animal welfare enforcement in the country. The Animal Welfare Act 2015 was gazetted on 29 December 2015 and the enforcement of

the Act was from 1 July 2017. Some provisions of the Act are already being used while awaiting regulations under the Act and the development of the Animal Welfare Code of Practices in various animal activities to strengthen the enforcement of the Act.

Other strategies include improving the organisational structure in government department and agencies to carry out the new roles and requirements under this Act.

A database on animal welfare management and traceability is being created and the first step has been the implementation of the pet passport.

The education modules in the field of animal welfare will be improved in the universities and animal welfare education modules are to be incorporated at school level. Training programs for responsible pet and animal rearing are being implemented.

Public awareness campaigns with the introduction of animal welfare personality, organising animal welfare day and dialogues with different stakeholders are being pursued.

Two colloquiums on knowledge sharing discourse have been organised with the theme being Animal Welfare from the Islamic Perspective. Islam gives importance to animal welfare with many of the verses in Quran explaining its significance. Also the sayings (hadis) of the Prophet also gives due regard to animal welfare. Poor animal welfare is a product of misunderstanding and the poor implementation of what was stated or mentioned in the religion.

The government is also providing allocations to fund research on certain areas of animal welfare which can be used to introduce science-based standards. Networking of scholars in the field of animal welfare ensures continuous engagement.

Publication of guidelines, booklets, stickers and books have been undertaken to provide sufficient knowledge and awareness to different stakeholders. One interesting and important guideline is the “Guideline for the Slaughter of Cattle for Religious Purposes” which gives emphasis on proper restraint of cattle, proper slaughter techniques, handling the carcass and proper disposal of waste. This guideline was used to train the religious leaders and the public. This initiative was positively accepted and practised nation-wide.

The Animal Welfare Board is made of representatives from the Ministry, Department and government agencies for the purpose of governing the Act. In addition, a special committee called the Animal Welfare Consultative Committee was established at the national level led by the Director General of DVS Malaysia and membership from NGO and industry representatives to provide inputs and feedback to the Animal Welfare Board to highlight related issues with regards to animal welfare.The role of the NGOs to ensure improved animal welfare in the country is to be applauded. However, the efforts and activities have to be further intensified.

South Korea

South Korea has shown good commitment to improving animal welfare. It introduced the Animal Welfare Strategy which outlines the various activities planned to be implemented. The Animal Welfare Act is in place to regulate animal welfare while the Korean Animal Welfare Advisory Committee functions to address animal welfare concerns and provide solutions to issues.

Awareness of animal welfare was given emphasis and the government engaged famous singers and actors as ambassadors for animal welfare. This has become an important tool in the dissemination of animal welfare concerns. Even the politicians were evaluated on their awareness on animal welfare or lack of it.

Other initiatives undertaken include the training of various stakeholders, and providing certification for farms which promote animal welfare. This certification will result in animal products carrying good animal welfare labels as certified by the government and being priced higher and receive a premium. This strategy has proven to be effective.

In trying to address the problem of strays and owners abandoning their pets, the government has introduced the national registration for companion animals.

Philippines

Animal Welfare Act has been in place since 1998. In addition the rules and regulations on transport of animals by land, sea and air were introduced. Humane handling for slaughter was also regulated. These regulations have resulted in improved animal welfare in the country.

The country has been quite active in organising training, workshop and seminars for its officers, the public and the people involved with animals to increase the knowledge and awareness on animal welfare. Another noteworthy effort is the introduction of animal welfare subjects and creating awareness on animal welfare to children.

The national program for controlling of strays has showed very good progress and directly has impacted in the lowering of rabies cases among humans. The program is extensively carried out throughout the nation.

China

Several legislations have been introduced to improve animal welfare. The Animal Husbandry Law of People Republic of China (2006) regulates the transportation of animals so as to ensure safety of livestock and to provide necessary space, food and water. The Pig Slaughtering Management Regulation (2008) mandates the slaughterhouses to conduct humane slaughter according to national standards. At the same time, the Management Regulations of Veterinarians Practitioner (No.18) requires a veterinary practitioner to love and protect animals and disseminate animal health care and welfare knowledge.

In May 2014, China introduced the Farm Animal Welfare Requirements for pigs (CAS 235-2014) and this was the first Farm Animal Welfare Standard in China. Following which the National Standard of The General Principles of Animal Welfare (AW) Assessment was completed and awaiting approval. It focuses on the welfare of various categories of animals including farm animals, and aims at raising the profile of AW within the livestock industry, and improving awareness and concern over farm animal welfare nationwide. Meanwhile the National Standard of Farm Animal Welfare Requirements for Beef Cattle and the National Standard of Farm Animal Welfare Requirements for Mutton Sheep have been drafted.

In improving animal welfare, dependence entirely on legislation was thought to be insufficient and the country decided to award good animal welfare practices. Good Pig Production Award, Good Chicken Production Award and Good Sheep Production Award were introduced. Companies will be selected based on their commitments to animal welfare, promoting animal welfare and the healthy and sustainable development of nationwide farming, and improving quality of animal products and the brand competitiveness. The 1st Farm Animal Welfare Production Award was launched on 20th of June, 2014.

In the education sector many universities are providing various courses about animal welfare. Examples of universities providing courses such as animal behaviour, animal welfare law and animal protection include China Agricultural University, Shanghai Jiatong University, Guangxi University and Nanjing Agricultural University.

India

Regulatory aspect of animal welfare in India is under the purview of the Ministry of Environment & Forests which implements the Prevention of Cruelty to Animals Act, 1960 (59 of 1960).

The Animal Welfare Board of India (AWBI) and Committee for the Purpose of Supervision and Control of Experiments on Animals (CPCSEA) were set to facilitate the implementation of the Act.

Training and education on animal welfare for the various stakeholders required the formation of the National Institute of Animal Welfare (NIAW) which is located in the state of Haryana. Workshops, seminars and conferences are organized there.

The Ministry also provides financial assistance through the Animal Welfare Board of India for the construction of animal shelter houses, clinics for strays. Grants are provided for ambulances & vehicles in connection with treatment and transportation of sick, injured and rescued animals. In addition funding is available for the sterilization of stray dogs. Funding is also available for the NGO's involved in animal welfare work.

World animal protection ranking

The measures and efforts undertaken by various countries to improve animal welfare require quantitative analysis. This is where the World Animal Protection (WAP) Index although introduced recently can provide for some basis for evaluation. However, further quantitative and qualitative indicators need to be introduced to better evaluate animal welfare improvements.

The World Animal Protection (WAP) which was formerly called WSPA (World Society for the Protection of Animals) is a worldwide NGO operating in many countries with the belief to protect animals.

In 2014, WAP decided to introduce a ground-breaking Animal Protection Index which judges 50 countries on their policy and legislation for animals, identifying where improvements can be made. The Index was grouped from Group A to G with Group A being rated the best.

Countries listed in Group A like UK, New Zealand, Switzerland and Austria had the highest level of achievement based on the criteria set.

In the Asia and Oceanic region, Malaysia, India, Philippines were ranked in Group C with countries like France and Italy. This was encouraging as it means some countries in this continent are on par (at least from the policy and legislative aspect) with some developed nations.

Some countries are ranked in Group G which is the lowest such as Iran. Improvements can and should be continuously made so that animal welfare standards can be further raised.

Conclusion

Asia with many countries with diverse culture, religion and language has shown improvements in raising animal welfare standards. The improvements are not similar but further efforts from these countries can improve animal well-being.

More initiatives, efforts, programs and activities are required towards this end. Some countries may require assistance in funding, some on technical expertise and others on proper guiding and mentoring.

The strategies include improving communication, education and training, upgrading skills and knowledge, improvement of legislation, obtaining high-level support, sustainable improvements on animal welfare, cooperation with NGOs, international organisations and key trading partners. These strategies must be shared through each country's OIE Animal Welfare Focal Point so that the implementation of animal welfare standards can be enhanced.

Given time most countries will be on the right track to achieve the level of animal welfare currently practised in the developed nations.

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PART 3
Animal welfare in the face of socio-economic and cultural factors

XII
The Costs and Benefits of Animal Welfare

Paper not received

XIII
Impact of international trade on ethical norms (updated 2016)

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Introduction

Consumers have become aware of the importance of international trade for animal welfare thanks to the Transatlantic Trade and Investment Partnership negotiations between the European Union and the United States. They now know that national norms, the most visible, are often the consequences of negotiations on a supra-national level. Establishing high animal welfare and biodiversity standards adds costs to the production of marketed goods. For this reason, national norms are often perceived as “impediments to trade” during international exchanges, and are therefore strictly regulated by the World Trade Organization (WTO) and bilateral free trade deals negotiated outside the WTO.

I. The "*extraterritorial consequences*" of animal welfare regulations

The "*extraterritorial consequences*" of a norm[1], sometimes inherent in certain provisions governing animal welfare or biodiversity, are highly likely to be “contentious” on an international level. Indeed, laws that only regulate the production and sale of national goods have no impact on international trade. Only some national norms affect the production and trade of goods by foreign companies. This is the case with laws that ban the import and sale of a non-ethical product within a state’s territory, or that require certain practices or formalities for a product to enter. These laws often serve a dual purpose: to encourage foreign companies to use production methods that are more respectful of animals and the environment, and to safeguard national companies from international competitors whose national laws are less restrictive, allowing them to produce at lower costs.

The EU's ban on beta-agonist veterinarian drugs, such as ractopamine, illustrates the national lawmaker's motivations and the trade barrier created by such a regulation[2]. Ractopamine is a feed additive used in powder or granule form by some countries (United States, Canada, Japan and Mexico) in the last few weeks of the fattening phase for some livestock, particularly pigs, cattle and turkeys, for rapid muscle gain and increased leanness. The drug also causes great mental and physical distress to the animal: scientific studies (EFSA, 2009)[3] have observed that the administration of ractopamine induces hyperactivity and tachycardia as well as joint pain due to the abnormally rapid muscle gain. In addition, ractopamine seriously impacts the animal's welfare when being transported to the slaughterhouse and during killing, as studies on pigs have shown that ractopamine makes these animals highly active and difficult to handle: this increases the risk of injury during transport and failed stunning[4]. The US Food and Drug Administration (FDA) requires that American ractopamine manufacturers to include the following warning on their packages: *"CAUTION: Ractopamine may increase the number of injured and/or fatigued pigs during marketing"*[5]. Based on studies carried out by the EFSA (European Food Safety Authority) showing a potential risk to the end consumer due to ractopamine residues in meat and proven compromise to the animal's welfare, the European Union banned the use of ractopamine for fattening among its Member States. Yet the practice provides a financial gain from the rapid weight growth of around $2 per hog (Alemanno & Capodieci, 2012). So that European farmers are not

disadvantaged against US farmers, the European Union also bans the import of animals to which ractopamine was administered. Through this ban, Europe is limiting a foreign farming practice that causes harm to animals: to continue to export meat products to the European Union, farmers from other countries must not use ractopamine for their export products. As a result, a restrictive national provision on imports protects European Union farmers from unsustainable competition while also changing the farming conditions for some livestock in countries outside the Union. These national legislations with "*extraterritorial consequences*" are undeniably an effective tool for promoting high animal welfare standards worldwide, but their international reach can easily lead to disputes[6]. With the case of ractopamine, countries that export meat treated with this growth hormone disapproved of the European Union's ban on their products. In 2012, they took international action and persuaded the Codex Alimentarius to vote (by a small majority) for "maximum residue levels" of ractopamine for meat products for human consumption. The Codex Alimentarius establishes international scientific standards that the World Trade Organization uses when assessing the merits of a national bill that has the potential to restrict trade[7]. While the ractopamine case has not yet led to a dispute before the WTO's Dispute Settlement Body, the total ban on imports of these meat products has been described by some authors as "*another endless transatlantic dispute*". In the case of ractopamine, the ban on imports essentially comes from the potential risk to the end consumer's health. Animal welfare certainly is a factor in the EFSA studies and documents published by European institutions state animal welfare requirements, but it comes after food safety. This human-focused motivation is common, as C. Deffigier and H. Pauliat note: "*It is a drive for food safety that boosts animal welfare demands*"[8] (Deffigier & Pauliat, 2009). It could also be a strategic choice made by Europe's lawmakers, aware that a ban on imports is more likely to be validated by the WTO's Dispute Settlement Body if it is based on a scientifically proven risk to human health than if it is based on animal welfare[9].

National norms with "*extraterritorial*" scope run the risk of litigation that may result in a penalty for the state that created the provision ruled to be illegitimate. International agreements and treaties have internal dispute settlement systems or refer the parties to an external court; they are thus able to have a state penalised if it breaches the provisions of the treaty. Within the WTO, the Dispute Settlement Body (DSB) fulfils this quasi-jurisdictional role: it can only be approached by a Member State and does not apply any financial sanctions. The DSB can authorise the aggrieved state to take an economic countermeasure, which in principle should be temporary because the aim of the DSB is to have the parties comply with the provisions of the WTO agreement. However, the WTO does not allow for investors to appeal[10]. As the Court of First Instance of the European Union indicated regarding the WTO "hormone beef" dispute, the aim of WTO agreements "*is to settle and manage relations between states or regional economic integration organisations, and not to protect individuals*"[11]. Free trade agreements often have a system to settle disputes between states[12] that can include an amicable solution or economic countermeasures like those of the WTO. Furthermore, these agreements increasingly include a second mechanism to allow an investor to take a state to an international arbitration court and obtain a financial penalty: Investor State Dispute Settlement (ISDS). National lawmakers are aware of the risk of being sanctioned by the WTO and by arbitral tribunals[13] when drafting a bill. As a result, if there is a risk that a legislative initiative to protect animals or biodiversity could oppose international agreements signed by the state and lead to sanctions, lawmakers may be reluctant to act. National laws on imports allow national law makers transmit their own values: by imposing certain ethical conditions for accessing its domestic market these encourage foreign producers to change their methods. However, states are not entirely free to legislate because in application of the adage "*Pacta sunt servanda*"[14], they must respect the international agreements that they have signed and which strictly regulate restrictive international trade laws.

II. The World Trade Organization and animals

The main international trade framework forum is the GATT, which became the WTO in 1995. At the time of the GATT, the purpose of the treaty was to clarify international trade relations: it promoted free trade and non-discriminatory trade practices without really taking into account the environmental or ethical aspects of trade in goods. As a result, when a state placed a restriction on the importation of certain goods that showed little respect to animals, this state's laws were often deemed to oppose the principles of the GATT. These laws were often seen as "disguised restrictions on international trade" used to allow a state, acting under the cover of seemingly legitimate environmental or moral grounds, to discriminate against contracting parties of the GATT, which is prohibited by the Treaty. The Dispute Settlement Body, mandated to settle trade disputes between contracting parties and interpret the provisions of the GATT, worked to make sure these types of laws did not remain in force. The structure has evolved considerably since its creation in 1947 and in a direction that is more favourable to animals. In 1995, when the GATT changed into the WTO, greater emphasis was placed on the environment and the protection of animals, which was not self-evident[15]. On the one hand, the WTO finally accepted the link between international trade and the environment: the organisation changed its structure to include a Committee on Trade and Environment[16], and now works with various animal protection organisations such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) to prevent trafficking of wild animals in international trade. On the other hand, the terms "animal welfare" and "welfarism" appeared in the decisions of the WTO's Dispute Settlement Body[17], which is increasingly accepting ethically or environmentally-orientated laws.

One of the fundamental rules of the WTO, as defined in Article XI of the GATT, is the prohibition of non-tariff barriers: in principle, the only trade restrictions authorised are tariff barriers such as "*duties, taxes or other charges*". However, there are WTO agreements containing provisions that, as an exception, allow international trade restrictions for ethical reasons:

- Article XX a) of the GATT relates to national laws necessary to protect public morals;
- Article XX b) of the GATT provides an exception for the adoption of national laws necessary to protect human, animal or plant life or health[18];
- Article XX g) of the GATT covers national laws relating to the conservation of exhaustible natural resources of which wild animals are a part.

These exceptions, which derogate from the prohibition on imposing non-tariff barriers and run a high risk of state protectionism, are strictly regulated by the WTO legal texts: the "chapeau", which recalls that the terms of the laws made in application of these exceptions must be enforced, stipulates that *"subject to the requirement that such measures are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or a disguised restriction on international trade, nothing in this Agreement shall be construed to prevent the adoption or enforcement by any contracting party*" of the aforementioned measures[19]. Certain decisions show that the Dispute Settlement Body, whose mandate is to clarify the terms of the agreements, is increasingly more inclined to validate these exceptions. During the dispute settlement procedure, where two conflicting states are unable to reach an amicable settlement, a “Special Group” of three or five experts is set up to produce a report that will be adopted or rejected (only by consensus) by the DSB. If the DSB adopts the Special Group report, it becomes a "decision" of the body. The parties to the dispute can appeal this initial decision by citing legal errors committed by the Special Group. Appeals are handled by three of the seven members of the WTO’s permanent Appellate Body, who can uphold or reverse the findings of the Special Group. The Appellate Body Report must then be adopted by the DSB[20]. Two decisions illustrate this favourable development for animals:

1. United States - Shrimp case of 12 October 1998[21]:

This dispute arose from a law on commercial shrimp fishing enacted by the United States (Act No. 101-162 of 21 November 1989, Section 609). The environmental provisions of this law placed a prohibition on certain shrimp fishing methods that were causing the accidental capture and death of protected species of sea turtles in large quantities. Domestic shrimp trawlers were required to install turtle excluder devices and foreign producers were banned from exporting shrimp harvested using techniques harmful to turtles to the United States. The ability to invoke article XX g) regarding the protection of animals was debated: indeed, certain states contend that the terms "exhaustible natural resources" means "*finite resources such as minerals, rather than biological or renewable resources*"[22], in keeping with the traditional interpretation (Carreau & Juillard). The Appellate Body ruled in favour of the United States on this point, stating: "*We are not convinced by these arguments. [...] modern biological sciences teach us is that living species, though in principle, capable of reproduction and, in that sense, "renewable", are in certain circumstances indeed susceptible of depletion, exhaustion and extinction, frequently because of human activities. [...] The words of Article XX(g), "exhaustible natural resources", were actually crafted more than 50 years ago. They must be read by a treaty interpreter in the light of contemporary concerns of the community of nations about the protection and conservation of the environment*"[23]. It was not however a complete success for the United States because the Appellate Body dismissed the environmental measures in question, ruling them to be contrary to Article XX g) of the GATT. The purpose of protecting sea turtles was not at issue, the DSB was only penalising the discriminatory application of the measure as it only provided leeway for complying and technical assistance to some of the United States' trade partners, and excluded other WTO members from benefiting from these. The Appellate Body insisted on the legitimacy of domestic ethical laws in a noteworthy statement: "*In reaching these conclusions, we wish to underscore what we have not decided in this appeal. We have not decided that the protection and preservation of the environment is of no significance to the Members of the WTO. Clearly, it is. We have not decided that the sovereign nations that are Members of the WTO cannot adopt effective measures to protect endangered species, such as sea turtles. Clearly, they can and should*"[24]. This passage from the findings, which shows that the WTO is willing to take an approach respectful of the environment and biodiversity, is a break away from the way Article XX g) was traditionally interpreted. Furthermore, the Appellate Body quashed the Special Group's decisions whose reasoning could have been fatal to domestic environmental laws. By concentrating on an analysis of the chapeau of Article XX g), the Special Group considered that a national measure should be challenged if "*such type of measure, if it were to be adopted by other Members, would threaten the security and predictability of the multilateral trading system*"[25]. This legitimate fear for the WTO's multilateral system could have prompted the Appellate Body to adopt the same reasoning, but this was not the case: it chose to simply state that the Special Group had not followed the key steps for analysing Article XX g). It then used the same two-tiered analysis method as the "United States - Gasoline" case, then validated the principle of environmental laws provided that they are not used in a discriminatory manner.

2. EC - Seal Products case of 25 November 2013 and 22 May 2014[26]:

This is a decision related to the European Regulation of 16 September 2009 banning the import and sale of seal products for commercial purposes[27]. It focused on commercial hunting and certain exemptions were made for hunts conducted by Inuit or indigenous communities for subsistence purposes, and for hunts conducted for marine resource management purposes. The regulation, which explicitly protects seals for ethical reasons based on these animals' sentience[28], was challenged before the WTO by Canada and Norway, for whom commercial hunting is a significant economic activity. Other than certain exceptions deemed to be discriminatory, the regulation was

validated by the DSB panel[29]. The Panel recalled the meaning and scope of the terms "public morals" under the meaning of Article XX a) of the GATT: these are standards of right and wrong conduct maintained by or on behalf of a community or a nation, the content of which can vary depending on prevailing social, cultural, ethical and religious values[30]. The term "animal welfare" appeared in this decision through the intervention of human interest where the Special Group notes that "*the principal objective of adopting a regulation on trade in seal products was to address public concerns on seal welfare*"[31]. It then needed to establish that these "*public concerns*" fell within the meaning of public morals in the European Union, and specifically that the protection of seals was part of European societies' moral ideals, to be able to demonstrate that the regulation was within the scope of application of Article XX a) of the GATT concerning public morals. In opposition to Canada's claims, the Special Group felt that the evidence[32] showed that "*animal welfare is an issue of an ethical or moral nature in the European Union*"[33] and that the European Union regulation fell within the scope of application of Article XX a) of the GATT. In addition, the Special Group felt that alternative import ban measures, despite being less trade-restrictive, were not applicable due to the high risk they posed to animal welfare[34]. In this case, the WTO gave ethical concerns for animal welfare precedence over trade concerns. This decision, in which the DSB declared that public moral concerns relating to animal welfare were of "*highly important interest or value*"[35]*,* is both fundamental and new for animal welfare: for the first time, the DSB based its reasoning on public morals and animal welfare and not on the preservation of a species as a component of the environment. As well as marking a shift from a logic of protecting a species as a whole to protecting an individual wild animal, this precedent laid the foundations of a new legal basis for the protection of wild animals and possibly owned animals on an international scale.

Not all WTO decisions are as satisfactory to animal, environmental and consumer protection campaigners as the United States - Shrimp and EC - Seal Products cases. For instance, the Special Group report for the United States - Tuna II case[36], on the compliance of eco-labelling with the WTO's Technical Barriers to Trade (TBT) Agreement was heavily criticised by environmentalists[37]. However, the WTO is opening up to non-commercial, ethical concerns, whether in its multilateral negotiations or DSB decisions, and this is considerable progress for animals used in international trade. But the WTO is not the only entity that provides a framework for international trade and faces stiff competition from bilateral and multilateral free trade agreements that contain their own dispute settlement systems. The proliferation of these agreements has become a threat to the WTO, just as the forum is beginning to accept the relationships between international trade, environmental issues and ethical consumption.

III. Free trade agreements and ethical standards

When a state wishes to favour a single trade partner, the WTO authorises it do so through a free trade agreement[38]. Although these economic matters unite some WTO member states and forsake others that contradict the multilateralism promoted by the WTO, an exception to the most-favoured-nation clause (Article I of the GATT) was introduced for two reasons: economic integration promotes international trade in the manner of the WTO, and in a post-war context, it was important to favour peaceful relations between states and "*isn't economic integration the surest way to ensure peace between two states?*" In the beginning, WTO member states only used this faculty occasionally. However, since the failure of the WTO's multilateral negotiations in the Doha Development Round, due in part to negotiations over non-market cultural values and no longer over economic concessions such as customs duties[39], the number of free trade agreements has risen sharply. While the WTO agreements and the jurisprudence of the DSB are beginning to provide certain guarantees in terms of animal welfare and biodiversity, many uncertainties remain as to how they will be implemented by these free trade agreements and their dispute settlement systems. Not all international agreements have the same impact on the level of protection for wild

animals and animal welfare. We need to determine which agreements provide a levelling-up of ethical standards and those that could hinder this type of legislation. With this in mind, two factors can be taken into consideration: the economic weight of the contracting parties and their capacity to impose their legal model; and the inclusion of an Investor-State Dispute Settlement (ISDS) in the agreement, which could, if it is not written in a restrictive manner, lead to a freeze on environmental and ethical standards.

The European Commission and the European Parliament regularly stress the importance of the issue of animal welfare in international agreement negotiations[40]. However, this political will is unfortunately not always enough because, in practice, the outcome of the talks depends on the economic and political weight of the states party to the agreement. So agreements signed between a developed country and developing countries are generally likely to export high animal welfare standards. These can even become tools for the protection of nature, animals and the fight against the poverty of local economic actors. For instance, the Cariforum-EC Economic Agreement signed on 15 October 2008 imposes sustainable agricultural and fishing resource management practices, farming training and the promotion of organic farming practices on the contracting parties. These provisions permit the conservation of biodiversity and implementation of more animal welfare-friendly farming practices. The European Union feels that this intentional agreement "*is a pioneering agreement in the international trading system*. It is the first genuinely comprehensive North-South trade agreement that promotes sustainable development, builds a regional market among developing countries and helps eliminate poverty"[41]. However, this is not the case of agreements signed between two developed countries: when two trade partners of an equivalent economic level negotiate, and their values differ, it is unlikely that either one is able to impose its own ethical laws. Trade disputes[42] between the United States and the European Union over food safety and the use of very different farming practices illustrate this difficulty. The European Union has some of the world's highest animal welfare norms[43], and despite certain initiatives in the United States (on a state or federal level) that are highly protective of animals[44], a large portion of American farming practices are sources of suffering for animals[45] (Frash *et al.*). Despite these ethical differences, which are as notable as they are persistent, these two states would like to reach a free trade agreement and are currently in talks. Unsurprisingly, this trade initiative has citizens and politicians alike perplexed and worried about their ability to reach a balanced agreement on these sensitive issues. Moreover, even though the European Union has an economic advantage over the United States[46], the United States' negotiating skills are far greater than those of the European Union. Powerful American lobbies will undoubtedly not make it easy for the European negotiators. In addition, American negotiators have a track record of being tough and persistent, as perfectly illustrated by a statement made by Clara Hills, U.S. trade representative from 1989 to 1993: "*We wrench open foreign markets with a crow bar if necessary, but with a handshake if possible*"[47]. So, despite the political willingness of European institutions to include animal welfare in their free trade agreement talks, it is uncertain whether they can systematically negotiate a sufficient level of protection.

The inclusion of an ISDS in a free trade agreement can also jeopardise national animal welfare standards. This dispute settlement mechanism allows a foreign investor to file suit against a state before an international arbitral tribunal if this state breaches the terms of the agreement. This would not directly affect national norms because under no circumstance may the arbitral tribunal require the state to change its legislation as a sanction. However, states, which need to pay the high fees of this private court[48] as well as fines that can reach into the millions, are placed under considerable financial pressure by these arbitral disputes. As the Comprehensive Economic and Trade Agreement CETA (Canada - European Union) and the TTIP (United States - European Union) talks include ISDSs, European institutions, aware of the risks of steep financial sanctions, have implemented a European regulation[49] to have the arbitral dispute fees shared between the

European Union and Member States. The second consideration of the regulation states that, with regard to complaints filed in application of an ISDS, that "*significant costs of administering the arbitration as well as costs relating to the defence of a case will inevitably be incurred*". Because participating in arbitral disputes mobilises considerable public resources, states may be reluctant to impose stricter ethical standards in the future or be compelled to abrogate a law; this phenomenon is known as a "freeze on standards". Other than the costs incurred by these disputes, ISDSs do not provide any foreseeable legal framework for the states given that they often authorise claimants to take the matter to an arbitral tribunal of one of the numerous existing arbitration centres (ISCID, UNCITRAL, ICC, etc.)[50]: the absence of a single court covering international trade disputes between investors and states is blocking the development of a unified, coherent and predictable system of law. This lack of predictability can also weigh heavily on a state's willingness to legislate in favour of animal welfare or the environment. Nevertheless, ISDSs should not be demonised, they do not set out to hinder the production of ethical standards but to provide investors with protection in order to facilitate international trade. These dispute settlement mechanisms provide a neutral judicial forum for investors, who, without this, would only be able to appeal to the sometimes-corrupt national jurisdictions of the state they are suing. By protecting investors against state abuses such as direct expropriation and providing them with a neutral legal framework, they favour international trade. In addition, some authors of legal doctrine encourage the protection of investors and even regret that this is not ensured by the WTO because after all, "*where the rules of international trade systems are breached, it as much by these operators as by states, and states are less reprimanded for these than the operators*" (Carreau & Juillard). Granting investors access to a means of appeal is beneficial but it remains vital that the risks of including an ISDS in a free trade agreement are reduced as much as possible during international negotiations.

To eliminate most of the harmful effects of ISDSs on national ethical norms, the first step is to remain vigilant when an agreement is signed between two developed countries because statistics show that it is these agreements that lead to the highest number of arbitral rulings[51], and therefore run a higher risk of a freeze on standards. The UNCTAD, a United Nations organisation in charge of international development and trade, even indicates that the United States and the European Union are the main users of the ISDS mechanism. Together they account for 75% of ISDS claims[52]. The second stage is to provide a clear framework around investors' right to appeal through arbitration. In theory, the ISDS mechanism can protect investors from a large number of state decisions, from direct expropriation (by which a public body can force a private entity to hand over property, usually in return for fair compensation) to indirect expropriation (where in the absence of a transfer of property, a state measure has an effect equivalent to direct expropriation). Indirect expropriation can be problematic for state ethical norms because this can be invoked by investors before an arbitral tribunal in order to challenge certain environmental[53] or public health[54] laws that have caused them a significant loss of revenue or closure of their business. It is therefore important that the conditions by which investors can act against a state are listed in full and that it is specified in the agreement and the ISDS that the right to legislate for national policy reasons is preserved. The European Commission deemed the CETA, a free trade agreement between the EU and Canada that was finalised on 26 September 2014, to be risk-free, stating that it "*does not limit the capacity to regulate in the future in any manner*". Indeed, the agreement mentions how important it is that global trade respects the environment (CETA, 2014) (but overlooks animal welfare, therefore also excluding owned animals). In addition, it preserves the parties' right to legislate to achieve legitimate political goals in health, the environment and public morals (CETA, 2014). This could be a ban on growth activators in farming for health purposes, a ban on certain fishing or animal husbandry methods, provided that the arbitral tribunals' interpretation is similar to that of the DSB, or cruel farming or slaughter techniques in the name of public morals[55]. The

ISDS of the CETA[56] and its appendix provide an effective framework for investors' legal proceedings while stressing that public policy measures taken to protect the environment, public health and safety do not constitute "indirect expropriations" and therefore do not entitle investors to take court action against a state. However, it is unfortunate that the concept of public morals, although stated in the agreement, is not reiterated in the provisions of the ISDS. While the use of precise terms and the strict framing of the notion of indirect expropriation ensure that the right to legislate is preserved in the areas of health and the environment, the absence of a reference to animal welfare is a sign that they are inadequately protected.

The current free trade agreement system and ISDS mechanism are being called into question, to an extent that the two international mechanisms are now at the centre of several reform projects, both in the European Union and globally. Aware that the "*traditional form of dispute resolution suffers from a fundamental lack of trust*"[57], the European Commission has proposed a reform of the investor-state dispute settlement. This reform process, of which the future is uncertain given that the Commission must first convince its trading partners to accept it, aims to create a first instance tribunal and an appeal tribunal whose judgements would be made by publicly appointed judges, comparable to the International Court of Justice and the WTO Appellate Body. This system will provide an improved framework for investors' right to act and free trade agreements will ensure that "*governments' right to regulate are enshrined and guaranteed*"[58]. While this reform presents greater guarantees than the current system, the Commission remains silent as to the nature of the sanctions that this new court could impose and whether it would allow for mitigation of damages on criminal sentences. Furthermore, there is still a risk of diverging interpretations between the Dispute Settlement Body and this new court. Despite these shortcomings, the reform project complies with the wishes of the UNCTAD, which feels there is a pressing need for a reform of the international free trade agreements to bring them in line with today's sustainable development imperative[59].

References

1. Dictionnaire de droit international public, éd. Bruylant 2001, p. 491: in public international law, extraterritoriality is defined as "a situation in which the competences of a State (legislative, executive or jurisdictional) govern legal relations outside of that State". The national laws presented in this case do not hold authority within another State. As such, this is not strictly extraterritoriality and therefore this article will use the terms "extraterritorial consequences" when referring to the economic and factual consequences that national laws on animal welfare can have.
2. Under the Directive 96/22/EC of 29 April 1996, it is prohibited to use veterinary beta-agonist drugs to fatten animals for human consumption. It is still legal for these substances to be used for therapeutic purposes on some categories of animal.
3. The report, in particular, notes tachycardia in dogs and humans to whom ractopamine was administered.
4. J. N. Marchant-Forde, D. C. Lay, E. A. Pajor, B. T. Richert, A. P. Schinckel, 2002, The effects of ractopamine on behavior and physiology of finishing pigs, Purdue University. *Swine Research Report*, p. 4.
5. Drug label information for the trademark Elanco, Paylean 45 Ractopamine Hydrochloride: "CAUTION: Ractopamine may increase the number of injured and/or fatigued pigs during marketing".
6. European Council conclusions, Follow-up to the adoption of a standard setting maximum residue levels (MRLs) for ractopamine by the Codex Alimentarius Commission at its 35th session, 3,193rd Agriculture and Fisheries Council meeting, 22 and 23 October 2012, p.2: The Council states that the ban on ractopamine is to serve the dual interests of public health and animal welfare.
7. The EU ban on imports of hormone-treated meat products led to a high-profile international dispute: EU-Hormones Case, Appellate Body report, 16 January 1998.
8. C. Deffigier, H. Pauliat, Le bien-être animal en droit européen et en droit communautaire, *Les animaux et les droits européens*, ed. A. Pedone, p. 72.
9. By virtue of Article 3 of the SPS agreement, health measures, such as the ban on imports of meat products treated with ractopamine, benefit from a presumption of conformity with the GATT agreements where these are founded on international standards or recommendations, in particular those of the Codex Alimentarius.
10. The Appellate Body confirmed the interstate nature of the DSB dispute in the United States/imposition of countervailing duties case of 10 May 2000, points 40 and 41.

11. Court of First Instance of the European Union of 11 January 2002, Biret International v Council, point 62, concerning the direct effect of the EC-Hormones Case decision, Appellate Body report of 16 January 1998.
12. This type of dispute settlement court, which often transfers jurisdiction to the DSB, only presents difficulties if it diverts the WTO's international trade dispute and creates a contradictory jurisprudence to that of the DSB. This type of court is not presented in detail in this article, which mainly looks at the WTO and ISDSs and their impact on the creation of ethical norms. For more detail on the distribution of authority between dispute settlement systems and their impact on animals, read Mercier, 2016.
13. Regulation (EU) No. 912/2014 of 23 July 2014 establishing a framework for managing financial responsibility linked to investor-to-state dispute settlement tribunals established by international agreements to which the European Union is party: "significant costs for administering the arbitration as well as costs relating to the defence of a case will inevitably be incurred in any such case." (Whereas 2).
14. Vienna Convention on the Law of Treaties of 23 May 1969, Article 26: "*Pacta sunt servanda*: Every treaty in force is binding upon the parties to it and must be performed by them in good faith."
15. The WTO is not an international organisation that governs the environment or animal protection and does not claim to do so. The purpose of the organisation is to regulate international trade. However, it does take into account certain ethical considerations where these affect international trade.
16. The Committee on Trade and Environment has a mandate to examine trade-related environmental issues and provide technical assistance where changes are to be made to WTO agreements.
17. EC – Seal Products, Special Group Report of 25 November 2013, § 7. 401; EC – Seal products, Appellate Body Report of 22 May 2014, § 5. 143.
18. The SPS agreement, which is one of the WTO agreements alongside the GATT agreement, is based on Article XX b) of the GATT.
19. A two-stage analysis by the WTO is required in order to validate a law adopted in application of Article XX of the GATT: it first verifies whether the law applies to one of the exemptions stipulated under Article XX, then its discriminatory nature is measured with regard to the chapeau of Article XX.
20. Memorandum of understanding on rules and procedures governing dispute settlement.
21. United States — Import prohibition of certain shrimp and shrimp products, Appellate Body Report of 12 October 1998, § 128.
22. Id., § 127.
23. United States - Import prohibition of certain shrimp and shrimp products, Appellate Body Report of 12 October 1998, § 128.
24. United States - Import prohibition of certain shrimp and shrimp products, Appellate Body Report of 12 October 1998, § 185.
25. Cited by United States - Import prohibition of certain shrimp and shrimp products, Appellate Body Report of 12 October 1998, § 112.
26. European Communities — Measures Prohibiting the Importation and Marketing of Seal Products (hereinafter the EC - Seal Products), Special Group Report of 25 November 2013; followed by an Appellate Body decision of 22 May 2014 validating the Special Group's analysis and conclusions.
27. Regulation (EC) No. 1007/2009 of 16 September 2009 on trade in seal products.
28. Id., Whereas: "(1) Seals are sentient beings that can experience pain, distress, fear and other forms of suffering."; Whereas "(4) The hunting of seals has led to expressions of serious concerns by members of the public and governments sensitive to animal welfare considerations due to the pain, distress, fear and other forms of suffering which the killing and skinning of seals, as they are most frequently performed, cause to those animals."
29. The European Union made Regulation No. 1007/2009 comply with the WTO agreements.
30. EC - Seal Products, Appellate Body Report of 25 November 2013, § 7. 379 – 7. 383.
31. Id., § 7. 401.
32. The elements of proof taken into account by the Special Group include legislative texts, legislative history applicable to seal products, actions taken by the EU and Member States in favour of animal welfare, and the ratification of international conventions on animal welfare.
33. Id., § 7. 409.
34. EC – Seal products, Appellate Body Report of 22 May 2014, § 5. 289.
35. EC - Seal Products, Appellate Body Report of 25 November 2013, § 7. 632.
36. United States - Measures concerning the importation, marketing and sale of tuna and tuna products, Special Group Report of 11 September 2011 (United States - Tuna II). This decision was followed by an Appellate Body Report on 16 May 2012.
37. The Special Group felt that the "Dolphin-safe" labelling constituted a technical regulation under the WTO agreement and that the measure taken by the United States was more restrictive on trade than was necessary to achieve the goal of protecting dolphin, although this goal was deemed to be legitimate. Read: A. Acuri, Back to the Future: US-Tuna II and the new environment trade debate. EJRR 2/12, p. 177.
38. The WTO's multilateral system is based on the most-favoured-nation treatment (Article I of the GATT) by virtue of which any advantage granted to a member of the WTO is systematically granted to other WTO members, but there

are a few exceptions to this. Within the derogation relating to regional integrations governed by Article XXIV of the GATT, the WTO authorises free trade areas and customs unions.

39. E. Adam, L'impasse des négociations internationales : la nécessité d'un aggiornamento, RDR novembre 2013.
40. See the following documents: European Commission, The Transatlantic Trade and Investment Partnership: the top 10 myths about TTIP, 2014; European Parliament, P8_TA-PROV(2015)0252, European Parliament resolution of 8 July 2015 containing the European Parliament's recommendations to the European Commission on the negotiations for the Transatlantic Trade and Investment Partnership (TTIP), p 13.
41. European Commission Press Release, The Cariforum-EC Economic Partnership Agreement, MEMO/08/624 of 15 October 2008.
42. EC-Hormones Case, Appellate Body Report of 16 January 1998.
43. European Food Safety Authority (EFSA) website, animal welfare section.
44. For example: initiatives aimed at protecting sea animals during commercial shrimp harvesting, protecting dolphins during commercial tuna fishing, the use of ecolabels to inform consumers on the production methods of certain animal products, the ban on foie gras in California and on anal electrocution of fur-bearing animals in the state of New York.
45. On a federal level, the Animal Welfare Act (AWA) excludes livestock from its protective provisions (7. U.S.C §§ 2131-2159), the Humane Methods of Slaughter Act (HMSA) reduce animal suffering during slaughter and the Twenty-Eight Hours Law 49 U.S.C § 80502 pertaining to transport were interpreted by the USDA to exclude poultry from its scope of application; the use of veterinary beta-agonist drugs for rapid muscle growth in livestock is authorised.
46. According to the European Commission (europa.eu, under The Economy), "In terms of the total value of all goods and services produced (GDP), the EU economy is bigger than the US economy".
47. M. Rainelli, L'Organisation mondiale du commerce, Repères économie 9th edition, p. 41.
48. Convention and Regulations of the International Centre for Settlement of Investment Disputes (ICSID): the parties must pay the arbitrators, lawyers, experts, translators and for the hire of the arbitration venues.
49. Regulation (EU) No. 912/2014 of 23 July 2014 establishing a framework for managing financial responsibility linked to investor-to-state dispute settlement tribunals established by international agreements to which the European Union is party.
50. E. Gaillard, La Jurisprudence du CIRDI, vol. 2 (2010), p. 4.
51. Recent development in investor-State dispute settlement (ISDS), United Nations Conference on Trade and Development (UNCTAD), II A Issue note, No. 1, April 2014.
52. Investor-State dispute settlement: an information note on the United States and the European Union, United Nations Conference on Trade and Development (UNCTAD), II A Issue note, No. 2, June 2014.
53. On 31 May 2012, the Swedish company Vattenfall filed a lawsuit against the German state in application of the European Energy Charter Treaty (a treaty that aims to develop the energy potential of European countries and includes an investor-state dispute settlement clause). This action, taken on the grounds of indirect expropriation from the Swedish company, followed Germany's decisions to abandon nuclear energy (Atomic Energy Act, July 2011).
54. Australian Government, Attorney-General's Department, Tobacco plain packaging - investor-state arbitration: In the Philip Morris case in 2011, the Asian subsidiary of this firm attacked the 2011 "Tobacco Plain Packaging Act" by virtue of an ISDS of an agreement between Australia and Hong Kong. The purpose of the Australian state's public health measure was to prevent and reduce smoking-related death by stipulating that tobacco producers were required to sell their products in plain packaging. Philip Morris felt that the loss of revenue caused by the Australian regulation constituted indirect expropriation. The regulation on plain packaging is currently the object of a dispute before the WTO.
55. In the aforementioned EC - Seal Products case, the DSB drew on the concept of public morals to validate the European regulation that bans the import and sale of seal products due to the cruelty of the hunting methods used.
56. The consolidated CETA text published on 26 September 2014, section on the protection of investors, p. 1581.
57. Cecilia Malmström, European Commission Press Release of 16 September 2015, Commission proposes new Investment Court System for TTIP and other EU trade and investment negotiations.
58. Id.
59. Taking stock of IIA reform, United Nations Conference on Trade and Development (UNCTAD), II A Issue note, No. 1, March 2016, Original text: "There is a pressing need for systematic reform of the global regime of international investment agreements (IIAs) to bring it in line with today's sustainable development imperative".

XIV
Is Animal Welfare Better on Smaller Farms?

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Abstract

Concerns about the welfare of farm animals often revolve around the issue of farm size. Many critics suggest that animals on larger farms are less likely to receive individual attention and instead are treated only as units of production, and that the shift to larger farms results in a decline in standards of care and ultimately in the quality of life for the animals. In this talk we outline the historical background of this criticism, drawing parallels with the earlier debate over the shift from an agrarian to an industrial society. We also argue that farm size influences different aspects of animal welfare in different ways. For example, larger farms may permit more specialized and professional management of animal health, but make it difficult to provide access to pasture for dairy cows. We also review the limited empirical literature linking farm size and welfare and conclude that available research provides little support for any simple relationship. In conclusion, increases in farm size provide opportunities to improve the welfare of farm animals but also create welfare risks. Policy and advocacy efforts, instead of trying to reverse the increase in farm size, would be better directed toward generalizing the welfare benefits and minimizing the risks.

Farm size – the dominant narrative

A common feature of discussion around farm animal welfare is that farm size necessarily affects the welfare of animals on that farm, with larger farms perceived to have poorer welfare than smaller farms. This view has been popularized in books including *Fast Food Nation* (2001), *Omnivores Dilemma* (2006) and *Animal Factory* (2010), that consider larger farms more likely to be under corporate (rather than family) ownership, and more likely to pursue profit at the expense of harms to the environment, to the workers, and to the animals.

For those that ascribe to this view the news is bad as farm size has grown, and shows every indication of continuing to grow rapidly. The United States Department of Agriculture (USDA) keeps good statistics on such matters, so we provide these numbers below. These U.S. changes are likely similar to those seen in other developed, industrial economies (that are based on largely of feeding grain to animals, such changes may be less pronounced in forage-based systems; Fraser, 2005).

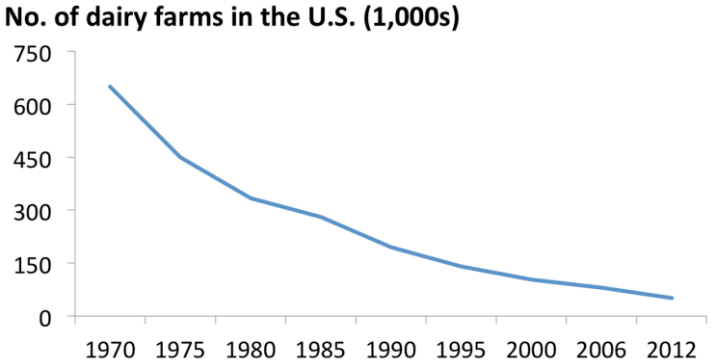

Figure 1. Changes in the number of farms in the United States (x 1,000) that have produced milk since 1970. Data are adapted from Blayney 2002, USDA, 2007; 2016.

Figure 1 illustrates data gleaned from these USDA surveys for dairy cows. As can be seen, the number of farms that produce milk has declined rapidly over the past 40 years, even though the total number of cows has changed little. Thus, the pattern of declining farm numbers is due to the smallest farms leaving the industry and the remaining farms becoming progressively larger.

The reasons for these changes are complex (see Fraser, 2005), but it seems likely that the forces at work will be difficult to counteract. If we wish to convince farmers and policy makers to reverse or even slow these changes we will need compelling arguments. Indeed, even if we focus on welfare concerns (the topic of this report) we can identify multiple factors. Here we separate these welfare related concerns into three broad categories: 1) that the technologies inherent to large farms are detrimental to the animals, 2) that due to dilution of worker effort over a larger number of animals, the standard of care provided to individuals animals will decline, and 3) that some especially beneficial management practices, like access to the outdoors, may become impractical once farms reach a certain critical size. Below we critically review some of the evidence relating to all three types of concern, using where possible, examples and evidence from our own work on dairy cattle. However, before we begin with this list we will first introduce some first-person evidence that has motivated our interest and questions regarding the dominant narrative that "big = bad" in terms of farm size and animal welfare.

Farm size and lameness in dairy cattle – cracks in the dominant narrative?

Over much of the past decade our research group at the University of British Columbia has been interested in lameness in dairy cows. This ailment is perhaps one of the greatest threats to dairy cow welfare; lameness is painful, long lasting and prevalent (many surveys show that 30% or more lactating dairy cows are lame).

One theme of this recent work has been to compare commercial farms in an attempt to identify features of these farms that reduce the risk that cows will become lame. Our studies of this type have shown a great range in lameness rates in our home province of British Columbia (Ito *et al.*, 2010), elsewhere in North America (von Keyserlingk *et al.*, 2012), and in China (Chapinal *et al.*, 2014 a). In each of the regions we have examined, we have found that some farms are able to manage lameness remarkably well, with only a small percentage of animals lame, while other farms struggle in controlling lameness, sometime with more than half the cows on the farm showing clinical signs of lameness (i.e. impaired gait).

Our primary goal in this work was to engage farmers in discussion about lameness, with the ultimate aim of motivating changes that help reduce the rates of lameness on their farms. In this aspect we have seen some success (Chapinal *et al.*, 2014 b), although clearly much still needs to be done. To help better inform changes in management we have also statistically assessed the relationship between farm practices and lameness rates. This work has identified a number of practices that can reduce the risk of lameness on farms. For instance, in north-eastern US the availability of deep-bedded lying stalls and the use of pasture were associated with lower rates of lameness. Our work has also shown that the risk factors vary according to the region. For example, in California where the use of deep-bedded stalls was universal (thus removing poorly bedded mats and mattresses as a risk), we were able to identify other factors as important, including the quality of the bedding management and the use of rubber flooring in the milking parlour (Chapinal *et al.*, 2013).

Given that farm size is perceived to negatively affect welfare outcomes, we also included this factor into each of our statistical models. However, instead of finding more lameness on larger farms we found the opposite result. As illustrated in **Figure 2**, cows on the largest farms were at a lower risk of being lame than were cows on the smaller farms. Indeed, we have found this

counterintuitive pattern in a variety of regions with farm size varying across two orders of magnitude (from less than 100 to almost 6,000 cows). We also found a very similar pattern for cows on large farms in China (Chapinal *et al.*, 2014 a).

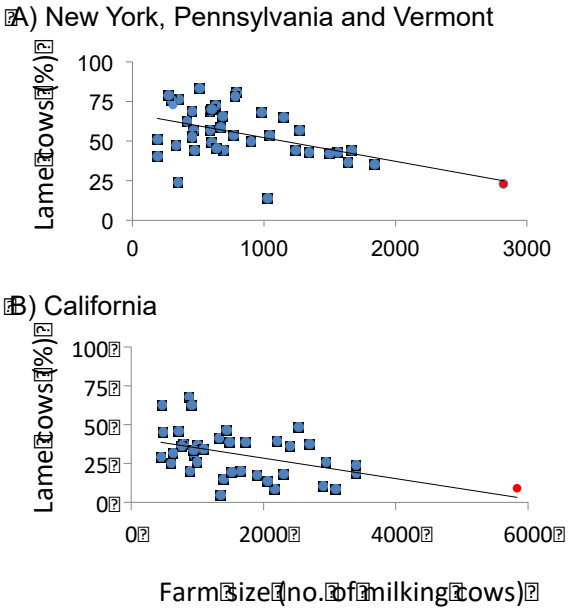

Figure 2. The percentage of lame cows in relation to farm size in two different regions of North America, three north-eastern states (New York, Pennsylvania and Vermont) and California. In both regions the percentage of lame cows declined with increasing farm size. In both regions the largest farm (indicated with a red dot) was at low risk, but the negative relationship with farm size persists even if these largest farms are not included in the analysis. Data redrawn from the Chapinal et al., 2013.

Welfare risk on larger farms

Are technologies inherent to large farms detrimental to the animals?

Technology can sometimes be seen as the antithesis of care, with compassion and the individual care of people replaced by cold, uncaring stainless steel, plastic and silicon. Imagine a milking parlour in a large, modern farm. All you see are workers, equipment and individual partitions. You have to look closely to see the cows' legs (and more importantly their udders) peeking out from beneath all the hardware and technology. This has to be bad for welfare, right? If we consider the tie-stall barn, which is an alternative system still common on small farms around the world, cows are still milked in their stalls, often with far less hardware and software, but this also means that the cows are often restrained in their stall 24 hours a day, sometimes even 365 days a year with little or no ability for social contact and self grooming. Thus, the technology of the milking parlour comes with loose housing for dairy cows, providing the animals much greater control of their environment (including when to go and eat, to socialize with other cows, scratch that itch on her rump, and when to lie down in a stall, even deciding which stall they wish to use). Indeed, the next phase in technology (the use of milking robots), allows even greater control by the cow, as now she can also decide if and when she wants to be milked.

Similarly, the use of automated milk feeders for calves facilitates the use of group housing for these animals, and thus allows farmers to move away from the relatively barren individual stalls and hutches that have been commonly used on dairy farms. Automatic sorting gates can also be used to more easily allow cows access to pasture at certain times of day and when conditions warrant. Automatic brushes, now becoming common on dairy farms, allow cows to use technology to seek out grooming when they choose, and to groom the parts of their body that they choose.

In addition to benefits in terms of autonomy and freedom of movement, technology can also have practical applications that focus on improving aspects of animal health. Much new technology is designed to provide real-time assessments of animal health, allowing for more rapid and more accurate diagnoses and treatment than is the case when animals are dependent upon human caregivers. For dairy cattle much of this technology has been based in the milking parlour or milking robot (and directed at the assessment of udder health), but new technologies are also used to assess cow lying times, rumination and feeding behaviour, and these measures may be helpful to assess other aspects of cow health. One especially creative aspect of animal welfare research has been in the development of methods to 'hack' existing systems (such as automatic milk feeders for calves) to extract new information that helps identify problems with cow health or welfare. For example, De Paula Vieira *et al.* (2008) were able to extract data on the number of non-nutritive visits from automated calf feeders, and then used this data to identify when calves were hungry.

In this last section we have left you with the sense that technology can be used to increasingly supplement the care of humans. Although the examples we have outlined above highlight positive examples (where the technology does new tasks, or does existing tasks better than can human caregivers), it is possible that the reduced contact between people and animals that is often associated with larger farms disadvantages the animals in other ways. We now turn to this idea in the next section.

Are the standards of care provided to individual animals lower on larger farms?

Somewhere perhaps deep in our ordinary conception of what makes for a good life for farm animals, and for the people that care for them, is the idea that the contact and connection between man and beast enriches and improves their lives. If this is true then large farms will likely be worse of in terms of welfare, as one common feature of larger farms is a high animal to caregiver ratio.

Despite the importance of this idea, there is very little work that has tested the nature of the relationship between farm animals and farm workers and how this relationship changes with increasing farm size. One study measured how willing cows were to allow people to approach, and used this measure to infer how fearful the cows were of the people (Waiblinger and Menke, 1999). Approach distances varied widely across the 35 farms assessed, from zero (the people were in direct contact with the cows), to an average of almost 2 metres. However, this approach distance showed no relation to farm size. Although this Austrian study used relatively small farms (fewer than 100 cows) compared to modern North American standards, the results suggest that there is no simple positive relationship between the quality of the cow-caregiver relationship and farm size.

More work has been done on the types of inputs provided to cows (in the current jargon of animal welfare science, 'facility-based measures'). Again, let us turn to the statistics compiled by the USDA. These show that larger farms are, for example, more likely to use a designated calving area, more likely to systematically evaluate dystocia, more likely to feed colostrum more rapidly, and more likely to assess the quality of the colostrum-feeding practices (USDA, 2007). Taken individually, each one of these features may not be essential for good welfare, but in combination they point, if anything, to a more positive situation on larger farms. One factor potentially accounting for some of the variation in all these features is the quality of advice the farmer receives. The norm in the dairy industry is for the farmers to have a close and on-going relationship with a veterinarian who can provide such advice. Unfortunately, smaller farms are also less likely to work with or to consult a veterinarian on a routine basis (USDA, 2016).

This use of professional services is, perhaps, one indicator of professionalism in larger farms. Other practices associated with professionalism may include the use of standard operating procedures, the use of standardized training, the hiring of specialized staff with specific qualifications and training, and articulating, measuring and incentivizing specific management

goals (such as the percentage of calves that receive appropriate colostrum feeding and thus acquire passive immunity for the colostral antibodies). Some work has shown that larger farms are more likely to use such practices (e.g. Beggs *et al.*, 2015; showing that larger Australian dairy farms have more trained staff), but more work is required to understand if professional attributes more generally scale with farm size, and if they do, the extent to which positive aspects could be extended to smaller farms using farmer training and industry incentives.

Are beneficial practices less likely to be used on larger farms?

Although we could not identify good evidence that the standard of care declines on larger dairy farms, it is possible that at least some especially beneficial practices are impossible or impractical once farms reach a certain critical size. One of the most discussed examples of this type of practice is the availability of pasture for dairy cows, in part because access to pasture is closely linked to good welfare in the minds of both farmers and the public (Cardoso *et al.*, 2016; Schuppli *et al.*, 2014).

Once again, the USDA (2016) statistics are telling, but in this case, they actually conform to our negative expectation concerning farm size (**Figure 3**). A large number of the smallest farms do provide lactating cows with some access to pasture, and even among intermediate-sized farms (less than 500 cows) some pasture access is common. However, on the largest farms (those with more than 500 cows) pasture access is the exception.

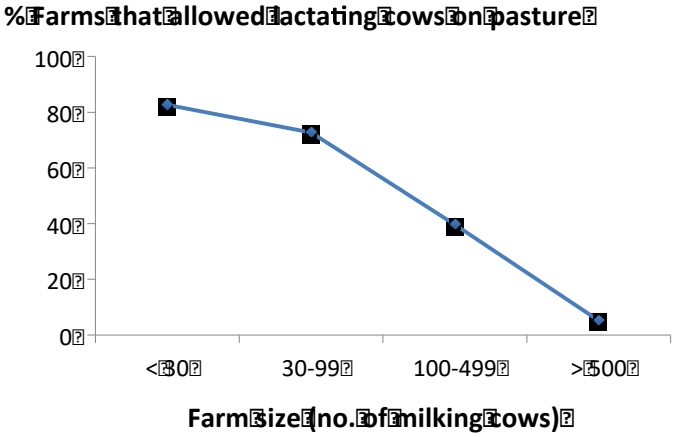

Figure 3. The percentage of farms that allow some or all of the lactating cows access to pasture in relation to farm size (number of milking cows). Data are adapted from the USDA, 2016.

This decline in pasture access with increasing farm size may be due to a number of factors, including the logistical difficulties involved in providing meaningful grass availability within easy walking distance to that many cows. If so, this suggests that there is some upper limit to the number of dairy cows that can be housed in a single barn and still allow for meaningful pasture access. Of course, on larger farms animals could be subdivided into smaller barns (perhaps each served by an individual milking robot), and thus still allow for the efficient use of pasture. Also, from a welfare perspective, although cows like to spend time outside on pasture, they prefer to eat the prepared diets available indoors (Legrand *et al.*, 2009). This allows for systems that separate the practice of pasture access from the practice of feeding grass, and opens up the potential of welfare friendly systems using more resilient (to heavy usage) but less productive grass varieties that allow for greater access to pasture by more cows.

Perhaps more importantly, we need to provide clear guidelines to farms about the types of practices that we (as a society) consider essential for our farm animals to have a good life. If some type of meaningful outdoor access is one such criterion (and we believe it is), then farms of different size will need to develop their own solutions for how best to include this practice, taking

into account all the specific constraints of the individual farm. This may pose an additional challenge to large farms, but does not inherently mean that larger farms will be associated with poor practices or outcomes.

Closing remarks

In summary, we have reviewed some of the main arguments concerning why larger farms are perceived to provide farm animals with a poorer quality of life. Using examples of research on dairy cows, mostly taken from our group, we have shown that the relationship between farm size and cow welfare is not necessarily negative. Indeed, in some cases it seems that larger farms are able to provide for better welfare of their cows, as we initially illustrated with the data showing declining lameness rates with increasing farm size. We also showed how larger farms often preferentially benefit from technology that can, at least in some cases, improve welfare and that larger farms benefit from more professional management that can reduce some welfare risks. Nonetheless, we also discussed how larger farms maybe less likely to use some positive practices, like providing their cows pasture access.

However, in none of these cases do we see farm size as inherently associated with welfare. Smaller farms can sometimes benefit for positive technologies and practices first adopted by larger farms, or at least can use some of the lessons learned in terms of these benefits (such as early and more effective disease diagnosis). Indeed, some of the costs of developing professional procedures (such as the development of detailed standard operating procedures) can be preferentially borne by larger farms but then transferred for adoption to smaller farms.

Ultimately, we encourage readers to shift their focus away from size per se, and onto practices that can benefit animals on all farms. This will prevent the stigmatization of farmers simply on the basis of the size of their herd, and encourage a more positive discussion on what features can benefit the welfare of animals on all farms.

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XV
Initiatives and achievements by farmers and the livestock sector in favour of animal welfare

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Abstract

Driven by citizens' concern and supported by the European legislation, animal welfare has become a non-negotiable issue for livestock breeders. Initiatives and achievements are numerous and diverse in their approach to reduce behavioural restrictions. To name a few, calf rearing has evolved with the introduction of collective pens, laying hen production has been transformed thanks to enriched cages, loose housing or aviaries, and tethering and individual cages have been banned for sows and force-fed ducks. Concurrently, a large number of specifications, codes of practice and assurance systems have developed. Following the results from European projects such as Welfare Quality® or European Food Safety Authority (EFSA) reports that have shown the benefits of an approach to welfare with animal-based measures when investigating risks of multifactorial origin, the animal-centred approach is now implemented in projects managed in the poultry, pork and dairy sectors. In the future, new technologies in precision livestock farming will enable earlier detection of behavioural problems, improved risk management and lifetime traceability of animal welfare. To conclude, we reiterate that the human-animal relationship is relevant to the search for solutions to improve animal welfare but also systems efficiency and the implementation of practices to reduce the need for therapeutic methods. Progressively, it is also taking a central place in reference guides and training content.

Introduction: Livestock breeding in France and animal welfare

1. Reminder of the roles and challenges in livestock breeding in France

Livestock breeding is a major activity in France, both in terms of the economy and land use. France is Europe's largest producer of cattle (22% of European production), eggs and chickens (14% of European production each), the second largest producer of milk after Germany (17% of European production), the fourth largest pork producer (9%) and the fifth largest sheep producer (8%) (Eurostat data). The livestock sector represents 37% of French agricultural production in terms of turnover excluding subsidies, which places it just behind the wine and liqueur sector. The dairy sector also has a strong positive impact on the trade balance with a net balance (difference between exports and imports) of €3.4 billion in 2014 (Agreste, 2015). The livestock sector also significantly contributes to employment. A specific quantification carried out by the scientific interest group (SIG) Élevage Demain (Lang *et al.,* 2016) shows that the livestock sector represents 703,000 full-time equivalents (a little over 800,000 jobs in total), namely 3.3% of the active French population, of which half are directly employed in livestock and half indirectly (agricultural supplies, feed, buildings, collection and processing, industrial supplies, veterinarians, training, etc.). This figure is all the more important given that it largely covers jobs in rural areas where there are often few job opportunities, meaning the livestock sector contributes significantly to the vitality of France's territories. Metropolitan livestock breeding also contributes to biodiversity conservation by using 11.5 million hectares of permanent pasture, paths, etc. and 2.7 million

hectares of seeded pasture (in total, 45% of France's utilised agricultural area (UAA)). These surfaces and associated structures (field edges, hedges, embankments, ditches, etc.) are a source of specific and genetic biodiversity (botanical, invertebrates, microbial) and are home to wildlife.

But French farming is in great difficulty, on farms and in downstream industries alike. These difficulties are undeniably greater for meat than milk and dairy products, even though the current crisis illustrates the fragility of these balances. This drop in the sector's competitiveness can be explained by the deterioration of the meat trade balance, which dropped from €0.27 billion in 2000 to -€1.58 billion in 2014. At the same time, the dairy sector's trade balance increased from €1.84 billion to €3.17 billion (Agreste, 2015) which places this sector just behind wines and liqueurs and cereals. Animal production is also losing ground in terms of volume with a decrease in production (pork: -5%; poultry bred for meat: -20%; veal: -20%; beef cattle: -9% since 2000). There are several reasons for these difficulties. Against a backdrop of rising agricultural production costs, the liberalisation of the global trade in agricultural and food products, and widespread public distrust of the agricultural sector in general and livestock breeding in particular (protest against "large-scale farming", opposition to biotechnologies and the opening of new farms, greater coverage by TV, radio, press etc. denouncing "the industrialisation of agriculture", criticism of meat consumption), farmers are struggling to generate enough revenue to invest, upgrade and innovate. In addition, livestock breeding businesses are still much smaller in France than in most of the competing production areas, which limits economies of scale and makes it harder to generate a return on their investments. For example, by 2007, farms of more than 1,000 fattening pigs already represented 81% of production in Denmark, 75% in Spain and 63% in the Netherlands compared to only 43% of pig farming in France (IFIP, 2013). Downstream companies (transport, slaughter and processing), often small and medium-sized enterprises (SMEs), also have very small profit margins and, due to a lack of finances, are unable to carry out the necessary steps to upgrade and innovate, although these very same SMEs are the lifeblood of the local economies. The sector is subject to stiff European competition, whereby certain areas have benefited from more lenient regulations (cost of labour in Germany, for example) and excessive specialisation in mass-produced products where the "end product price" remains the key competitive factor.

2. The issue of animal welfare

The modern concept of animal welfare came about in the 1970s. The following 40 years profoundly changed French and European livestock breeding with the almost widespread abandonment of the most restrictive systems for animals, such as calves in small individual cages or tethered sows. On an ethical level, European policy on animal welfare has proven to be effective as well as insightful given changing attitudes worldwide. This policy could only be introduced because farmers were willing to make changes for a goal they work towards on a daily basis.

Today, the sector must address the two core issues of improving animal welfare and eliminating pain in order to meet the demands of our citizens, who are increasingly mindful of livestock breeding and slaughter conditions. Many associations recommend that livestock breeding and processing practices are improved (Delanoue and Roguet, 2015). Citizens' animal welfare expectations focus on several simple principles of obligation of means: restricted size of farms, low animal density, freedom of movement, supply of moveable materials (notably straw), access to separate areas of buildings (for feeding, sleep, exercise) and above all, fresh air (small courtyard or outdoor areas for granivores, pasture for herbivores), and absence of mutilations.

The French livestock industry is somewhat ambivalent to this issue, which our citizens sometimes have trouble understanding. Given the range of livestock breeding methods (access to pasture and paths, diversity of biotopes, etc.) and the existence of small family businesses (comparative to other European production areas), the French people's expectations in terms of

"naturality" are partly met (for example, Label Rouge chickens). However, these advantages can also become weaknesses where investments are needed, given the financial constraints mentioned above - and the smaller the business, the greater these constraints become - but also because progress needs to be made in several hundred thousand farms spread across the country, as the sector is much less densely concentrated in France than it is in rival production areas, and much more varied in terms of livestock species and consequently in terms of specific requirements that need to be integrated into the approach. This requires heavy investment from the sector in terms of human and financial resources but also knowledge and time.

The principles of agroecology applied to livestock breeding were recently described (Thomas & al., 2014). Animal welfare can and must be seen as a component of agroecology applied to farming systems, as should the related integrated management of animal health, control of functional biodiversity or management of element fluxes (nitrogen, phosphorus, carbon) to reduce emissions. Animal welfare is a natural process that needs to be expressed as well as possible in order to develop sustainable, efficient farming practices that allow the farmer to feel like his/her work is valued. For example, it has been established that group changes in cattle (cows or young bulls) reduce production over periods of various length (for example, Mounier & al., 2005). Livestock breeding systems must reduce constraints on animals as much as possible and respect their behavioural repertoire and animal-environment interactions. There is no opposition between the introduction of more ecologically neutral systems and the improvement of welfare through an ethological approach to animal husbandry, as demonstrated by the changes to broiler chicken runs or improvements to pasture through grazing, for example.

This text aims to analyse the strategic commitment priorities of farmers and the livestock sector to improve animal welfare and eliminate suffering in farming during live animal transport and slaughter. It also aims to describe what new understanding needs to be achieved in order to make further progress on the issue of animal welfare. The few examples cited do not constitute an exhaustive list of what has been achieved. Various initiatives and projects have been undertaken in order to develop new farming systems, as shown by the labels regularly awarded by animal protection associations.

Sector initiatives and achievements for livestock breeding conditions

1. Implementation of European regulations

Europe took on board the issue of animal welfare in 1976 with the European Convention for the Protection of Animals kept for Farming Purposes. This Convention stipulates that the farming environment must comply with the biological needs of the farmed species, at least with regard to the current understanding of its needs. This Convention led to several recommendations (for cattle, pigs, ducks, turkeys, etc.), put to the signatory parties to the Convention (including the European Union (EU)). In accordance with this convention, the European Union adopted several directives (calves, laying hens, sows) or recommendations on a Union-wide level (cattle, sheep, pigs, ducks, turkeys, etc.). The directives take steps to remove housing that induces major behavioural restrictions for animals (individual cages, bare cages, tethers) and painful interventions or at least the use of induced pain (castration, tail docking, etc.). At the same time, several EU regulations and directives have addressed transport and slaughter conditions. Prompted by new insight, the EU opened the path to a renewed approach to the issue in the 2000s by including animal-based and result-based objectives (directive on broiler welfare) along with obligations of means in the field of housing, and by supporting ad hoc scientific projects (Welfare Quality®, AWIN).

Europe can now been seen as the most advanced region in the world in terms of farm animal welfare. America became aware that it was falling behind on the issue and in 2015 the National

Research Council (NRC) published a manifesto calling for further research into livestock production in order to increase productivity in a sustainable development context, paying more attention to animal welfare in particular. American standards are well below European standards and today the US sees this as a competitive edge for European exports in a global context where there is an increasing worldwide demand for animal products.

2. Progress made through regulatory changes

Since the early 1990s there has been progress in nearly all sectors thanks to changes to regulations and standards. Initiatives and achievements are numerous and diverse in their approach. To name a few, the introduction and widespread use of collective pens for calf rearing, laying hen production being transformed by enriched cages (perches, nests), loose housing or aviaries, duck farming where individual cages are no longer allowed, pig farming where sows are allowed to live in groups (currently affecting 80% of sows) except, of course, during birthing where priority is given to reducing the risk of piglets being crushed. These changes have required heavy investment from the sector, with very few government subsidies, unlike investments made to control pollution. Technical institutions have been able to quantify the level of investment. The figure reaches approximately €98 million for the veal sector (Mounaix & al., 2007), $1 billion for laying hens (and not all "chicken" farms are entirely up to standard), €100 million for ducks and $250 million for the pork sector. Other livestock sectors are not directly concerned by these regulatory changes given that they have already made strong commitments, as is the case in organic farming.

3. Initiatives taken by the livestock sectors

In addition to the regulations gradually being put into place and evolving, some sectors have taken a proactive approach and made voluntary commitments. This is the case with the introduction of a charter on sheep and cattle farming processes. This farming charter mirrors that of the "Red Tractor" scheme set up in the United Kingdom in the 2000s, which is often cited as an example. The information required for the two schemes is nearly identical (figure 1). Initially, the Red Tractor scheme was made to create added value by promoting animal welfare as a means to cope with the lack of competiveness of the livestock sector.

Figure 1. Comparison of the French good practices charter and the Red Tractor scheme used in the UK

Red Tractor	French good practices charter
United Kingdom	France
Around 11 500 dairy farmers and 24 700 sheep and beef farmers	Around 90 % of French cattle farms
Cleanliness of animals	Cleanliness of animals
Ventilation of the premises and natural light Daily physical activity for tethered animals One stall per cow and recommendations on surface needed per animals	Ventilation of the premises and natural light Tether accepted all year round/ Tether accepted but not all year round
Housing conditions adapted to minimise injury risks	Housing conditions adapted to minimise injury risks
Natural or artificial shelter in pastures	Natural or artificial shelter in pastures
No use of cattle prod and adapted restraint techniques	Handling without cattle prod and adapted restraint techniques
Disbudding and dehorning under anaesthesia	Disbudding recommended and use of analgesic when dehorning

These schemes can also be applied on a world scale as the guide on good practices in dairy farming shows (International Dairy Federation Guide, 2008) for animal welfare in dairy production, 2008 (Rev. sci. tech. Off. int. Epiz., 2009, 28 (3), 1173-1181). Key economic actors, the industrial players are now trying to work on standardising World Organisation for Animal Health (OIE) recommendations in terms of animal welfare on an international level. As a result, food industry players are behind an ISO standardisation project with the aim of formalising the rules of implementation for OIE animal welfare standards.

Other networks have been built in France around the product quality - animal welfare pairing. This can be seen with label initiatives, which are primarily aimed at improving the gustative quality of the products but also respect for animal welfare and the environment. The most famous of these is the 'Label Rouge' brand, whose primary aim was to provide a better quality product (in comparison to standard products) and which is now explicitly linked to improved animal welfare and environmental qualities. For example, for some time 'Label Rouge' broiler chicken or laying hen breeders have been setting the benchmark in terms of welfare and are committed to being proactive in providing runs that meet the behavioural needs of the birds (Mirabito *et al.*, 2002; Lubac *et al.*, 2003) or more generally ensuring the sustainability of their systems including environmental aspects and biodiversity (Lubac *et al.*, 2016).

It is however important to note that this labelled production initiative is very French, even though it is also being developed somewhat in Italy and Spain. In other European countries, Germany for instance, progressive improvement systems have been implemented by the livestock and distribution sectors, which inevitably results in a more expensive product for the consumer (Roguet *et al.*, 2016).

In France, initiatives can also be taken by cooperatives or distributors who want their suppliers to exceed current regulations. This is the case of the Cooperl cooperative in Brittany, which has a network supplying intact (non-castrated) male pigs. The main purpose of castrating male piglets is to improve the quality of male pig meat by removing odours due to sex hormones (androsterone and to a lesser degree skatole), which most consumers find repellent. In Europe, 80% of male piglets are castrated. In France, as with most other European countries, castration is done surgically, without anaesthesia or pain relief. It is sometimes done by chemical immunisation (less arduous for the animal). Welfare is improved by eliminating the pain of castration (Le Neindre *et al.*, 2009). The Cooperl cooperative supply chain has eliminated all animal castration, whether surgical or immunochemical. The carcasses are sorted at the time of slaughter and any pieces containing too many odorous compounds are removed from the meat market and recycled as processed products because the processing greatly reduces consumers' ability to detect the odours. This strategy requires a change in farming practices (separation of sexes, increase of available space) in order to protect the other pigs because intact males are more aggressive (Prunier *et al.*, 2013).

Supermarkets can also become key actors in the area of animal welfare by imposing certain standards. The supermarket chain Carrefour has been offering a greater range of alternative products. Carrefour-Belgium seems to be more proactive than Carrefour-France with regard to welfare, offering non-battery farmed rabbit meat, for example. The sale of free-range eggs is also growing rapidly. The success of this market is due to the small difference in price, as the price of an egg itself is very low.

In fact, a large number of specifications, codes of practice and assurance systems have developed. The combined technology network (RMT) on animal welfare and farming systems (*Réseau mixte technologique "Bien-être animal et systèmes d'élevage"*) recently produced a summary of these various systems which clearly shows the diversity of approaches and goals.

4. Individual initiatives taken by farmers

Some farmers have taken individual steps to implement projects to develop alternative paths at the level of their farm. These strategies give priority to improving animal welfare, which drives changes in production but is also generally paired with other goals, particularly the reduction of the negative impact of farming on the environment and a desire to improve the quality of their products (and therefore has an impact on prices). The most high-profile example is certainly that of Thierry Schweitzer's pig farm in the Bas-Rhin region. Schweitzer chose to produce "*in keeping with society*" as he puts it, using a farming system entirely based around the welfare of the animals: sows raised in groups and housed on straw, then allowed outdoors so they can build their nests for birthing, no systematic teeth cutting and no surgical castration, which is replaced by immunological castration, all while respecting organic farming specifications. A pork butchery was created to process products from this farm and the farmer has his own selection of "organic" products, all of which he sells under the Schweitzer label. This type of change to the system shows that pioneering farmers can successfully undertake radical changes themselves and create niche markets, at least in the beginning. They must be encouraged and rely on consumers' willingness to pay. However, we still need to satisfy the majority of consumers who demand the lowest prices possible.

Handling of pain in farms and slaughterhouses

1. Potential improvements to avoid sources of pain in farming

Changes in farming conditions seen in Europe and North America over the past 50 years have led to widespread practices such as dehorning, castration (pigs, calves, sheep, chickens, done through caponisation for the latter), docking (cattle, sheep, pigs) or debeaking. These mutilations are often justified as a means to reduce the risk of illness or injury from other animals (pecking, cannibalism), improve product quality (castration in pigs, cattle and chickens produces more marbled meat with a sensory quality preferred by consumers), or make farm work safer (dehorning for example) or easier. These practices however cause pain to the animals. There was a significant shift in the social, political and scientific context around these issues following the *Rencontres Animal et Société* event[1] in 2008 in France and the collective scientific report on pain in animals compiled in 2009 by INRA at the request of the French Directorate General for Food (Le Neindre *et al.*, 2009).

There are alternatives but this is not always the case, and these alternatives themselves come with drawbacks. For example, in pig farming, physical castration may be replaced by immuno-castration (a vaccine has been authorised in Europe since 2009) but this technique has met with consumer reluctance towards a vaccine designed to suppress sex hormones. Carcasses also need to be checked to verify that the immunisation was effective after vaccination and all boar taint has been removed. As it stands, there has been little documentation of the vaccine's effects on animal welfare. From this point of view, the aforementioned Cooperl initiative that examines the issue of castration at a supply chain level is interesting.

There are also alternatives to tail docking. Tail docking of dairy cows is an interesting case of a very old, painful practice that was abandoned without any economic or health repercussions after it was demonstrated that there would be no adverse effect to udder cleanliness if it was not done. In pig farming, tail docking prevents tail biting, which is a behavioural disorder. Environmental enrichment through provision of bedding and maintenance of stable groups reduces but does not entirely eliminate the risk of this. Tail docking is not practiced in organic farming, where animals are reared on bedding. For laying hens, it is possible not to debeak the White Leghorn breed, although there is still a risk of occasional episodes of pecking and cannibalism. However, this

application, used in the Netherlands, is not available in France, where the consumer mainly buys brown eggs. Projects (Casdar funding[2]) involving various stakeholders are being carried out to make the use of these farming prevention factors more popular.

Sector-led initiatives can help improve the situation where there are no alternatives. This is the case for dehorning in cattle which, when practised without analgesia or anaesthesia, is known to be painful. An operational project involving all actors (farmers, veterinarians, technicians, trainers, scientists, non-governmental organisations (NGOs), government) was conducted in France as part of the combined technology network on animal welfare and farming systems. Officially, dehorning was to be done by veterinarians but in practice, since 2011, farmers have been authorised to perform the procedure without any specific training. After taking into account the viewpoints from the various actors, this project led to a consensus between different actors (farmers and veterinarians) to facilitate the implementation of a pain management protocol that includes the use of local anaesthetic. The project also led to the experimental validation of a dehorning protocol (horning done as early as possible, with cauterisation of zones that produce horns at less than one month when horns are still absent), the development of practical guidelines and training methods for those performing the procedure (including farmers), test training sessions and an analysis of changes in farmers' practices before and after training. The project actors received government backing and the programme will be gradually rolled out with support from interprofessional and professional training organisations.

2. Limiting pain at the time of slaughter in farm animals

Animal slaughter conditions are a key point in how farming is accepted by our Western societies, not only in terms of respect for the animal but also due to food safety concerns. European and national regulations provide a framework to protect animals at the time of slaughter.

In France, the slaughter of livestock for consumption purposes is regulated by Articles R214-63 and R214-72 of the Rural Code. Article R214-67 stipulates that all slaughter areas, installations and equipment must be designed, built, maintained and used in such manner as to spare animals from any preventable agitation, pain or suffering. Particular provisions are provided in the Rural Code (Articles R214-73 to R214-45) for ritual slaughter (animals are not systematically stunned before being bled). This must take place in a slaughterhouse, after mandatory mechanical immobilisation for sheep, goats and cattle, before and during the bleeding. Bleeding must be done by a priest authorised to sacrifice by certified religious organisations. Current knowledge does not allow us to confirm the existence or absence of pain associated with this practice.

While stunning has been mandatory since the mid-1960s in France, the latest text adopted on the subject, the Council Regulation (EC) No. 1099/2009, imposes a performance target and requires that the animal has been rendered insensitive, which must first be verified by systematic checks followed by representative sampling. This high standard of quality is strengthened by the need for companies to appoint an animal protection manager, develop standardised operating methods and internal control procedures; while responsibility remains with the administrative control authority. From 2008 onwards, the French livestock sector addressed these issues through a joint project that led to a collective formalisation of control regulations (amounting to a complete overhaul of some procedures) for operations in the restraining-stunning-bleeding cycle and internal control procedures by producing a reference guide on slaughterhouse good practices. All actors and stakeholders involved in the issue in any way were involved in achieving the performance target. After a draft version of the guide was compiled, it was then reviewed by various sector actors, the French Directorate General for Food (DGAL), NGOs involved in the protection of animal welfare as well as representatives of various religious faiths. Following these discussions, a more detailed document was produced and appraised by the French Agency for

Food, Environmental and Occupational Health & Safety (ANSES) before the final version of the *Guide des bonnes pratiques* (good practices guide) was validated by the DGAL and submitted to the European Commission. It is important to note that the whole process was very long because the initial working group was set up in 2008 and the DGAL's final validation did not take place until 2014. To our knowledge, this is the very first guide of its kind at a European level resulting from a wide consultation beyond sector actors.

The good practices guide for managing the protection of cattle in abattoirs (2014) is now a reference tool for cattle professionals and will soon be validated for the sheep and pig sectors (a poultry guide, *Guide de la filière volaille,* is currently being drafted). Other than their technical content, these guides have prompted a variety of research that has improved our knowledge of the area. This is the case for stunning methods, for example, the use of a stunbolt gun for cattle in conventional and ritual slaughter, or electronarcosis settings for sheep and poultry. It is also the case for the development of loss of consciousness indicators (a project being developed to provide an automatic support system for cattle and pigs, indicator and delay of loss of consciousness in ritual slaughter), and for restraint techniques (Borest project). This action was paired with training and assessment that in less than three years saw all operators receive their first training on the key areas of animal protection at the slaughterhouse.

Although subsequent efforts have been greenlit, there are still reports of derogations from animal protection, and in some cases serious breaches have been noted. These events, when proven, are of course no longer tolerable and were condemned as such by the sectors. A general inspection carried out by the government shows that there are very few such cases. It must be stressed that France is still rich and has 150 small local slaughterhouses that are SMEs (CGAER, 2011) and supply retail butchers, meaning that greater value is added to local production, which contributes towards keeping the activity in often underprivileged areas that without the local farms and slaughterhouses would be deserted. Powerful industrial groups (Bigard-Socopa, Elivia, SVA, Tradival) on the contrary have modern, well-equipped slaughterhouses (often on an industrial scale). Even if there is not necessarily a correlation between the size of the business and bad practices, the businesses' diversity makes it difficult to systematically roll out good practices, where this often goes hand in hand with insufficient financial resources to introduce new tools (for example, small communal slaughterhouses) and the human factor. In particular, training agents must be a priority. This is a real difficulty and political choices must be made in order to balance compliance with good slaughter practices (and have them evolve in the future in light of new findings) and the need to maintain business activity throughout our regions while reducing live animal transport.

Management of welfare when transporting live animals

Animal transport is also the object of an impressive body of regulations. In France, this concerns 380,000 farms, approximately 1,500 traders and over 800 companies. It also concerns 1.2 million cows, 0.9 million sheep, 71,000 pigs and 7,000 horses. There are many reasons for transporting live animals. Other than transport to the slaughterhouse, breeders may sell their calves to fatteners, dairy farmers transfer their male calves to stockbreeders for fattening, horses are transported for competitions, etc.

There are very specific regulations governing road transport that include journey planning, vehicle equipment and duration and means of transport (breaks, food, water). Horses, for example, cannot be transported for more than eight hours straight. They need a break of at least one hour every eight hours to drink and rest before the journey can start again. They must be given 24 hours' rest upon arrival. Cattle transport is subject to the same regulations but with 14-hour transport shifts. The youngest animals (live weight of less than 100 kg) must have 0.4 square metres in the

lorry and the heaviest animals (700 kg or more) must be given at least 1.6 square metres. Piglets can be transported for 24 hours straight (while of course respecting the highway code that limits how long drivers can drive before taking a break) provided that they are given a permanent supply of water and that the animal density of the lorry does not exceed 235 kg per square metre. The spread of standards and good practices is achieved through similar training to that provided for slaughter professionals.

In 2007, with support from the Institut de l'élevage (French livestock institute), French professionals proposed a transportability assessment guide, a key component of animal protection during transport, which was then used as an example by European organisations (European Livestock and Meat Trades Union, Eurogroup for Animals, Federation of Veterinarians of Europe) to draft a European guide. A self-evaluation tool was developed to allow transporters to assess the quality of their transport. This involves an assessment of loading and unloading stages, an assessment of practices, and monitoring of animals and transport conditions during the journey. The tool is used on a voluntary basis and relies on a self-evaluation process that allows the driver to improve his or her practices.

International transport regulations require animals to be unloaded at control stations during very long journeys. The European Union agreed to provide significant funding for setting up "high quality" control stations (welfare, health, working conditions) by financing the development of an audit reference matrix and subsidising renovation programmes for around ten of these stations.

Better understand and assess to progress

1. Assessing welfare in farming using animal-based indicators

The issue of providing an objective assessment of animal welfare has been a common thread in research carried out in European countries for many years.

The Welfare Quality® project funded by the European Commission (2004-2008) has led to the development of European animal welfare assessment standards in livestock farms. The original nature of this project was to define a welfare assessment method based not on an obligation of means or the implementation of a practice (for example, cage size for poultry) but on animal-centred measures, which makes it possible to detect risks to welfare of multifactorial origins. The criteria chosen were based on scientific understanding at the time as well as societal expectations recorded by focus groups and citizen juries. The assessment criteria include feed conditions (absence of hunger and thirst), housing (thermal comfort, ease of movement, comfort at rest), health (absence of injuries, disease and pain) and expression of behaviours (social behaviours, human-animal relationship, other behaviours, emotional state). A final welfare score is calculated from these data. Assessment protocols were developed for pigs, cattle and poultry. The concept of welfare developed as part of Welfare Quality® has set the benchmark and has been used in most projects developed since then (for example: AWIN for the transport of horses, goats and sheep). Key methodological improvements have been made: the definition of 12 assessment criteria, the development of algorithms to progress from simple measurements to quantitative assessments on value scales, and the development of an original aggregation model to provide an overall judgement of the level of animal welfare at a farm.

This animal-centred assessment approach is today used by the livestock sector in France as part of several projects with funding of various origins (minister, sector, cross-sector actors, etc.) and involves all stakeholders to develop pertinent indicators recognised by all. The aim of these projects is to develop Welfare Quality®-inspired methods that are easier to use on the ground. To name a few, the "Ebene" Casdar project which covers poultry and rabbits, a project on pig indicators (INAPORC[3] funding), recent work carried out in the dairy industry at the initiative of the

NGO Slowfood backed by the European Food Safety Authority (EFSA). The list could go on with the many initiatives of this kind in France and abroad. These projects also aim to outline so-called "sentinel" indicators that are used to detect potential problems early on.

2. The use of new precision farming technologies

Visual animal scoring systems to assess their welfare can only be used at specific times whereas animals change over time and so do their responses. There are age and/or development cycle-based dynamics at play. The needs of a 10 kg piglet or a 80kg pig are not the same. There are also natural physiological cycle dynamics involved. Dairy cows are much more sensitive to mastitis at the start of lactation than at the end. New precision farming technologies and digital technologies can help us provide a near real-time assessment of the animal throughout its life (including at the time of slaughter) that is much easier for the farmer. These systems, due to their scanning frequency, can detect things the human eye cannot see. They can also provide continuous management and make it possible to act prior to problems in order to prevent them, but also provide a trace of an animal's welfare throughout its life. As with other human activities, livestock farming could benefit from these technological breakthroughs. For example, it is now possible to provide real-time measurements of an animal's body temperature, locate it within a building or outside, analyse its sounds and in the future recognise its expressions. Provided that this raw data can be analysed to generate reliable data (development of new indicators: biomarkers, behaviour and health monitors, augmented reality, etc.), it is becoming possible to detect problems one to two days before they appear and therefore act in advance. There are many possible applications. Other than the daily management of livestock, we must also look at what can be done through big data, such as adding value to data via a data-sharing and statistical analysis system, or developing new training and publication tools (online training, virtual reality), which would facilitate access to training courses and/or enrich the traditional content of current courses.

A project financed by the European Commission recently looked into precision farming and how it can be used to improve animal welfare and health. For instance, this project examined new real-time monitoring of broilers' behaviour: it is now possible to detect feed line problems or the mood in a building based on changes in animal activity rates and how evenly they are spaced throughout the building. Similarly, in dairy farming, by detecting cow activity (position of an animal in the stable using GPS-type technology) and analysing the daily profile of this activity and its changes from one day to the next, it seems possible to detect in advance the appearance of mastitis or lameness (Mialon *et al.,* 2015). Again in dairy farming, camera analysis of the movement and position of cows' feet can be used to detect lameness. This technology can also be used to analyse a horse's gallop or trot. These new technologies show great potential for making progress in the assessment and improvement of animal welfare. However, these are still only prototypes and for the time being, farmers are very pragmatic in the way they use systems proven to help them better manage their livestock (heat detectors, for example). While precision farming offers great hope, we must avoid falling into certain pitfalls such as "technology for technology's sake", which should first and foremost be at the service of animals and farmers. This means we must first set goals and determine which technologies are interesting/necessary to achieve these, while avoiding a proliferation of systems where there is no harmonisation of technical specifications or data validation methods, and where users lack training in these new tools, especially when it comes to detecting and managing risk.

3. Contribution of genetic selection

The possibilities offered by animal genetics are still to be explored. Several genetic selection paths are being explored to see how this could contribute to animal welfare and health. The most

important approach is to take into account so-called functional selection characteristics, such as sturdiness, resistance to disease (mastitis in dairy cows for example), calving ease and "hardiness" that can be defined as the ability to easily adapt to a range of farming conditions. Selection can also be done to eliminate painful practices, such as the genetic selection of odourless pigs to prevent castration of piglets, or hornless cows to prevent dehorning.

4. Need to acquire new knowledge

The first challenge is to better assess welfare. Welfare is a multidimensional concept that must be given a multicriteria assessment. To make progress in this area we need to combine animal-based indicators to assess the level of welfare with resources and practices to identify risk factors. More research needs to be done to confirm the robustness of the criteria used today and develop new ones based on continuous recording systems with data processing algorithms to detect problems early on. These assessment systems need to then be adopted on a large scale by all farms. The European Innovation Partnership set up as part of the European Horizon 2020 programme can be an effective tool for this.

The second challenge is to continue to improve animal welfare by improving farming conditions. Progress will also come from better understanding of animals' affective experiences, including their emotions, which should help develop innovative livestock breeding practices that take into account the cognitive capacities of animals. Acknowledging animal welfare in farming should not consist only of reducing stressful experiences and minimising constraints to which they are subjected but should also favour positive experiences throughout their lives, particularly by respecting their behavioural needs and interactions with other animals and the farmer.

Progress also requires innovative approaches because animal welfare is a sensitive subject that involves many stakeholders. Globally, welfarist NGOs want fast progress with animals having greater access to the outside, more comfortable buildings where animals have more space, and the end of painful practices. On their part, farmers would like to make progress but stress the economic constraints related to the investments required and lack of market recognition for improved products in terms of animal welfare. Joint progress approaches involving all stakeholders are undoubtedly vital for there to be a widespread acceptance and understanding of the issues and solutions at hand. INRA recently began setting up a *"Laboratoire d'innovation Territoriale"* (territorial innovation laboratory) for the Grand Ouest region (Normandy, Brittany, Loire) (LIT Ouesterel) dedicated to welfare and reducing the use of antibiotics in poultry, pigs, and dairy cows, the main livestock sectors of these three regions. With the help of public authorities, elected representatives, the sector and partner welfarist associations, the LIT Ouesterel now comprises public and private actors from the entire research, development, training/transfer, production and consumption continuum, in order to develop innovative solutions together. The aim is to jointly build new farming models and livestock sectors, sell animal products from these and re-establish connections between farming and society. The idea is to provide socio-economic and ethical responses for both breeders (knowledge, tools, training) and citizen-consumers (information, labelling and certification of products from these new sectors) in a virtuous collective circle. This experience, which improves the mutual understanding of actors who in theory have differing points of view, aims to publish its findings throughout France. In 2018, the LIT Ouesterel was one of the 24 winners of the Call for Expression of Interest launched by the *Secrétariat Général Pour l'Investissement* (General Secretariat for Investment) as part of the *Programme d'Investissements d'Avenir* (Investments for the Future Programme) to build a *Territoire d'Innovation de Grande Ambition* (Territory of Innovation of Great Ambition).

Conclusion

The acknowledgement of animal welfare and elimination of pain (dehorning, castration, tail docking, debeaking, etc.) have become more prevalent issues and are now central to the sustainability of farming. Livestock actors are aware of this and the first steps have been taken with normative approaches (norms in housing, space, temperature, hygrometry) as well as joint initiatives involving breeders, veterinarians, NGOs acting to improve animal welfare and public authorities. Today, approaches based on animal-centred measures have proven relevant, and a greater understanding of the state of the animal based on more accurate visual indicators and, more automatically, new precision farming technologies, has allowed us to imagine a new generation of progress, even if this should not lead us to overlook the importance of the "naturality" component that remains a key discussion point between stakeholders.

Livestock sectors can and must always do better. Much work remains to be done in terms of the expression of animals' natural behaviour and acknowledgement of their sentient nature. The joint approaches to making progress by involving all stakeholders are certainly difficult to set up but are vital for there to be a widespread acceptance and shared understanding of the stakes and solutions at hand, and have already proven their pertinence and effectiveness. The development of new participatory research tools such as the *"living labs"* are opportunities that must be taken in order to create innovative farming systems that incorporate animal welfare right from the design phase.

Spreading progress remains a difficult task due to the diversity of farming styles in France and the number of actors involved (300,000 farmers, 250 slaughterhouses). The improvement of welfare incurs extra expenses for farms as well as the livestock sectors at large. The various sectors therefore need to be able to create added value by, for example, the consumer agreeing to pay and/or new opportunities to export animal products to higher-demand, solvent markets. There are undoubtedly opportunities to be taken but demand is currently largely focused on cheap and convenient processed products.

Translator's notes

1. The *Rencontres Animal et Société* meetings were a concertation organized by the French government with members of the parliament and local elected representatives, agricultural professional organisations, animal protection non-governmental organisations, scientists and representatives of the ministries. Four topics were subject to discussion: the status of animals, animals in the city, animals, economies and territories, and bullfighting. Those meetings resulted in 4 reports with 56 proposals in total.
2. Public funding allocated to rural and agricultural development projects.
3. INAPORC is the national inter-branch organisation for the pig sector.

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XVI
Consumer information supplements the official (statutory) animal protection efforts in Switzerland

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Introduction

Take a conscious look at how farmers keep their animals in Switzerland today and you will be astounded. You may no longer find the traditional chicken on a dung heap, but luckily, we in Switzerland are still a long way from the industrialised and intensive animal husbandry methods that have long-since become established as standard in many areas of the world. In this country too, livestock farming operations are becoming much bigger than they were, and many technical systems (including robotic milking and computerised feeding units) are gaining ground here too. Nevertheless, animal-friendly forms of husbandry, such as open-bay barns and access to the open air and pastures are now also widespread; they are no longer the rare sight they used to be twenty years ago. In the interim, considerable sections of the Swiss agriculture and livestock industry have also differentiated themselves positively in comparison with other countries in terms of the wellbeing of their livestock and the living conditions of animals on their farms.

All the same, it is still true that "In the land of the blind, the one-eyed man is king". Even in our country, millions of animals live in cramped pens with no opportunity to spend time out of doors: calves are fed to make them produce pale meat, which means that they have to be treated with antibiotics more often than other categories of animal. Dairy cattle are pushed to achieve ever better milk yields, and sows give birth to more piglets than they have nipples to feed. It is quite legal to use bare bays to fatten bullocks and pigs, denying them any straw on which to lie or access to the open air. Our agricultural policy also intends to open the door to ever more foodstuffs that are manufactured under production and intensive farming conditions that we ourselves prohibit! This places enormous pressure on the nation's endeavours towards animal welfare.

We therefore still require action to be taken on animal welfare in the Swiss agricultural sector, and animal protection campaigners should not rely too heavily on the Swiss law governing animal welfare. Firstly, this was only put into effect a few years ago (in 2008), and many of the transitional arrangements still apply. Therefore, the political will for any revision will probably still be weak. We also need to bear in mind that the law on animal protection in Switzerland prescribes husbandry methods that are not particularly animal friendly. In reality, it simply prescribes the boundaries between what is and isn't allowed.

In the opinion of Swiss Animal Protection SAP, it transpires that the most efficient method of improving animal welfare involves a combination of market economy and statutory measures: the generation of consumer demand for (animal welfare) labelled products on the one hand and the promotion of animal-friendly forms of husbandry through specific, direct payments on the other. The following discourse is an attempt to substantiate this assertion, concluding with a demonstration of the need for action in market, agricultural and environmental policies.

SAP guidelines

First of all, here are a few basic principles that guide the engagement of our organisation with the market and with agricultural policy:

1. The first requirement in animal protection is for people to take responsibility for their own actions, with the State in second place. This is because animal protection measures may be prescribed, but they have to be put into practice on a well-motivated day-to-day basis by farmers and consumers in order for these statutory provisions to take effect for the benefit of the animals.

2. Consumers must be able to recognise the connection between their purchasing behaviour and the actual welfare of animals on farms. Consumers can only evaluate their purchasing behaviour and be prepared to pay the necessary higher price for products based on more animal friendly husbandry if they are properly informed.

3. Rather than preaching consumer denial, SAP advocates sustainable consumption. If we do eat eggs, dairy products and meat, then we should at least ensure that the animals concerned are kept decently and treated considerately. Office-based idealists would probably love to push filthy Mammon entirely out of the picture, but animal protection campaigners know that they have to keep their eyes on the economic realities. On the one hand, even the most animal-friendly farmers want to make a living from their animals, and on the other, even if consumers are highly motivated and friendly towards animals, they will not be able to pay unlimited amounts of money for their food.

4. This pragmatic point of view does not exclude SAP's strenuous efforts to achieve a reduction in the consumption of animal products, or to promote vegetarian and vegan nutrition. The simultaneous pursuit of both paths – campaigning for the sustainable consumption of products from animal-friendly husbandry systems, and demonstration of alternatives to animal products – is neither a contradiction nor an inconsistency. In fact, this is an absolute necessity for those animal protection organisations that want to be measured by the concrete improvements actually achieved for animals – in their stalls, during transportation and when they are being slaughtered. Real animal protection has to mean more than simply preaching and pointing a moralising finger, in some kind of a cheap show of the clean conscience of a better person!

5. People who earn their living from animals and from products of animal origin, who might be farmers, transportation businesses, butchers, retailers or the restaurant trade, all have a clear ethical duty towards animals, which they must fulfil within the constraints of their own environment and capabilities. SAP challenges the food industry on this point on a regular basis.

6. Good animal welfare lies in mankind's own best interests. There is a correlation between the welfare of the animal on the one hand and the quality and safety of the product on the other. According to studies carried out by the Swiss Federal Office for Agriculture and the Federal Veterinary Office, adherence to current labelling requirements and the directives contained in the national animal welfare promotion programme may improve the health of animals[1]. In some areas, they also increase the quality of the products (e.g. the directive on pasture for cows – an increase in CLA[2] and omega-3 fatty acids in the milk; free-range chickens – more moist and better taste) and food safety provisions (BTS/RAUS[3] pig farms demonstrate evidence of significantly fewer antibiotic-resistant microbes). Keeping grazing animals on pasture also reduces the emissions of ammonia and of carbon dioxide.

7. The State must take action to stop abuse and any practices or husbandry methods that violate animal protection measures; it must also pursue misdemeanours and enforce punishments (in relation to the law on animal protection). In addition, it must also intervene in those cases where the market malfunctions (i.e. where the market and consumers alone cannot put things right; this may be because no (animal welfare) labelled products are available or because the

market may even be promoting methods of keeping livestock that work against animal protection, as in the case of cheap imports from foreign intensive farming operations. This might be achieved by banning imports involving cruelty to animals, requiring an animal protection declaration on foods or promoting animal-friendly stall structures and outdoor rearing.

This activity on the part of the State for the benefit of animal welfare is legitimated by the fact that keeping livestock in a way that is friendly to animals is the most important concern of the Swiss population in relation to agriculture; we are also prepared to invest a relatively large amount of tax revenue for this cause.

The development of the animal welfare label in Switzerland

Let us now turn to the market and to consumers. When KAGfreiland[4] and Swiss Animal Protection SAP began to advertise and market Swiss Barn and Free Range Eggs specifically in the 1970s, they were the first to do so; no-one would then have predicted such growth for products from animal-friendly farming methods. At the beginning of the 1990s, "Experts" foresaw a revenue of no more than 2-5 % and the attitude of most of the agricultural associations was highly sceptical.

The breakthrough for the animal welfare labels came in 1989, with the collaboration between "Agri-Natura", the cooperatives organisations, now known as FENACO, and "Gourmet mit Herz", backed by the MUT Foundation and SAP. Konsumverein Zürich, which was later taken over by the Coop, offered a relatively wide range of "Agri-Natura/Gourmet mit Herz" labelled meat and eggs in its 70 branches. The highly satisfactory demand motivated Migros and Coop to develop their own equivalent label projects.

These subsequently acted as drivers for the further development of these special labels. Thanks to their use, free range eggs and labelled meat achieved the leap from niche to standard product after the turn of the new millennium. In the 1990s, Coop, the major Swiss retailer, issued "Naturaplan" (Organic) and "Naturafarm" (controlled by SAP), the most consistent and hitherto best-known labels. Coop's rival Migros has changed the names and requirements for the labels several times but has now gained continuity and credibility with "TerraSuisse" and the collaboration with the IP[5] farmers. Depending on the type of meat involved, the major distributors achieve a turnover of between 20 and 70% on label meat.

The example provided by the major distributors and the growing demand for products based on animal friendly farming methods has inspired other retailers to place more faith in label products. This applies to Manor, Spar and VOLG, for example. By now, Spar also offers restaurateurs an animal friendly range, through TopCC Shops. And even those newcomers from Germany (Aldi and Lidl) offer Swiss organic and free range eggs and a range of label meat, though this is still limited.

In the meantime, some consolidation has taken place among the labels. The wheat has separated from the chaff, the number of labels has grown smaller and they have become more transparent. The requirements of the Swiss BTS and RAUS animal welfare promotion programmes have been accepted as basic requirements by most labels, thus guaranteeing that the majority of the labels really do improve the lot of the animals.

Even though certain agricultural functionaries continue to denigrate the animal protection label idea, these animal protection programmes represent a minor story of success. They offer a livelihood to thousands of country people, improve the image of Swiss farmers, and appeal to millions of consumers who by now buy label products worth about 3 billion CHF every year. Most important of all, however, they have by now resulted in a significantly better life for many millions of animals.

Agricultural policy and animal welfare

Apart from consumers and the commitment of the retailers, the success of the animal welfare label has also been related to the complete overhaul of the Swiss agricultural policy undertaken in 1993. Specifically, animal welfare is only partly a marketable achievement, to be covered by the creation of labels and a corresponding demand from consumers. When it comes to many of the approximately 25 categories of animals used in agriculture, no animal welfare labels can be used to promote an improvement in animal husbandry via the market and consumer demand. This applies to all young and breeding animals, for example, as well as to sows, goats, sheep and horses.

For this reason, the Swiss Federal Government introduced promotion programmes in the mid-1990s with a direct payment system for forms of husbandry that were particularly friendly to animals. SAP lobbied strongly for this idea and pushed it through politically with the help of the environmental and nature protection organisations and the farmers' associations. In addition to the opportunities offered by the market, farmers were expected to take part on a voluntary basis in state-run programmes to promote animal welfare.

Animal friendly forms of livestock husbandry usually give rise to higher costs than those systems that simply conform to the law. They require more work and additional infrastructure (outdoor access, behaviour-appropriate facilities, etc.) and subsistence costs (straw for bedding rather than lying on the bare concrete floor). The additional costs are particularly high in the case of poultry kept for fattening, in that the selection of suitable breeds that will grow slowly and put on less meat means that only about half the fattened birds can be produced per pen and per year compared with conventional Swiss pens.

By covering part of the additional cost, BTS and RAUS contributions offer farmers a certain incentive to provide the socially-desirable added value in terms of animal welfare. The strength of this incentive depends primarily on the following three points:

- The motivation and sensitisation of the farmer towards animal welfare.
- The availability on the farm of infrastructure and accessories (e.g. pen systems; outdoor access; meadows; bedding).
- The synergy between BTS/RAUS and the market: is it possible to join a label scheme?

The ideal pre-conditions are: motivated livestock owners with farms that offer good structural conditions for BTS/RAUS, and who want to convert a category of animals that generate products for which there is a label to BTS/RAUS. Most of the farms currently participating in BTS/RAUS could offer two or even all three of the above pre-requirements.

The need for action in the retail sector

Migros and Coop, who were formerly the drivers of growth for animal welfare products, now seem to be marking time to some extent. Their strategy of offering the broadest possible range of products acts against the interests of the animal welfare range. By now, they have become just one range among many, from the cheap price ranges through a patchwork of special lines – Heidi, Anna's Best, Betty Bossi, Pro Montagna, Jamie Oliver – to premium ranges and children's lines. The advertising and PR budget for animal welfare products has thus melted away, and there is a risk that the interest and creativity of the management and the external credibility of the major retailers' engagement in animal welfare may suffer as a result.

We would like the major retail traders to reflect upon the values that are truly genuine and necessary in relation to the sale of food, where the focus should quite clearly be on production methods that are as close as possible to nature and as kind as possible to animals – regardless of whether the products are then sold in cheap, premium or eco ranges. Perhaps we also need to ask

ourselves whether customers and businesses are in fact well served by the current multitude of product ranges or whether they simply lead to an unnecessary rise in cost at the procurement and sale stages.

While Migros and Coop offer a relatively broad animal welfare range, this could be developed further in the case of most other retailers. For example, only a few retailers offer free range chickens or animal welfare labels on rabbit or lamb meat – replacing them all the more frequently with imported goods produced by intensive farming methods that are prohibited in Switzerland, leading us to repeatedly see "control" as a little-known concept.

SAP would like all the retailers to put the sustainability and animal welfare intentions they present so beautifully in their brochures and on their websites into practice, consistently and emphatically. This relates in particular to the information given to customers about the quality of the animal welfare products, as well as to their procurement policy. Customers should in future at least have a choice in each chain of shops. This also applies to discount chains such as Denner, Aldi and Lidl.

The need for action in the restaurant sector

The restaurant sector represents the largest development location for animal welfare in Switzerland. In 2008, over 13 billion CHF were spent on eating out in Switzerland. Half of all the meat eaten in Switzerland is consumed in restaurants! A quarter of all the meat consumed outside the home contains pork, making it the favourite type of meat away from home, closely followed by beef, with a share of 23%. The trend for poultry is growing, currently standing at a share of 18%.

Four restaurant businesses stand out with regard to their use of meat from animals that have been kept in a way that is appropriate for their species. Based on recommendations made by Swiss Animal Protection SAP, McDonald's (which has the largest turnover of any restaurant business in Switzerland) has, since February 2010, only used beef raised in Switzerland so that the animals have regular access to the outdoors (RAUS). In 2009, McDonald's Switzerland procured 3900 tonnes of beef from Swiss farmers, which corresponded to 4.5% of the beef consumed in Switzerland. Migros, Switzerland's second largest restaurant operator, has used label meat a little longer in its restaurant range. Coop Restaurants, number six in system gastronomy, also choses label meat relatively consistently.

The "Gout Mieux" foundation (www.goutmieux.ch) lists more than 70 restaurants that are committed to a consistent procurement choice of products from organic and animal-friendly origins. In 2016, SAP signed a cooperation agreement with the sv Group, the largest supplier of several hundred staff restaurants in Switzerland. This bound the parties concerned to the promotion of animal friendly products in the sv Group's shopping basket. The basis for this agreement is formed by a medium term plan with defined animal welfare targets for each year. Apart from its commitments regarding products of animal-friendly origin, the sv Group has also decided that it will no longer offer hormone-treated meat and that it will forego foie gras, frogs' legs and other products associated with animal cruelty.

The remaining around 15,000 restaurants, staff restaurants and fast food outlets in Switzerland tend to use few animal friendly products, offering their guests either conventional Swiss and (even more often) imported meat and eggs. The owners of these businesses are frequently not properly informed about the conditions under which livestock is kept at home or abroad, or about the various animal welfare labels.

Since almost half of the meat consumed in Switzerland is used by restaurants, it is extremely important that the gastronomy sector should at last recognise its responsibilities towards animals and their wellbeing! Plenty of guests would pay for these ranges. According to a SAP-Gastro survey in 2011, the owners themselves estimate the guests' animal welfare potential at 50%. We would

want all restaurants to at least use Swiss free range eggs and to offer two or three menus featuring label meat! In order to convey this message more successfully to the target group, SAP will run a specialist symposium on animal protection for the restaurant sector in 2016.

The need for action in agricultural policy

Animal welfare labels and corresponding marketable products cannot be produced and/or do not exist for about half of all animal categories, e.g. for all breeding animals, sows, sheep and goats. The synergies that operate so splendidly between labels and the market and the BTS/RAUS agricultural policy can play no part here. The incentive to convert to an animal friendly form of husbandry in these animal categories depends exclusively on the level of the statutory contributions from the BTS/RAUS animal welfare support programme. There is no market incentive involving purchasing agreements and an increase in price. When we then add in the unfavourable operational conditions, e.g. housing systems or even complete buildings that could be expected to involve major expenditure to cover the adjustments for BTS/RAUS (construction, infrastructure, costs, etc.), most of the current BTS/RAUS rates are far too low to represent a real incentive in business management terms.

The stagnation seen in BTS/RAUS participation since 2006 originates in these circumstances. This failure of the system works to favour animal protection minimalists and provides far too little support for animal friendly farmers. It is also completely contrary to the interests of the tax payers who finance the CHF 2.5 billion direct payments every year. They want to achieve a more powerful system of support for animal welfare, not to provide support for animal protection minimalists. This situation must change when the law on agriculture and the direct payment system are revised. More powerful support must be given to additional animal welfare provisions that are sensible from a professional point of view and are desired by our society.

The need for action in environmental policy

Over the past few years, scientists have frequently postulated a conjectural contradiction between the aspiration towards animal friendly outdoor rearing methods and climate protection targets[6]. We must therefore state right away that climate protection need not be contradictory to domestic animal husbandry! If we keep animals in a way that suits their species and stick to ecologically-managed agriculture systems, we will create the best possible conditions for success. This approach will also conserve resources – as long as consumers make their own contribution.

We need to differentiate between the industrial forms of animal production (which have unfortunately long-since become the norm in many European countries) and a rural method of keeping livestock that is adapted to suit the location and the relevant species, based primarily on animals that eat rough fodder, such as cows, other cattle, sheep, goats and horses, and can thrive without large quantities of concentrated feed. This type of natural husbandry on pasture land is not climate-relevant – in contrast to industrial animal production methods; in fact, it ensures that CO_2 is increasingly stored in the top soil on the ground. Neither do ruminant animals on pasture compete with human beings for food, since they use permanent grassland that is unsuitable for arable farming, as well as the types of grass and herbage that are inedible to humans. A rural form of animal husbandry with controlled management of the pasture and natural cultivation methods (as practised in organic and IP farms in Switzerland) therefore forms part of the solution to the climate problem – not part of the problem itself!

The use of corn, maize, soya, potatoes, turnips and so on to feed animals is not, in and of itself, bad. For example, poultry are the most efficient of the domestic animals at converting corn into meat (or eggs). The production of plants for human consumption gives rise to large volumes of leftovers, which can be used perfectly well by pigs, who are born “waste processors”. In contrast,

the growing use of feed concentrates for animals who eat rough fodder, particularly in milk and beef production operations, is extremely questionable.

It is true that Switzerland requires just 0.3% of the volume of soya traded worldwide while the EU and China alone consume sixty percent, i.e. two hundred times as much. Nevertheless, it is still worrying that the cultivation of vegetation for fodder is no longer promoted in Switzerland even though current crop breeding methods would make it possible climatically to grow soya here too. In fact, protein imports have tripled and soya imports have grown by a factor of ten. Far too many resources are also squandered unnecessarily in the production and distribution of food in Switzerland. This begins with the housing used for these animals. The extremely high performance demanded from livestock results in the lives of cows, pigs and chickens becoming ever shorter. As a consequence, more animals have to be reared each year to replace the previous generations as they are used up every more rapidly. This requires more fodder, more housing, more energy and more work, with ever greater wear and tear on the animals!

Very little is said about the fact that about 30% of the food produced worldwide ends up being wasted rather than used to benefit of human nutrition. At the current status of food production, this means that it would not only be possible to satisfy the appetite of every human being on the planet right now in principle, but we could also do so in 2050. In view of this, the argument for ever higher performance in our fields and stalls in order to feed mankind simply falls apart.

450,000 tonnes of meat are produced in Switzerland every year. At the same time, this gives rise to 220,000 tonnes of animal by-products; following our experience with BSE and the total ban on feeding livestock on meat and bone meal, these by-products are now mainly disposed of as waste, i.e. incinerated. Of course, we wouldn't complain about the ban on cannibalism, i.e. on feeding a particular species of animal with bone meal made from its own species, as was the case up to 1990. However, the current extreme waste of animal by-products as a resource should give us the impetus to consider some more sensible use, rather than sticking to incineration! After all, this ban is part of the reason for such a large increase in the ecologically questionable importation of feeding concentrates over the past ten years.

By now, the growing demand from affluent Swiss consumers for prime cuts has also led to a fundamental problem, in that it is becoming ever harder to make good use of the remaining parts of any animal that has been bred and slaughtered in this country. This affects animals from organic agricultural systems in particular – after all, customers for organic meat often want prime cuts! This unbalanced demand for prime cuts also requires more animals to be fattened and slaughtered. Livestock farmers try to take this trend into account and choose breeding lines with a high proportion of valuable cuts of meat, which exerts a negative influence on animal health and welfare in pigs and poultry.

The Goal: Switzerland, a country of free range farming

The goal of making "Switzerland, a country of free range farming" will be within our reach if we can develop the market for animal welfare products in the retail trade and the restaurant sector still further, and protect the extensive production methods used by Swiss agriculture on small farms against the competition provided by foreign industrialised factory farms, even in the face of the growing liberalisation of global trade. SAP is firmly persuaded that we can achieve this aim, as long as we all accept our responsibility towards animals in our own localities and according to our own opportunities.

References

1. ETH Zurich; Grangeneuve Agricultural Research Centre, Posieux (FR)
2. CLA = Conjugated linoleic acids
3. BTS = Particularly animal-friendly housing systems; RAUS = Regular exercise in the open air
4. A Swiss animal protection label with very high animal welfare standards (e.g. outdoor requirement and cattle required to have horns)
5. Integrated Production – minimal national animal welfare and eco label, now the de facto minimum standard in Switzerland
6. This discussion centres around the emissions of climate-damaging gases (CO_2 and methane) caused by livestock husbandry.

PART 4
Objectives for the future: finding alternatives, overcoming the shortcomings

XVII
Legally accepted pain and other poor welfare in animals

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Summary

Animals kept as pets or for farming, including all mammals, birds and fish, have pain systems and their welfare can be poor because of pain or fear. The extent of pain can be measured using physiological and behavioural measures such as thermography or grimace scales in sheep, horses and mice. It is important to evaluate the magnitude of poor welfare, a function of severity and duration.

In general, our laws prohibit treatment of animals that causes pain or other poor welfare. However, there are exceptions in laws for reasons of tradition, financial cost, gastronomic preference, convenience in management or breeding, or avoidance of other problems. Some activities that harm animals are considered to be "sport". For example the bull pierced by numerous lances in the corrida, the deer chased by dogs and by humans on horseback, or the dog or cock forced to fight. These "sports" have entirely negative effects for the animal. Another example is the animal killed during shechita or halal slaughter without prior stunning. The justifications for this are: tradition, edict from an interpretation of a holy book, and the mistaken belief that blood in a carcass is in some way unclean.

Evidence from welfare assessment studies shows that: cutting the throat without prior stunning causes up to two minutes of extreme pain. Castration, disbudding, or beak-trimming, without anaesthetic or analgesic causes pain for many hours, and often leads to more prolonged pain because of neuroma formation. Tail removal prevents normal defence against flies in cattle and social signalling in pigs and dogs. Tail-biting by pigs and injurious behaviour by hens can be prevented by giving the animals manipulable materials and more space. This costs more but the painful procedures can be avoided. Foie-gras production necessitates confined rearing conditions, aversive force-feeding and failure of the detoxifying function of the liver so that death would result soon after the normal killing time. Caponising is a major operation that is painful and the wounds take some days to cease to cause pain. In all these cases, the main beneficiary is human and the cost is borne by the animal.

1. Introduction

Legislation and philosophical arguments about how animals should be treated refer to the welfare of the animals. The welfare of an animal is its state as regards its attempts to cope with its environment (Broom 1986). Well-being has the same meaning as welfare but welfare is considered more precise so is more often used in scientific and legal documents. Welfare is a characteristic of an animal at a particular time and should be translated into French as bien-être, not as bien-traitance which, like animal protection or good husbandry, is a human activity. The term "quality of life" means the same as welfare but is not normally used for brief periods of life, whereas we can consider the welfare of individuals over periods lasting for seconds, hours or years (Broom 2007). Welfare includes positive and negative feelings and the state of other mechanisms for coping and it can be assessed scientifically, for example by measuring behaviour, physiology, injuries or the functioning of systems for coping with disease (Fraser 2008, Broom 2014, 2016e, Broom and Fraser 2015). The evaluation of the strength of animal preferences is also important so that we can

find out what conditions to use for animals in order to avoid poor welfare and maximise good welfare (Duncan 1992, Dawkins 2006, Kirkden et al. 2003).

Pain and fear are important aspects of suffering and poor welfare and measurement of these in farm animals has been the subject of the recent E.U. funded Animal Welfare Indicators (AWIN) project. There is clear scientific evidence for pain and fear systems in all vertebrate animals, including fish, and some invertebrate animals such as some molluscs - Cephalopoda (*Octopus, Loligo, Sepia)* and some crustaceans - Decapoda (*Cancer, Homarus, Palaemon*) (Elwood 2012, Broom 2013b, 2014, 2016b, Mather 2013, Sneddon *et al.*, 2014). All of these are sentient (Duncan 2006, Broom 2014, 2016 a, c).

2. Pain assessment

How can we identify and assess pain? There has been recent AWIN work on sheep, horses and goats (McLennan *et al.* 2016). Indicators of pain during foot-rot, mastitis and pregnancy toxaemia were investigated. If a sheep is "standing" with its front feet bent under it so that it can avoid putting pressure on them (**Fig. 1**), the probability of pain in the feet is very high. This has long been known but it has recently been found that, when a sheep is in pain, it shows changes in facial expression that can be evaluated. **Fig. 2** shows a normal sheep and **Fig. 3** a sheep that is in pain. Many sheep with painful lesions show: orbital tightening, cheek tightening, ears turned down, and change in the shape of the mouth and nose. This is called a grimace and a very similar combination of movements is a pain indicator in humans. A scale of different intensities can be compiled and sheep showing this grimace had painful pathologies recognisable from other clinical signs (Corke *et al.* 2015, McLennan *et al.* 2016). The "grimace scale" can also be used for horses, mice, rabbits and other species (Keating *et al.*, 2012, Defensor *et al.*, 2012, Dalla Costa *et al.*, 2014).

Fig.1 Sheep with foot-rot which cannot stand comfortably on its hooves (photograph C. Rebelo)

Fig. 2 Face of normal sheep (Photograph C. Rebelo)

Fig.3 Face of sheep with foot-rot (Photograph C. Rebelo)

There are many other behavioural and physiological indicators that can be used to quantify pain. For example, pain is also indicated by inflammation, as measured in sheep with foot-rot, by thermography and several blood chemicals. These various indicators of pain cease to be shown when the clinical condition disappears or when an effective anaesthetic or analgesic is used. As Flecknell *et al.* (2011) pointed out, the major challenge for pain research is being able to assess the emotional side of pain but the close correlation between the behavioural measures and the physiological changes strongly suggest that all of these measures indicate the negative pain feelings associated with pathology and tissue damage in these studies.

There are many indicators of good and poor welfare. Welfare indicators, like those described above, provide quantitative information about how much pain and other poor welfare is caused. However, the duration of the pain is important as well as its severity. When welfare is evaluated, the relationship between intensity and duration should be taken into account (Broom 2001), for example as shown in **Fig. 4**.

In **Fig. 4**, the area under the plot of severity against time is the magnitude of poor welfare. The maximum severity is the same in each example but the magnitude of poor welfare is much greater during procedure (a) than during procedure (b)

If an effect, like that shown in **Fig. 4**, is a benefit, the intensity of positive effects is measured and the magnitude of good welfare determined.

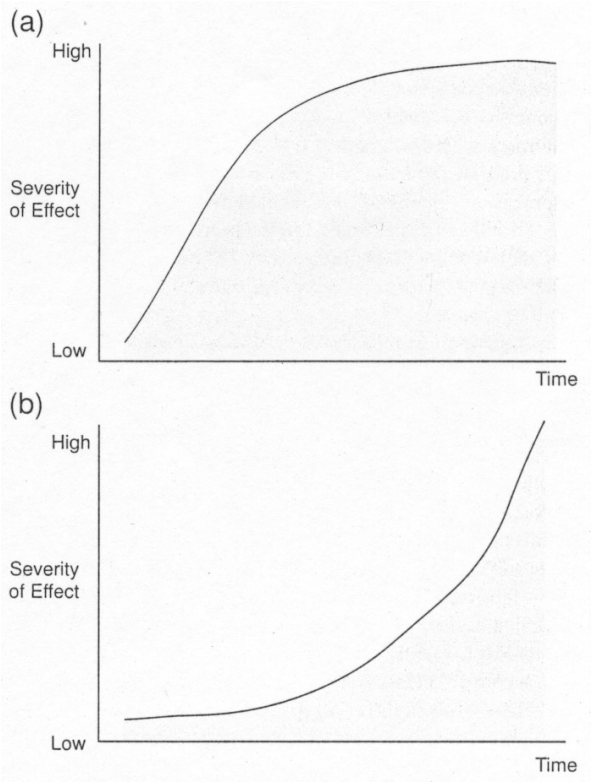

Fig.4 Examples of measures of severity of pain plotted against time (modified after Broom, 2001).

3. Examples of legally accepted pain or other poor welfare

In general, our laws prohibit treatment of animals that causes pain or other poor welfare (Broom, 2017). However, there are exceptions to these laws that permit pain or other poor welfare to be caused to animals. The following list shows some reasons for exceptions to laws intended to prevent poor welfare:

- veterinary treatment,
- tradition,
- convenience in management,
- financial cost,
- gastronomic preference,
- training of animals,
- entertainment (sport),
- breeding,
- keeping animal that injures others.

In all of the cases described in sections 3.2 to 3.8, the main beneficiary is human and the cost is borne by the animal. The examples are explained in more detail by Broom and Fraser (2015).

3.1 Veterinary treatment

When medical or veterinary treatment is carried out, in some cases pain is caused to the patient. This is permitted by law, even if in some cases the pain is substantial. In recent years, veterinarians have become accustomed to use anaesthetic or analgesic to mitigate any pain. Whilst the use of pain reduction methods is now widespread for companion animals, it is much rarer for farm animals. The pain system is just as well-developed in a cow as in a dog so failure to prevent pain in cows during veterinary treatment would seem to be morally wrong.

3.2 Traditional activity, entertainment or sport

Bull-fighting is a traditional activity that is permitted in some countries. In the course of the corrida, the bull is pierced by numerous lances and other weapons.

There is no possibility that this can occur without the animal feeling pain. The suggestion that the bull does not feel pain because of the high concentration of endorphins in his blood is not supported by evidence.

During the hunting of deer or foxes with packs of dogs, the animal is chased by dogs and by humans on horseback. This chase must always cause much fear to the chased animal, especially when it realises that capture by the dogs and humans is likely or imminent. Fear is often more important than pain as a cause of poor welfare. The chase in a deer hunt may last for more than an hour. Animals caught by packs of dogs may suffer much pain before they lose consciousness. The fact that wild animals may suffer in the same way when chased by wild predators does not alter the magnitude of poor welfare for the chased animal or the responsibility of people not to cause extreme suffering. Shooting animals accurately causes no poor welfare if death is instantaneous. However, shooting, poisoning or trapping that takes a long time to kill results in a high magnitude of poor welfare.

When a dog or cock is caused to fight by humans who are entertained by the spectacle, it will be caused injuries that can be extremely serious and painful. The duration of the poor welfare may be relatively brief, if the animal is killed soon after the fight, or much more prolonged if the injured animal is kept while it heals.

All of these “sports” have major negative effects for the animal. What is the moral principle to consider in relation to such human activities? One approach is the deontological in that many people say that it is wrong to cause the poor welfare associated with the animal’s pain and fear. Another approach is the consequentialist in which the cost for the animal is set against the entertainment benefit for humans. Most people resolve such issues by a combination of deontological and consequentialist arguments (Broom, 2003).

3.3 Convenience in management and financial cost

Mutilations of animals, i.e. deliberate damage to living sensitive tissue of animals, are permitted to facilitate ease of management of farm, companion and working animals. The impact of the mutilation on welfare will depend on whether or not adequate anaesthesia and analgesia are used, how much loss of function is caused and any benefit of the mutilation that can be set against the pain or other poor welfare. Some examples of mutilations are mentioned briefly here and described at greater length, quoting references, by Broom and Fraser (2015).

Castration of animals is used to facilitate control of reproduction and sometimes to reduce unwanted but natural behaviours. If pain is not prevented using anaesthesia for the consequences of the first actions and analgesia for the post-operative pain, the procedure itself causes very poor welfare. For some methods, such as use of a tight rubber ring around the scrotum in lambs, kids or

calves, the severe pain is prolonged. Some negative consequences and benefits of castration last for the whole life of the animal.

Removal of horns or antlers after they are formed is a substantial and painful operation. Disbudding, which entails destruction of the growing horn areas before horn formation involves painful tissue destruction using mechanical means, a hot iron, or strong alkali. All cause great pain so anaesthesia and analgesia should always be used.

Removal of the sensitive area, which includes important sense organs, behind the beak tip, in chickens or other farmed birds is called beak-trimming. This is often done without anaesthetic or analgesic, it causes pain for many hours, and it often leads to more prolonged pain because of neuroma formation.

Tail removal from dogs, pigs, cows or horses is a painful operation, prevents social signalling in pigs and dogs and prevents normal defence against flies in cattle. Tail-biting by pigs and injurious behaviour by hens can be prevented by giving the animals manipulable materials and more space. This costs more but the painful procedures can be avoided.

3.4 Tradition, gastronomic preference and convenience in management

Foie-gras production necessitates confined rearing conditions, aversive force-feeding (Fig. 5) often with injuries to the oesophagus and failure of the detoxifying function of the liver. The toxins that are not destroyed because of liver malfunction can cause pain, malaise and early death. The welfare of ducks during foie-gras production is reviewed by Rochlitz and Broom (2017).

The eating of capons necessitates caponising, i.e. removal of the internal testes by opening the body cavity. This is a major operation that is painful and the wounds cause pain for some days.

Fig. 5 Duck being force-fed (gavage) during foie-gras production. The ducks are more often in group-cages in some countries, but the living space is still small and they have to be crowded together in order that they cannot avoid the person feeding them. Feeding involves the duck's neck being grasped, the tube being inserted and soaked maize being inserted rapidly by machine (photograph D.M.Broom).

3.5 Training animals

Many owners of companion animals, guard dogs, dogs used for retrieving horse used for social riding and horse used for sport train their animals using pain as a reinforcer. Although reward-training is also used, punishment-training is widely used. This is legal, unless deemed excessive, but causes pain and other poor welfare to the animal. There have been many prosecutions of animal trainers found to be using cruel levels of punishment, sometimes as a result of the actions being recorded on video.

After training, or in the course of it, or in the absence of it, an owner may beat a dog that does not do what the owner wants it to do, or that does something that the owner does not want. In order to restrict dog movements, owners may use shock collars. These can easily be misused by delivering a particularly painful shock so they should not be sold to the general public. A form of training used on farms is the electric fence. Most animals learn by having one negative experience with an electric fence, or by observing another individual have such an experience. If the fence is readily recognisable and the animal can control whether or not it touches the fence, the use of electric fences is justifiable provided that the shock is not extreme.

3.6 Breeding

It is legal to genetically select farm animals in order to increase production efficiency. However the E.U. Directive (98.58.EC Concerning the welfare of animals kept for farming purposes) specifies that this may not be done if the welfare of the animals will be poor because of the selection. Despite this Directive, meat chickens have been selected for fast growth with the result that many of them have considerable leg pain, difficulty in walking, hock burn and breast blisters. The breeding procedure could be challenged legally but, at present, this amount of pain and other poor welfare is seldom the subject of legal action. Since the broiler chicken is the most numerous animal kept by man and the extent of poor welfare is large, this constitutes the greatest animal welfare problem in the world today.

Dog breeds have been selected for various cosmetic characteristics that are associated with pain and other poor welfare. Among the disorders resulting from breed selection are hip-dysplasia e.g. some German Shepherds, having a brain that is too large for the skull e.g. some Cavalier King Charles Spaniels, and a range of breathing problems, especially in brachycephalic dogs. It would seem that current laws should allow the prosecution of breeders who breed such dogs.

3.7 Keeping an animal that injures others

Some people train dogs to be dangerous to humans and other dogs in order to protect their property or to use the dog as a weapon. Whilst the law is sometimes invoked when a dog attacks a person, and the dog and owner can be apprehended, some pain and poor welfare is caused to people and to other animals by such dogs without retribution.

Some cats are kept for pest control. These animals may limit their attacks on other animals to rodents, that is to the target desired by their owners. The cats do cause pain to some of the rodents that they kill but many are killed rapidly so there is a low magnitude of poor welfare. A much greater problem is that many of those who own cats allow their animals to roam outside the owner's house and to kill wildlife. Some cats catch a prey mammal or bird and then release it and catch it again thus torturing it. This is often one of the worst examples of poor welfare caused to any animal. The fact that wild animals may sometimes also do this does not alter the fact that, when it is done by an owned cat, the owner is responsible for the poor welfare and should prevent it.

3.8 Legal killing of farm animals that causes pain

3.8.1 Humane killing

Laws concerning the killing of animals require that the procedure is humane. Humane means the treatment of animals in such a way that their welfare is good to a certain high degree (Broom 2013a, Broom and Fraser 2015, Chapter 22). Hence the term humane is an absolute one. The procedure is either humane or it is not and it is not possible to talk about the degree of humaneness. However, the extent of poor welfare can be measured during killing procedures.

The generally accepted principles of E.U. legislation (E.U. Regulation 1099/2009) is that humane killing implies:

1. the treatment of the animals just before the stunning or killing procedure does not cause poor welfare *and*

2. the actual stunning or killing procedure results in instantaneous insensibility.

or

3. if the agent causing insensibility or death is a gas or injectable substance, whether or not it is detectable by the animal, there is no poor welfare before insensibility.

4. During insensibility, a killing method is carried out so that recovery of consciousness does not occur before death.

This is normally cutting the throat so that the animal dies from blood loss.

These principles are used when considering any form of killing (Broom 1999), for example the killing of seals on ice-floes (Broom 2014 Chapter 11, Broom 2016). The European Food Safety Authority (EFSA) has published guidance on stunning methods (EFSA 2004, 2006, 2013 and others on poultry, pigs and farmed fish).

3.8.2 Religion and tradition in killing: effects on welfare

When halal (Muslim) and shechita (Jewish) slaughter methods were first developed, accurate and reliable stunning was not possible so these methods were the best that could be carried out. Indeed, the word halal refers to the purity of the action. Now, good stunning procedures exist but the traditional methods are regarded as important by many people. However, these methods are the result of interpretations of holy books rather than statements in the most holy texts. In some countries, killing by cutting the throat without stunning is permitted for halal or shechita slaughter. In other countries stunning is legally required for all farm animals.

A recent development in many countries is that, during some halal slaughter, the animal is stunned at the same time (within five seconds) that the throat is cut. The welfare of the animals is very much better if this is done.

In one interpretation of Jewish holy books there is the idea that blood, blood vessels and some other tissues should not be consumed because they are unclean. It is never possible in any circumstances to eat the meat of animals without consuming some blood. Blood is not harmful to human consumers. Neither is the eating of blood vessels. If tendons are eaten, the material is harder and less digestible than other meat tissue but any minor risk of choking is readily avoided. Biologically, the avoidance of blood, blood vessels, and other parts of muscles is not logical.

3.8.3 Do stunning procedures work?

If applied properly, the methods of stunning used in commercial slaughterhouses that follow E.U. law result in insensibility that is instantaneous. Gibson *et al.* (2009c) recorded the electroencephalogram (EEG) in calves stunned with a captive-bolt gun. The total power of the EEG (Ptot) decreased sharply at the point of the stun, verifying that stunning had occurred. There is similar evidence for other stunning procedures.

How often are animals not stunned properly? An analysis of the use of a captive bolt gun in an efficient mammal slaughterhouse indicated that 0.1% of animals were not stunned on the first occasion that this was attempted. However, the time taken for a repeat stun when stun failure was detected was normally 10-15 seconds.

Some individuals working in slaughterhouses are less careful and less efficient in their work than others. If there is video-recording in a slaughterhouse, bad treatment of animals pre-stun is much reduced and inadequate stunning is reduced.

3.8.4 If shechita or halal is used, does the animal suffer and how much?

When the throat of a mammal is cut, this cut does not anaesthetise the animal.

One source of evidence for this is that people whose throats were cut and who lived, reported that they felt extreme pain. Another, more precise, source of evidence comes from recording from the brain and describing behavioural responses after the throat of a farm animal is cut. This indicates that consciousness continues for about 20 seconds in sheep, 120 seconds in chickens and 126 seconds in cattle). If the gill region of fish such as salmon in cold water is cut, consciousness persists for up to 20 minutes (Daly *et al.,* 1988, Gregory, 2007, Broom and Fraser, 2015). It has been suggested that cutting the throat leads to suppression of pain as a result of secretion of endogenous opioids with an analgesic effect. However, there is no evidence that this occurs.

Gibson *et al.* (2009a) recorded EEG while the throat was cut by a ventral-neck incision. The response was consistent with the cut causing severe pain. The EEG indications of pain were also present if the neck tissues were cut but not the blood vessels (Gibson *et al.,* 2009b). Much of the pain results from the neck tissue damage. If stunning with a captive-bolt gun was carried out within 5 s of the throat being cut, the EEG flattened, indicating unconsciousness (Gibson *et al.,* 2009d). Whilst stunned animals do not suffer, the welfare of animals killed without prior stunning is always very poor for 20 to 126 seconds.

Stunning at the time of cutting the throat would be widely accepted on animal welfare grounds. Many halal slaughterhouses now do this in the U.K. and it is accepted by most Muslims and some Jews in countries where cutting the throat without prior stunning is illegal.

3.8.5 Is the stunned animal alive when the throat is cut?

The EEG data show that the properly stunned animal is still alive at the time that the throat is cut. If left without being killed by cutting the throat, the animal will recover. The only exceptions to this occur if wrongly adjusted equipment is applied to the animal. This has been shown to be the case with some head to body stuns but it can be completely avoided by proper adjustment of the equipment, as required by law in many countries. When stunning equipment is of good quality and is properly checked, the animals that are stunned remain alive and capable of recovery until they are killed by cutting the throat.

3.8.6 Is the blood removed from the body after slaughter?

It is thought by some that leaving blood in a carcass is unclean and that blood is not lost efficiently from the hindquarters of an animal. As a consequence, some Jews consider that meat from the hindquarters is not Kosher and will not eat it. It is put on the general market without labelling. Whilst some of this meat goes to the Muslim market, nobody who eats meat can be certain that the animal was properly stunned

Most of the blood is exsanguinated whether the animal is conscious, unconscious or recently dead.

However, no animal is ever completely exsanguinated from any part of its body.

The forequarters and hindquarters still have a little blood in them.

This small amount of blood does not cause any disease problems so, scientifically, the carcass is not unclean because of it.

3.8.7 Can consumers avoid meat from animals that are not stunned?

Most consumers do not wish to eat meat unless the animal has been properly stunned and many find it extremely offensive to consider that they might unknowingly eat such meat. Whilst some of the meat from the hindquarters of animals after Kosher slaughter goes to the Muslim market, nobody who eats meat can be certain that the animal was properly stunned.

What can consumers do about this? In countries where religious slaughter is allowed, it is possible for members of the public to avoid eating meat in restaurants or other places where they are told that the animals have been killed in this way. However, it is necessary to label meat from animals killed in these inhumane ways, without stunning at the time of slaughter, in order that restaurant owners and the public can make this choice. At present this is seldom done. It is particularly important to label the hindquarters of animals killed by shechita. Consumers can ask questions, demand labelling and refuse to buy products from restaurants or retailer shops who cannot provide guarantees.

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XVIII
Importance of living environment for the welfare of captive animals: behaviours and enrichment

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Abstract

Animal welfare can be defined on the principle that a captive animal must present no prolonged negative emotional states thanks to physical and social environments that allow it to express its full behavioural repertoire and maintain its homeostasis. For several years, livestock breeders and zoos have been working to increase the welfare of their animals by applying ergonomic principles otherwise known as environmental "enrichments". These enrichments must allow the animal to enjoy daily activity that satisfies its physical, physiological and cognitive needs, which in concrete terms is shown by

(1) an increase in behavioural diversity,

(2) a reduction in the frequency of abnormal behaviours (stereotypies for example), and finally

(3) an increase in the positive and full use of the captive environment.

This of course requires specific knowledge of the animal's behavioural repertoire in its natural environment, but also of its ecology and biology in general. Five enrichment categories can be defined: physical, social, dietary, sensory and cognitive. Much progress has been made in terms of physical enrichment: size of pen or presence of structures and accessories are now seen as a priority, particularly at zoos. But there is room for other improvements, particularly for social enrichment: the important presence of animals of the same species is often overlooked. In terms of food, major problems are often noted for the particular class of social carnivores but in general there is very little diversity in the composition of food or its spatial or temporal distribution. Once again, such improvements can only be made if there is an understanding in the biology and ethology of the species held in captivity but also by incorporating the principle of animal welfare at all levels of society.

Introduction to enrichment

1. Definitions

Environmental enrichment is a concept which describes how the environments of captive animals can be changed for the benefit of the inhabitants, thus enhancing their welfare (Hill & Broom 2009). Animal welfare is defined as the absence of suffering and the respect of animals' needs, not only imperative and nutritional – which would mean good treatment – but also behavioural. There are many behavioural needs, such as living space, sociality and the capacity to move, flee, hide or hunt (Vilanova & Smith 2014).

An analysis of animals' needs allows us to better define what would be their ideal environment. These needs are assessed by studying an animal's physiology, movements and posture. Obvious signs can be used to understand whether an animal, whatever its species, is suffering or in a state of unease. These signs increase in rate and amplitude based on the intensity of the constraint imposed

or suffering felt. The latter will first impact behaviour (presence of stereotypies, self-mutilation, aggression), physiology (increase in cortisol indicating high levels of stress, ulcers, decrease in noradrenaline), neurology (decrease in brain cell density, decrease in cerebral plasticity, memory), then production (absence of milk, impact on growth, absence of reproduction) and finally the animal's health (decrease in immune response, weight loss and illness)(Veissier & Boissy 2009).

Principles of ergonomics are therefore applied to animals, seen as agents that carry out certain tasks: feeding, resting and moving. The ergonomic approach can reduce injury and increase the animal's comfort by creating suitable facilities, and is itself called "enrichment".

2. The different historical approaches

Differing notions of welfare, which more or less take into consideration the different needs and wants of animals, have led to the development of three approaches to improving animal welfare: the naturalist approach, the adaptive approach and the mental approach (Young 2003).

The naturalist approach considers that an animal must be able to live its natural life (Rolin, 1993), namely perform its species' full behavioural repertoire. By applying this approach, the aim is therefore to favour environments that are similar to the species' ecological niche, in other terms recreate the animal's natural environment. There are pitfalls with this approach however, because animals have continued to demonstrate abnormal behaviour in captive environments that visually look like the animal's natural environment. This is because the similarity was artificial and based on the structural aspect of the environment (shape of trees and rocks, landscape, terrain) instead of the ecological aspect (presence of real plant and animal species with which the animal can interact). The idea above all is that the animal can interact with its environment.

The behavioural approach is based on the principle that all individuals have mechanisms to adapt to their environment to achieve a state of homeostasis (behavioural stability). But if the gap between the animal's actual environment and optimum environment persists, it will tire itself out trying to adapt. This approach therefore consists in ensuring that the animal exhibits its full behavioural repertoire even if the captive environment is not visually similar to its wild environment. In this approach, the animal interacts with objects or structures in its environment, even if they are not visually similar to elements that it would encounter in its natural habitat.

Finally, the mental approach draws on the very notion of welfare itself: the animal's captive environment must be designed in such a manner that the animal’s resulting state is free of prolonged negative emotions (fear, pain, frustration). This state is subjective and unique to each individual depending on the way it perceives its environment and this mental approach therefore includes the notion of sentience. However, fulfilling the criteria of this approach means fulfilling the same needs as the two approaches mentioned above. The three approaches are complementary and all require knowledge of the animal's environment and behavioural repertoire in its natural environment. The animal's captive environment must more or less resemble that of its natural environment (naturalist approach) but the animal must be able to interact as much as possible with elements of this environment (behavioural approach) in order to decrease its stress as much as possible (mental approach).

3. Objectives

In short, enrichment can be used to achieve four objectives. The first objective is to increase behavioural diversity, namely increase the number of behaviours shown by the animal, whether these behaviours are natural or non-natural but leading to a better level of welfare. Adding straw bedding for pigs instead of leaving them on bare concrete allows them to root and dig as they would in their natural habitat. This also decreases diseases caused by direct contact of hooves with concrete. The element itself (straw) is not natural, meaning that pigs naturally root earth or grass

rather than straw, but adding straw helps the animal express this natural behaviour (Guy & al. 2002; Morrison & al. 2007). It is also possible to provide an animal with a non-natural element that will result in a non-natural behaviour, and therefore increase its behavioural diversity but not its abnormal behaviours. For example, a chimpanzee feels a certain sense of well-being by holding and using a pen or painting on paper with its finger, even if chimpanzees do not paint in their natural environment (Watanabe 2012).

The second goal is to reduce the frequency of abnormal behaviours that are defined as frenetic behaviour towards abnormal objects (chewing on an iron bar instead of natural elements) or an absence of objects (chewing on nothing in the absence of even an iron bar), or stereotypies (static, repeated or apparently aimless activity such as head-shaking or pacing in cages). Pigs frequently chew on elements in their environment, whether to feed or not, elements that are usually present in a captive environment. The presence of substitute elements allows the animal to produce these rooting behaviours. However, the absence of these elements can lead to abnormal behaviour such as repeated biting of pen-mates' tails (hence the practice of tail docking in piglets on farms) or stereotypies (Collectif & Chemineau 2013).

The third objective consists of increasing the number of natural behaviours by enrichment, often for purpose of species conservation. Finally, it is not necessarily useful to increase the number of natural behaviours for animals raised as livestock, it is simply necessary that their welfare is respected. However, it is very important that natural behaviours are expressed along with the full behavioural repertoire of animals reared to be released into the wild or reared to produce offspring that will be released. In this case it mainly concerns flight or predatory behaviour (Guy & al. 2014).

The fourth objective is to increase the positive and full use of the captive environment. For a zoo or farm, space has a cost. The non-use of space by animals can have a significant economic impact and it is important that we understand why animals are not fully using their enclosure. This could be due to an element in the environment that keeps the animals away from part of the enclosure (other species if a mixed group, external factor such as a nearby road, etc.), or the animals are not drawn to this part of the enclosure and the enrichment would be to add structures that attract them there.

A user can enrich the enclosure to fulfil one or all of these objectives based on its use by the animal or the reason for which it is being reared. However, the objective to reduce the number of abnormal behaviours must be achieved for all animals held in captivity. Many arguments have been made against the use of enrichments; these can be mostly defined and summarised as follows:

- Enrichment increases maintenance costs for captive animals. This is false. Most often, any cost, as little as it may be, put into enriching an enclosure, will be gained elsewhere on animal care costs and the fact that it will be less likely to destroy its environment by looking to increase and diversify its activity.
- Enrichment creates extra work for animal keepers. This is partly true and partly false. Work to enrich the animal's environment can lead to less destruction of this environment. Where animal keepers loose time, they gain it elsewhere. Moreover, involving animal keepers and having them understand the value of enrichment, playing on entertainment rather than obligation, generally leads to better psychological welfare of the animal keepers, meaning they are more effective in their work and therefore saving time and money (Young 2003).
- Enrichment leads to a riskier environment for the animal. This is false if we know the animal's habits and behaviours in its environment and the enrichments are suited to the species' ethology. It is obvious that a three-dimensional environment is riskier than an environment without structures (branches, trees) but the animal's distress is such that it is riskier to leave it in poor conditions rather than improve its enclosure with physical enrichments.

- Enrichment increases inter-individual variability in test protocols. This is false if the same enrichments are given to the tested subjects. A PVC or paper roll in a mouse's cage will not increase this variability in relation to an environment without any enrichment. Inter-individual variability is, in any case and intrinsically, already great enough between individuals and this personality trait is very seldom tested during research protocols or product tests. Moreover, giving a poor environment to subjects leading to a chronic increase in their stress levels is not a solution for verifying the effectiveness of substances and renders scientific results invalid and non-transposable to the target subjects.
- There is no scientific evidence that shows the effect of enrichment on animal welfare. This is false. Many examples showing its effectiveness are published every month in specialised peer reviews.

The various types of enrichment

There are various types of enrichment that we can group into five main (non-exclusive) categories. When an animal's environment needs to be rich and diverse, adding a specific enrichment must respond to a specific need of that animal (social, locomotive). For example, if an animal exhibits stereotypic "pacing" behaviour, the size of its enclosure needs to be increased; adding a social partner as an enrichment would not resolve the stereotypic problem. If the animal has a behavioural problem, the first step is to:

(1) identify the problem, then

(2) identify its cause or causes,

(3) treat these by a suitable enrichment, and

(4) verify the effectiveness of the enrichment on the problem in question.

Therefore, generally speaking, when the environment of one or several animals must be enriched, several questions should be asked. These questions will make it possible to provide the most appropriate enrichment for the captive animals. These questions are varied and cover the sociality of the animal, its diet, activity, the time it spends per day satisfying its needs (time budget), *etc.* For example:

- How social is the species (solitary, gregarious, social)?
- How many dimensions does the animal move in (two or three)?
- What distance does each animal cover each day and for how long?
- What is the animal's diet? What is its dietary diversity?
- Is the animal a prey or a predator? Does it hunt in groups?
- How many times is it fed a day and for how long?
- What sense does the animal use to find its food?
- How does the animal extract its food? What parts of its body are used to do that?
- How do the answers to the questions above vary depending on the type of food the animal eats?

The list of enrichments for improving captive animals' welfare that we have provided here is far from exhaustive. Other examples are given in the numerous references. We strongly recommend the book *Environmental enrichment for captive animals* by Robert J. Young (2003) and the website "The Shape of Enrichment", which has a very extensive video library on the topic.

1. Physical enrichment

The enclosure of an animal or group must suit its species in terms of enrichment. The personalities of captive animals and interactions between individuals will determine how the enclosure will be used (Clark 2011; Gartner & Weiss 2013; Tkaczynski & al.). The size of a zoo

enclosure, livestock pen or medical research cage must first and foremost allow animals to express their natural behaviours, particularly locomotive ones. The size of the cages must be defined on the principle that a rabbit must be able to jump and a chicken must be able to spread its wings (see Decree of 1 February 2013 implementing the conditions for the agreeableness, structure or function of an establishment of a breeder, supplier or user of animals used for scientific purposes and their controls NOR: AGRG1238753A). Herbivores must also be given enough space for the grass that they graze to be able to grow back or be given a hay supplement (Ramos & al. 2016).

The animal's social aspect must also be taken into account. When animals are placed in groups in an enclosure or cage – where this is preferable for the expression of their social behaviours – it is vital that the space is big enough for individuals to stand apart or escape their pen-mates. The suitability of the space for the species can easily be noted by observing the animal's health. One or several individuals regularly presenting numerous injuries is firstly a sign of (1) a feeding problem: the quantity of food must be increased and placed in various areas. If the problem persists, it means that (2) there is a spatial problem: the size of the enclosure (or cage) is too small and needs to be increased. A persistent problem even with a larger enclosure suggests that there is (3) a social problem in which several individuals are not socially compatible. This requires an ethological study of their social relations (Sueur & Pelé 2015).

A new way of thinking about space in zoos, fields and nature reserves is to remove barriers. In these conditions, certain animals that live in groups or herds are given GPS collars and a negative conditioning system (electric shock that is no greater than that of the existing electric fences already used in many enclosure systems) (Sikka & al. 2004; Butler 2006). This creates a virtual barrier so that when an animal wearing a collar crosses over the line, it receives a shock, which conditions it to turn around and stay within the predefined space. The benefit of this system is that not all members of the group need to be equipped – which would be difficult to implement due to economic and health considerations (need to anaesthetise the animals). The few individuals that are given a collar are chosen because they are known to be "leaders" (Ramos & al. 2015).

The complexity of the enclosure can also be enhanced by non-linear division into more or less isolated areas. In some zoos, the enclosures are built so that species can be easily switched between compartments using a system of hatches. With this system, the animals' enclosure can be changed and the animals temporarily blocked off from certain compartments, which also constitutes an enrichment.

Permanent structures must be presented in the enclosure. These structures can be rocks placed so that the animals can overlook their enclosure and beyond, bask in the sun or on the contrary, find shade or shelter from the rain. For arboreal and semi-arboreal mammals and birds, it is important that they are given structures such as beams and perches on which they can move across several levels. Herbaceous, shrubby or arboreal plants can also be placed in the enclosure. If the enclosure is outside, other non-captive species may be attracted to these and mix with the captive animals. However, checks must be done to ensure that the plants placed with the animals do not cause any health issues for the captive species. Enclosure platforms often allow individuals in a group species to stand apart. However, it is important to check how many platforms to install as they can often be monopolised by certain individuals, stopping other members of the group from accessing these elements. The same applies to swamps or mud puddles that limit the number of individuals they can contain due to their size. It is therefore important to check that the number of permanent structures can be accessed by as many individuals as possible. The brown bear enclosure at the Sainte-Croix Animal Park (Rhodes, France) was entirely redesigned in 2014. With a strong resemblance to the natural environment of brown bears (*Ursus arctos*), the two-hectare enclosure offers its four inhabitants a range of areas: a damp area with reeds that allow the bears to hide, a tree-lined area, various reliefs and several ponds.

Temporary structures may also be installed. They are temporary because they deteriorate much faster than the permanent structures and are precisely designed to be "damaged" and used by the animals. These could be tree trunks or branches that the animals will gnaw on, plastic barrels or iron sheets that the animals can climb, or cardboard boxes which they can hide or lie in. The latter are in fact a typical example of temporary enrichment used for felines: cats, lions, panthers, tigers and others love playing in cardboard boxes or sleeping inside them. This infatuation is mostly likely due to the fact that felines hide to hunt and rest, and particularly during parturition. The benefit of these temporary structures is that they are often recycled objects and cost nothing for the keeper regardless of how they will be used.

With regard to animal research, it is possible to provide mice and rats with permanent structures (tubes, exercise wheels, nests, etc.) as well as temporary structures (cardboard rolls, cotton, etc.). There are several suppliers of enrichment products that are specifically packaged (sterilised, suitable for autoclave treatment) for laboratory animals.

2. Social enrichment

Many species live in social groups or flocks. Social animals need to interact with members of their own species. An animal's social interactions and structures, whatever its degree of sociality, has a huge impact on its health, welfare, ability to reproduce and longevity (Price & Stoinski 2007; Silk & al. 2003; Stanton & Mann 2012). It has been demonstrated in several species that investment in the development of long-lasting stable relationships has a positive effect on the animal's quality of life and reduces their stress levels (Archie & al. 2014; Fürtbauer & al. 2014). It is therefore important that social animals are in contact with members of their own species. In its natural environment, an animal also interacts with animals of other species. Social enrichment and the contacts on which it is based can thus take various forms.

It is vital for social animals to live in groups. Research on baboons in their natural environment showed that the stability of social relationships had a positive impact on their health and welfare (Silk & al. 2009). It is therefore important that stable, long-lasting relationships are favoured in order to ensure the welfare of the individuals. This does not entirely fit in with conservation and reproduction programmes that result in animals being exchanged between zoos to prevent inbreeding. The stability of social relationships also depends on the sociability of the individuals in the group, another aspect of personality (Wolf & Weissing 2012). Certain species that are solitary in their natural environment may be held in groups in their captive state. In zoos, brown bears (*Ursus arctos*) often share their enclosure with members of the same species although they are solitary in their natural environment outside of breeding season. These bears must develop social contact with the individuals with which they share their enclosure; if the enclosure is big enough, this can be an advantage for their welfare compared to being alone. In agriculture, chickens (*Gallus gallus domesticus*) are held in groups that are more or less dense whereas in the wild, their ancestral species lives alone or in very small groups. Recent studies have shown that domestic chickens can interact and even develop positive relationships with those nearest to them (Abeyesinghe & al. 2013; Koene & Ipema 2014). The social relationships of a social group must therefore be known, and the inter-individual hierarchy must be noted and monitored from one year to the next in order to prevent any social problems from arising within the group.

In other cases, animal welfare can be improved by the creation of multi-species groups (Chapman & Chapman 2000; Buchanan-Smith *et al.* 2013). Individuals from different species will either simply share the space without developing any particular relationship, as is the case of hoofed 'Savannah' animals (zebras and antelopes) or European fauna (bison, deer, ibex), or share the same space but also develop social and relationships and groom each other (Pearson *et al.* 2010). For example, this is present in various species of lemurs, but is also frequent in gibbons and

orang-utans. For example, it was shown that these mixed groups led to a decrease in vigilance in impala antelopes (*Aepyceros melampus*) (Pays *et al.* 2014). This also allows them to intensify their search for food in their natural environment (Farine *et al.* 2015). It is however important that the species kept in contact maintain positive or even neutral relationships, but above all not negative ones. A species can be relatively aggressive, due to territorial behaviour for example, and this can lead to attacks that cause injuries or even the death of an animal. Contact with humans can also be important if it is the only contact possible. However, it is important that the animals can extract themselves from this contact when they feel like it in order to avoid stress.

When it is unfortunately not possible for an animal to be in contact with other animals of the same species or another species due to health reasons or a test protocol, solutions exist to socially stimulate the animal. First of all, animals held in separate cages must be able to see each other. This visual contact is vital for social animals (Bayne *et al.* 1993). Under such conditions, contact with humans is also very important: animal handlers must interact with the animals whatever the species, and this is even more vital for species that have advanced cognitive capacities, such as monkeys. As a last resort, the animal can be stimulated by a sensory enrichment such as radio or television. If possible, the animal must be able to turn the device on or off by itself, so as be calm or stimulated when it wishes. Finally, it has been shown that animals quickly get used to this type of stimulus, as they soon cease to pay attention to it. Therefore it is a temporary solution because it clearly falls short on meeting the minimum conditions of welfare. As a result, it is important to check the animal's psychological state and assess whether it has fallen into a state similar to depression.

3. Cognitive enrichment

Cognitive enrichment consists in stimulating animals' cognitive capacities. For many species, looking for and extracting food in the natural environment takes up a large part of the day (up to 95% of the day, excluding rest). For example, chimpanzees may use sticks as tools to look for ants or termites in collectively built tunnels; they also break nuts open using selected stones called hammers or anvils (McGrew 1974). With cognitive enrichment, we are trying to recreate this foraging time by making food access more complicated. The idea is not to make all food difficult to access but for some more appetising food items to be integrated into these distribution systems. For primates, biscuits may be freely available but fruit or grains may be more difficult to access. This enrichment is not only possible for species with high cognitive capacities but can be adapted to any species. For example, piles of tubes or tunnels can be made to house ants or other insects that can be hunted as food. The enrichment can also be a system that makes it difficult to access a piece of meat for a carnivore, either because the meat is hidden, up high or on a moving structure.

The first type of cognitive enrichment can be puzzles or artificial fruit. Puzzles are labyrinth systems where food is placed at one end beyond the animal's reach. The animal must use its fingers or a tool to extract the food through an opening at the other end. These devices are used mainly for primates but are beginning to be developed for other species. Artificial fruit are boxes in which food is placed (Dindo *et al.* 2008; van de Waal *et al.* 2012). The animal must handle the box (turn it over or around, or use a lever) to access the food. Although initially developed for zoo or laboratory animals, these enrichments have been made available for pets. For example, no fewer than eight bowls using the same concept have been developed for cats (the Trixie Tunnel feeder, Aïkiou's Stimulo, Chat Perché's Temple à croquettes, Cat it's LabyrintheSense, and others). None of these are electronic but more sophisticated systems have been developed, such as CleverPet's game console for dogs. This interactive learning and entertainment device has coloured keys that light up which the animal must touch to receive a food reward. These devices prevent the pet from getting bored when their owner is not present. They can also be used to maintain a certain level of cognitive activity in older animals. Over the past decade, similar systems have been developed for

primates that use touch screens on which the monkey must resolve more or less complex cognitive problems to be able to access an appetising food item (again in addition to its unlimited food). These systems allow the animal to replace their natural food foraging time and reduce their levels of stress. New Kinect-type interfaces (without levers or screens) are also being developed by Melbourne Zoo in Australia with orang-utans. Interaction with humans, whether for entertainment such as a show, but above all as part of behavioural experiments, such as in comparative psychology and ethology, also provide animals with stimuli. These tests are regularly renewed and test advanced cognitive capacities such as recognising numbers, colours and symbols, opening enticing boxes using tools or the capacity to exchange elements of different values (Tomasello & Call 1997; Pelé *et al.* 2009). The Wolfgang Köhler Primate Research Center invites visitors at the Leipzig Zoo in Germany to attend behavioural tests with great apes. Neither should we underestimate the importance of human presence and contact with isolated animals. Bayne *et al.* (1993) have shown that only six minutes per week of human presence significantly decreases stereotypic behaviour in individually housed rhesus macaques (*Macaca mulatta*).

4. Sensory enrichment

Sensory enrichment, as its name suggests, will stimulate one or several of the animal's senses: sight, hearing, touch, taste and smell, with the latter two generally combined.

Visual sensory enrichment consists of giving the animal the possibility of observing a changing environment. In zoos and farms, this enrichment can first be done by creating an enclosure that allows the animal to see outside, or even have an overlooking view and/or be able to see the horizon. Animals are stimulated by seeing visitors and/or other animals. Access to television or a computer can also elicit behavioural reactions from animals. For example, in China, videos of coupling pandas (*Ailuropoda melanoleuca*) increased the breeding success rate of captive pandas ("Panda Pornography", Wikipedia, 2016). In birds, if a quail has two containers, one red and one blue, and is shown a video of a Japanese quail (*Coturnix japonica*) only eating from a blue recipient, this will increase the probability that the quail having seen the video will also eat from the blue recipient (Akins *et al.* 2002). A mirror can also be used to enrich an animal's environment but has different effects on animals' behaviour depending on their cognitive capacities (Gallup Jr *et al.* 2002). For example, for species that do not recognise themselves in the mirror (no self-awareness), the mirror creates the illusion of there being more individuals in the pen, which can increase the individual's welfare and reproduction, as has been shown with flamingos (O'Connel & Rodwell 2004) and rabbits (Jones *et al.* 2005). However, great apes, which are able to recognise themselves in a mirror, will spend time using it to inspect parts of their bodies that they usually cannot see (behind, inside mouth). Nevertheless, it is not advisable to place a mirror in front of gorillas (*Gorilla sp*) because this species sees direct eye-to-eye contact as aggressive behaviour. Direct visual contact is also a threat for many monkey species.

Auditory sensory enrichment consists of playing sound (natural, music, radio) to animals that have no open environment or have been temporarily isolated. Sound can also be played when an animal must enter an unfamiliar enclosure or area. Music is also increasingly used in dog shelters to calm and sooth new arrivals (Wells *et al.* 2002). As with television, these sounds must not be played continuously but only for several minutes a day or week. For species whose vocal repertoire includes song (gibbons, passerines) or which simply communicate through vocalisation (wolf howl, deer bellow), playing sound recordings can stimulate the animals. As music can have a positive effect on animal welfare, it also affects their production. It has been shown that cows produce more milk when music, especially classical, is played (Albright & Arave, 1997). Many species are also able to recognise a beat and enjoy rhythm, such as seals (Cook *et al.* 2013) or parrots (Patel *et al.* 2009). The Washington National Zoological Park in the United States has even given Asian otters access to a synthesiser; the animals were able to play with the keys and produce sounds. Behavioural

research has also shown that a chimpanzee hitting or beating a barrel followed a rhythm similar to rhythms produced by humans (Dufour *et al.* 2015).

Tactile sensory enrichment consists of giving an animal various substrates (with different textures or grains) with which it may interact or on which it can move. These enrichments may be permanent or temporary. By simply knowing how a species interacts with elements in its natural environment, it is possible to know which substrate to introduce to its captive environment: sand or straw for animals that look for food on the ground, such as chickens and pigs; mud for animals that like to cover themselves with it; access to water (river or pond) for animals that like to bathe. Pinnipeds (seals, sea lions, etc.) whose vibrissae are innervated and contain a blood supply, are able to detect by touch shapes that are 3 mm thick and 2 mm wide, meaning they are able to search through sand and look for decapods (lobster, crayfish, etc.) and shellfish. The walrus (*Odobenus rosmarus*) tank at the Nagoya aquarium in Japan has a plastic mat along the bottom dotted with bumps and gaps to stimulate the animal's sense of touch. Tactile enrichment can also consist of installing showers that the animals can activate at will or automatic water misters. Another activity is to place items (food or other things) in ice. Ice is also given to animals during heatwaves to cool them down. This consists in giving animals blocks of ice that contain food (fish for bears, seeds for granivores, meat for felines, fruit and vegetables for primates, and others).

Finally, sensory enrichment by smell consists in stimulating the animals by using natural or chemical odours that the animals are not used to. This could just be branches or trees cut for clearing but placed in the enclosure instead of being thrown away, or items specifically purchased for their smell (odours of other predatory, prey or neutral species; various spices). For example, Seattle Zoo in the United States recycles its coffee grounds by giving them to grizzly bears (*Ursus arctos horribilis*) because the smell of coffee stimulates them: they roll in it and rub it on their fur.

5. Dietary enrichment

Animals in their natural environment spend most of their time looking for food, namely 80 to 95% of their time when not resting or sleeping. However, this time depends on the animal's diet. Each animal species has developed a specific diet that depends on its natural habitat, namely what food is available, the way in which it is provided and the presence of rival species. These ecological pressures have shaped animals' food foraging behaviour. A species' natural food types must be respected for the welfare of animals held in captivity (Newberry 1995; Young 1997). Very often, captive animals are given a very rich diet that greatly reduces their foraging behaviour and can lead to weight problems. It seems vital that there is a similar level of difficulty to that which an animal encounters in its natural environment when extracting food or catching prey. For certain species, it is therefore necessary to provide systems that complicate access to their food. This can be spatial (the food is placed in several areas around the enclosure) and temporal (food is distributed throughout the day or at random times).

Placing food in various areas, changing these areas every day or scattering food allows a frugivore or carnivore to find food when alone. Placing food in a specific location rather than more or less randomly around the enclosure can increase food competition within a social group and prevent subordinate or peripheral individuals from accessing this food (Barton *et al.* 1996; King *et al.* 2011). Keeping a log of aggressive behaviour can also help understand the group's hierarchy and reduce conflicts. Before setting up a food distribution system (which areas and how often), it can be interesting to understand the sub-groups or groupings present and determine the number of food distribution locations based on these affiliations. This will prevent aggressive encounters and reduce overall stress levels (Buchanan-Smith *et al.* 2013).

Temporal food distribution involves two factors: frequency and food distribution order. In their natural environment, animals do not have permanent access to vast amounts of food. It is

therefore necessary that food or certain types of food are provided intermittently. Unlimited supplies of some food may be given (biscuits or hay) while more appealing food is given two or three times a day. Other less frequent foods in their diet can also be given once a week or month. Food distribution systems can be made very easily by drilling holes in tubes that let the food out intermittently. For insectivores, crickets or larvae can be put into tubes placed high up; as they move the insects will gradually fall to the ground, increasing the animal's foraging behaviour. These same tubes placed freely or attached to the ground and filled with seeds will also increase the animal's dietary activity.

Dietary enrichment also consists in playing on the novelty of the food provided. Animals are often given pumpkins for Halloween, whatever their normal diet. The value of this food is not necessarily nutritive but rather gustative and tactile. The animal can play at destroying the pumpkin and more or less eat it. Many zoos use pumpkins for a wide range of species: carnivores, primates, elephants, monitor lizards, etc.

For captive animals in zoos, the ideal situation would be to present predatory species with live prey to stimulate their senses, cognitive capacities and motor capacities. This is already sometimes done for animals that will be released into the wild to increase population numbers for the purposes of preserving the species (People Le Ruyet *et al.* 1993; Young 1997; Bashaw *et al.* 2003). This enrichment raises several issues. The first is that we must ensure that the predator kills the prey "quickly and cleanly" so as to limit its stress and pain. Health risks must also be removed. Another important issue is how zoo visitors might react; they will certainly not react in the same manner to a cricket being eaten by a bat as to a rabbit being suffocated by a snake (Ings *et al.* 1997). This emotional reaction from visitors, which entirely depends on the type of prey and its reaction to the predator, could be called speciesism; but there is also the variable aspect of nociception (set of phenomena that allow a central nervous system to integrate a painful stimulus by activating nociceptors (pain receptors) found in the skin, muscle tissue and joints) to be taken into account. As prey, a mammal or bird will not have the same cognitive (suffering) or emotional (pain) integration of nociception as an insect or bivalve mollusc. These scientific and ethical concerns should be taken into account when wanting to provide this type of enrichment. Finally, more or less complex systems can be put into place to simulate the characteristics of prey and approximate the difficulty a predator faces when hunting. For example, lure coursing is used in some zoos to encourage cheetahs (*Acinonyx jubatus*) to run.

Current issues

Much progress has been made in understanding animal welfare. However, there is much more to be done first, in terms of understanding different species' biology but also applying welfare approaches to different domains. We have chosen to discuss three main issues here.

1. Species-specific needs

As indicated in paragraph 2.5. on dietary enrichment, natural ecological pressures have shaped animal behaviour and respecting the natural diet of each species appears to be vital for improving animal welfare. Herbivores, as well as most hoofed animals, spend little time looking for and extracting food but a long time foraging. On average, a giraffe (*Giraffa camelopardalis*) eats 66kg of plant matter a day. This foraging activity takes up nearly all of the animal's time budget (excluding rest or chewing time) due to the low nutritional value of their diet. The animals therefore need to be able to graze all day long. Whether giraffes live next to other species (savannahs) or not (zoos), any other enrichment would be almost superfluous.

On the other hand, frugivorous species, such as many primates or parrots, eat more high-energy food (fresh fruit or nuts) but these foods take a great amount of time to find and extract.

Therefore, these animals should be given puzzles or artificial fruit as outlined in paragraph 2.3. on cognitive enrichment, to keep them busy.

Finally, carnivores in their natural state only eat every two to three days, and have a long resting period (up to 20 hours per day for felids). However, they spend a large amount of time and cover great distances finding their prey. These species should be given a large amount of space to avoid stereotypic behaviour. With pets, it is most often the owner's lack of knowledge that causes human-animal relationship problems and distress to the animal. A good understanding of the species, in terms of its physiology, ecology and ethology, is essential for the welfare of captive animals, whether they are zoo animals, livestock or pets.

2. A multi-factorial approach

Only animal welfare should be taken into account when introducing an enrichment. However, this is far from what is done in reality and the approach to enrichment is often multi-factorial. There are three inseparable factors to take into account: (1) animal welfare, which is the purpose of the enrichment, (2) "consumer" satisfaction, and (3) the keeper. By "consumer", we mean owners, whether they are professionals or individuals, zoo and aquarium visitors, laboratory animal handlers and buyers of agricultural products. So a consumer and a keeper are often one and the same person. Of course, a zoo or pet shop manager must not decrease the welfare of their animals to benefit the consumer or animal care staff, but the right balance must be found in order to maintain an ethically and economically viable system. Enrichment, notably size, vegetation and other structures, can prevent visitors from seeing the animals. The failure to satisfy visitors who are keen to see the animal can lead to lower attendance rates with a varying impact on the zoo's budget. But this enrichment also allows the animal to not be seen. Continuing to think of zoo enclosures as they have been made until now creates a conflict between animal welfare and visitor satisfaction: an increase in one decreases the other. Why not look at new ways to design enclosures? They do not need to be polygons that visitors stand around but can be spaces which visitors are able to "enter" through a system of footbridges, tunnels or paths that take them closer to the animals, without being seen. Protected vehicle systems (bicycles or electric cars) could also be made. The Bjarke Ingles Group architecture firm drew on this new approach to create Zootopia, a zoo soon to be built in Denmark (Quintal 2014). Finally, the animal care team, whether for a zoo, laboratory or farm, must also be trained in animal welfare and the needs of each species. If animal technicians are trained and involved in decisions made for the welfare of the animals that they tend to, they will be more willing to spend part of their working time carrying out these activities.

3. Double standards depending on the sector and use of the animals

Much progress has been made in animal welfare over the past 20 years, though not in all fields in which animals are involved. Zoos have developed facilities and introduced enrichments to improve animal welfare as a result of pressure from two sources: (1) visitor opinion and (2) the need to implement conservation plans that respect the behavioural integrity of animals. However, circuses, which also have an entertainment aspect, have not progressed in the same way as the pressure they receive is not the same. Nevertheless, in the past few years, there has been some public interest in protecting circus animal welfare, an interest to which the circuses themselves pay very little attention. As a result, several towns and countries have banned circuses that use wild animals.

The most common pets are cats and dogs but rabbits, ferrets, rodents and other new pets (*nouveaux animaux de compagnie* - NAC) are being seen in increasing numbers in French households. A certificate is required to obtain and keep some NACs, such as snakes. However, any French citizen has the right to acquire a dog, cat, rabbit, rodent, etc. in France without having to

certify that they understand the animal's physiological or ethological needs. This is not the case in Switzerland, where since 2008, owning a dog has required a licence. Owning an animal is not a trivial thing, especially when the latter is kept in an apartment. Many people own dogs that only have access to the outside a few minutes a day and cats that never have access to the outside. This only causes a few complications for some breeds but is clearly problematic for others. For the latter, their behaviour needs to be closely monitored and they need to be given many enrichments. With regard to NACs, as things stand, there are only recommendations as to what conditions the animals are to be kept in. As a result, rabbits often live their entire life in cages that are too small and are unable to express their natural behaviours such as running and jumping. Much progress remains to be made in terms of prevention and education about pet ownership.

The same can be said for livestock reared for agricultural products or meat. This activity concerns the use of the greatest number of animals and yet it is here that the worst animal welfare conditions have been observed. This is largely due to societal and economic demands that have led to more intensive farming practices. Most livestock are reared in individual cages that are too small for them to express natural behaviours (spreading their wings or lying down, for example). The space given to groups is also small, which leads to significant attacks. Lastly, there is almost no enrichment of their environment. However, in recent years a collective awareness seems to have appeared, both in terms of what conditions are unsuitable for animal welfare, the economic stakes that animal welfare involves (consumer impression, better productivity, better immune system, etc.). As a result, some livestock breeders leave their animals in groups with access to the outside, and provide them with enrichments such as bedding, ground mats, perches, music or pivoting brushes to sooth cows. On 1 January 2012, the European Union banned the use of conventional battery cages (cages with 550 square centimetres of space per hen) for laying hens. There is also a strong trend towards the consumption of free-range chicken, particularly in Germany and Austria.

Finally, animal testing for scientific research is often problematic in terms of animal welfare, even if the conditions for using animals has never been so controlled as they are today, and compared to other fields that use animals. Without mentioning the constraints placed on animals in test protocols, the breeding processes used for laboratory animals often do not meet the minimum conditions to ensure those animals' welfare. Cage size, use of enrichments or the number of pen-mates are often limited. These conditions are maintained for the purpose of decreasing the number of variables that could influence the test results and are often standardised as a result. But could such conditions - the minimum for respecting good treatment - not cause the opposite effect? The animal could be in such a state of stress that it could invalidate the scientific test and its findings. It is therefore important that the species' biology is respected by providing it with conditions that ensure its welfare. Other than valid scientific results, an animal such as a macaque (*Macaca sp.*) should not ethically be held in a 1.5 cubic metre cage without contact with other members of its species, in light of its need for social interaction. Mounting pressure from citizens on this aspect of animal use is starting to make itself felt and there is an interest in taking this into account so that research can continue calmly.

Outlook

Respecting animal welfare is an ethical issue – as humans, do we have the right to impose poor captive conditions on the animals that we use? – but also has an economic impact: for a zoo, a distressed animal does not attract visitors and depending on the species, produces little or no offspring; for farmers, a distressed animal grows less, produces less, cannot breed or falls ill; for an individual, a distressed pet is synonymous with chaotic co-habitation and a difficult relationship. It is therefore important that animal welfare is improved but also that this approach is multi-factorial, one that simultaneously includes animal welfare, the ethics of the target audience

(livestock, entertainment, research) and understanding of the regulations in place. As such, an animal needs to be looked at from three angles to ensure its welfare: 1) biology, namely its ethology, physiology and ecology; (2) the law, namely any regulations pertaining to its use, and (3) ethics, namely what is moral to do or not. These three disciplines appear inseparable. However, in France very few universities offer courses that combine these three complementary fields. To date, a university degree in equine law is offered by the *Institut de droit équin* (equine law institute) and an animal law degree is offered by Limoges University. The VetAgro Sup veterinary school in Lyon also has a course entitled "Animal protection: from science to law", created in partnership with the French *Fondation Droit Animal, Ethique et Sciences*. Strasbourg University offers a Master's in Ethics and Societies with a major in animal ethics that includes lessons in ethology, animal ethics and animal law. The same university also offers a continued learning course on animal law for professionals as well as public lectures on animal ethics. We encourage the spread of these types of course in France so that all animal keepers or owners can learn the basics for ensuring their welfare.

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XIX
The French national strategy for animal welfare: 20 priority actions

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Ministry of Agriculture, Food-processing Industry and Forest

The following information and additional information are available here.

Priority action plan for "animal welfare"

The animal welfare plan clearly falls into the agro-ecological approach. The ambition is to support French initiatives at the European and international levels.

Point 1: know and innovate to adapt to a moving world

1. Creation of a national reference centre on animal welfare in 2016, whose mission is to provide scientific and technical support to all stakeholders, particularly livestock farmers, and to contribute to the dissemination of research outcomes and technical innovations.

2. Promote and support innovation in order to continue the development of animal welfare practices: € 4.3m will be granted to the project of sexing embryos in eggs, as part of the "investment programme for future".

3. Integrate animal welfare as one of the priority thematics of the "Agriculture Innovation 2025" plan and "Innov'action" plan of the chambers of agriculture.

Point 2: Make farmers the principle operator in the welfare of their animals

4. Promote the virtuous practices of the sectors and favour the implementation of good practices guides and charters drafted by professionals.

5. Set up a platform dedicated to training as part of the national reference centre on animal welfare in order to promote and facilitate access to all the training courses for all stakeholders and allow, when necessary, the update of training requirements in line with new knowledge.

6. Rely on the veterinarians' expertise specifically through their mandate from the government and thus reaffirm their role at the core of the animal welfare plan.

Point 3: continue the evolution towards animal welfare practices

7. Accompany farmers into the modernisation of barn structures, equipment and material and into the enrichment of animals' living environment through identifying and activating the financial leverage of the second pillar of the common agriculture policy.

8. Provide livestock farmers with technical tools to allow an even better prevention and managing of pain in their animals through the use of local analgesics and anaesthetics by farmers, and the implementation of training.

9. Encourage alternatives to painful practices such as castration or beak and tooth trimming.

10. Support the development of alternative techniques to the use of animals for scientific purposes: pursue the approach of the 3Rs (reduce, refine, replace).

Point 4: reaffirm the requirement of protecting animals at slaughterhouse

11. Reinforce State control: reaffirm the role of inspection by veterinary services at slaughterhouses (priority inspection field, staff supervision, crossed inspections, exchange of practices), increase the level of sanctions in case of proven mistreatments.

12. Reinforce vigilance inside slaughterhouses: generalise the nomination of a person responsible for the control of the methods of killing the animals in every facility, adapt their training, structure the network of these responsible people, organise formal meetings between the slaughterhouse's management and the departmental services for the protection of the population, protect all the staff in case of the notification of a problem.

13. Promote the modernisation of stunning structures and materials in abattoirs and support the research of alternative techniques (particularly alternatives to CO_2 stunning).

14. Make practices evolve to better implement the regulation related to the transport of animals through an inventory of good practices, and define the methods to implement slaughter on the farm.

Point 5: accompany livestock farmers with serious difficulties and overcome care deficit

15. Detect livestock farmers with serious difficulties at an early stage through favouring synergy among all stakeholders thanks to the implementation of prevention operational units.

16. Improve the time period for taking over the animals through shorteningthe procedure to withdraw the animals and through the internal expertise of the departmental services for the protection of the population network.

Point 6: fight against the abandonment of companion and leisure animals

17. Pursue the legal framework of companion animals' husbandry and trade in order to fight against abandonment of animals and promote responsible ownership: developing awareness and communication tools for (future) companion or leisure animals' owners.

Point 7: Do well and make it known

18. Make objective information on the definition of animal welfare and how it is applied in farms available to consumers. Enhance French production assets such as free-range farming through quality and origin certifications (organic label, Label Rouge, protected or controlled designations of origin (AOP/AOC)), in order to increase the agro-ecological approach of the agricultural sectors.

19. Raise the work of professionals and the strengths of the French livestock farming at the European level, and promote the principle of reciprocity in the commercial trade with third countries.

20. Make the progress of the national plan for animal welfare public through the implementation of follow-up indicators of priority actions.

Conclusion to the symposium: Animal welfare, law and ethics

Louis Schweitzer
president of La Fondation Droit Animal, Ethique et Sciences

The text is transcribed from Mr Schweitzer's final speech.

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To conclude this conference, I would like to briefly discuss four points:

Opinion of the German Ministry of Agriculture

The first point concerns Germany: in 2015, a scientific committee for the Ministry of Agriculture released conclusions which seem quite strong to me. It stated that the current farming system will not be viable any longer and is not sustainable in the long term because it is socially and humanely unacceptable anymore. The first conclusion of the experts is that if our current livestock farming system is no more viable, it has to change. In Europe, this change comes from governments. We heard from Pr Broom the fact that, in the United Sates, change comes from society. It may be slower, but this change, or at least the demand for a change, is happening worldwide. The German scientists made nine recommendations. I will not detail them in full, but these recommendations are the exact application of what was presented today: we need to offer farm animals the possibility to go outdoor, to have enough space, to show their normal behaviours, to have a social life and we must put an end to everything related to mutilations. The Germans added two points that were not discussed today: one is about chemical substances and other medicines that we inject in our animals for other reasons than health, and the other one is about the training of those who are in charge of rearing animals. The German experts, because they are realistic, reckoned that these changes will lead to additional costs that they estimate at 3 to 5 billion euros. These amounts are significant: they represent 13 to 23% of the annual expenditure of livestock farming in Germany. In other words, these experts did not only make a general, timeless statement. Interestingly, they stated what had to be changed, that it will cost money, but that it needs to happen.

Opinion of the French ethics committee for agricultural research

The second point I would like to discuss is the initiative taken by the ethics committee for agricultural research in France, which I had the honour to chair until 2015, and which works for the Cirad, the first organisation of agricultural research specialised in the North-South link, and for INRA, the National Institute of Agricultural Research, the second most significant agricultural institute worldwide. In 2015, after an in-depth study, this ethics committee took into account the issue of animal welfare and made a few recommendations that I will discuss. It has to be underlined that the top executives from these two organisations, INRA on one hand, Cirad on the other hand, are committed to implement the recommendations of the committee. We had the privilege to listen to some researchers from INRA, who gave us outstanding presentations, but these researchers - there are about 70 of them at INRA - are only a minority in organisations which aimed primarily at productivity, and more recently at the environment. What are these recommendations?

1. Animal welfare as end in itself

The first one is to recognise that animal welfare must be one of the goals to reach in farming. It seems very simple, but it is very new. Until now, the aims of livestock farming were to produce quality food in efficient economic conditions; today we say that these must not be the only aims, because animal welfare is one of them too. Let me be clear, there is a link between the efficiency of a farm and animal welfare; this was underlined. There is also a link between animal welfare and the quality of the products made from the animal. But saying that it is a goal in itself goes far beyond. By stating that animal welfare is a goal in itself, an ethical goal, independently from any economic reason, we clearly converge with what the experts from the German Ministry of Agriculture stated: livestock farming is condemned if it is not modified. It is not viable in our societies. And this is important, not only for the animal: while it is first and foremost a concern for animal welfare, it is also, as underlined by the ethics committee, essential for the well-being and the life of those who take care of the animals, whether it is the farmer himself/herself, or his/her employees and of all those who work with animals. It is a not a desirable life to work with unhappy beings.

What is it about, precisely? First, it is about developing further animal welfare research at INRA and this development has two objectives. In the first instance, knowing what animals feel, as it was discussed today. How do we assess their welfare? We saw that, on this issue, there have been much scientific progress, but much still has to be done: the animals show compelling behaviours but they do not speak. A second topic of research is as important: how do we assess, how do we evaluate from outside the welfare of an animal? Pr Broom referred to this: it is clear that a vet, or an inspector, who is visiting a farm, needs to assess the reality of the welfare of the animals in a reasonable amount of time. An effort in research has to be made on this topic, and it involves, for the country in which CIRAD intervenes, the integration of animal husbandry practices, human-animal relationships that are very different from European practices and which cannot be reduced to them.

2. Integration of animal welfare

A second objective is to say that animal welfare is not only a goal in itself, it also has to be part of all things related to livestock farming, which means that research teams at INRA must not only be strong, but they need to be included in all animal husbandry research fields. In other words, there is not one sector dealing with animal welfare on one hand, and sectors dealing with topics commonly known as important such as economy, fattening, reducing the amount and cost of all inputs on the other hand. Productivity and welfare must constantly be included everywhere.

3. Vigilance on genetic selection

Another important recommendation deals with genetics; Pr Broom also referred to it. Research institutes work a lot on genetics and the traditional objective is to make animal breeds which maximise production. The position of the ethics committee is: "*Animal selection, however it is done, must not result in the reduction of the welfare of the animals or in decreasing their ability to reach a welfare state.*" This point is important: animals that are structurally denied welfare are one thing, and we have created cattle and avian breeds which are structurally in a bad state of welfare. But we can also imagine a genetic selection which creates vegetative-animals, if I may say, which means that they are unable to experience welfare; this is ethically just as condemnable.

4. INRA as a prescriber

Another remark: INRA, top executives as well as researchers, engineers, supervisors, are prescribers constantly liaising with the professional world of livestock farmers. In France, it is well-known that INRA has been a prescriber of agricultural models. Organisations and their researchers

are invited to meet the professionals, to maintain a dialogue and also to offer training. In other words, it is necessary to ensure that animal welfare know-how is spread and to do it actively: we should recognise that this implies that researchers and staff at INRA are trained on how to go and meet them, which will not always be easy. We know that there will be positive welcome, but meeting people and explaining things which does not always bring – or seen as not always bringing – an immediate benefit demands an additional effort.

5. Exemplary behaviour and animal welfare charter

Another recommendation concerns INRA, which itself rears and experiments on animals. At INRA, there are experimental farms. Of course, it is not possible to defend something and not respect it: INRA's commitment is not only to respect all the national and European norms on animal husbandry, but also to create an animal welfare charter which will apply to itself, and to have a willingness to be exemplary as regards animal welfare. In other words, it as about saying: "*See how I do and how I would like you to do*".

6. Implications at European level

Finally, one of the recommendations of the ethics committee is that INRA must participate actively in every European programme related to animal welfare.

Other recommendations are stated in this opinion of the ethics committee. It is 25 pages long and can be found on INRA's and Cirad's websites. I of course invite you to read it carefully, because it shows a major turning point on the approaches of our national research institute towards animal welfare, and this has to be underlined in our conference.

National strategy for animal welfare

The third point of my intervention will be brief: I want to underline that this is the first time that France officially announces a strategy for animal welfare. I thank Mr Dehaumont for his presentation which exempts me from discussing this strategy in full details as he has done it perfectly. I would simply make one comment: I am not sure that one of the predecessors of Mr Dehaumont, director general of Food for the Ministry of Agriculture, would have come to speak in a conference on animal welfare five or six years ago, and I am not sure that he would have been applauded. I wanted to underline this. This strategy definitely does not include many quantitative goals, that there are still things to do, we can still progress on some aspects; but the important thing is that it exists, that it has been published, and that Mr Dehaumont came to present it to us. One aspect of this strategy, which will serve as a transition to my fourth point and which is a strength of this conference, is that it has enabled dialogue. France explains in this strategy that it will be proactive, positive in the effort to put in place European norms on animal welfare. We have to acknowledge that when Pr Jean-Claude Nouët and I went to Brussels a few years ago to discuss possible progress for European regulations on animal welfare, France was not seen as the most active country in supporting more stringent and tougher norms. I now have the hope that this opinion on France is no longer present, that in maintaining a relation with Germany, and that France and Germany speak together in favour of effective Europeans regulations enabling progress for animal welfare.

International trade agreements/treaties

Now my fourth and final point is precisely on the international level, which is central for three reasons. The first one is of course that animals live on the entire surface of the earth and that there is no logic in saying that one is interested in animals in only some place, some country. The second one is that animals, living or dead, travel around the world, and this trade is the source of a competitive pressure, bringing with it threats that the worst practices, those only oriented towards

an immediate financial profit, block any chance of progress in other countries: it is not totally by chance that Switzerland, whose system is very protected, is a driving force in animal protection. The third issue on the international level is that there is less possibility of expression of public opinion and political capacity. As a result, the balance is more on the side of the economy and less on the side of social demand. This clearly means that WTO's actions and efforts to link free-trade to the respect of animal welfare norms must be supported. This means that in international negotiations between the European Union (EU) and Asia on one hand, and the USA on the other hand, the demand for animal welfare must be brought by negotiators in places where actions occur. I say it emphatically: it is the European Parliament, where I think opinion can be vigorously expressed, which must approve those trade agreements, also with the support of the EU. There are fields where the EU has obviously been a progress factor. Animal welfare, I say it again, is one of the fields where the EU has been a drive of progress.

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Now I would like to conclude this conference with two final remarks. The first one is to come back on its international dimension. As in our 2012 conference, we have enabled scientists and experts from all over the world to intervene. I must say I am delighted that science in this field is indeed international. It is also important to give the floor to specialists from all over the world because, at the same time it enables us to discover better practices and to note that bad practices spread. At an international level, it is a struggle between the progress taken from others' best practices and bad practices which are contagious. My conviction is that animal welfare progress will be international or will not be. This creates for us both possibilities of action and challenges.

My second remark is more national. In France, and also elsewhere, investigations show that, in their vast majority, men and women are in favour of animal welfare. We can multiply opinion polls, support is always massively predominant; but the reality, in the political debate, is that this vast majority is very badly organised in front of a minority which is much more organised and thus often much more effective. It is then essential, for those who are active supporters of animal welfare, to coordinate, to organise common actions, and to seek allies, because if we do not act this way, we can be right and yet lose. Our objective is indeed to find allies. On 24th November 2015, I had the pleasure to participate in a conference on animal welfare organised by the National veterinary board, chaired by vet Dr Michel Baussier. One could think that these two conferences only 10 days apart are competing. I note that the two conferences are also two successes and that, without the alliance with veterinarians, our actions are limited in France. The director general for Food also underlined that he was a vet: he is therefore interested in our subject. If we want to turn our ideas and opinions into concrete actions, it is very important that we succeed in establishing this alliance; convergence of actions will give us efficacy.

These are the messages I wanted to share in my conclusion. They are not as attractive as some that you heard today, but I hope that they will enable us in a future conference - maybe we will hold one on wild animals as we have not talked about them much. Progress is always slower than we would want or hope; but at last I see an ongoing dynamic. No matter the subject, this future conference will also help us assess how much the progress which we are hoping for is accelerating.

Animal Welfare: from Science to Law

The conference "Animal welfare: from Science to Law" took place on 10 and 11 December 2015 at the "Maison de l'Unesco" in Paris, under the patronage of the French commission for Unesco. It was organised by the Fondation for Animal Law, Ethics and Sciences (La Fondation Droit Animal, Éthique et Sciences – LFDA). This document gathers texts written by the invited speakers and was updated in 2018. The publication is divided in four parts:

- Part 1: What is animal welfare?
- Part 2: Animal welfare as taken into account by law around the world: globalisation and disparities
- Part 3: Animal welfare in the face of socio-economic and cultural factors
- Part 4: Objectives for the future: finding alternatives, overcoming the shortcomings

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