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Bridging the divide between science and animal ethics

The morality of industrial animal farming with regards to animal welfare

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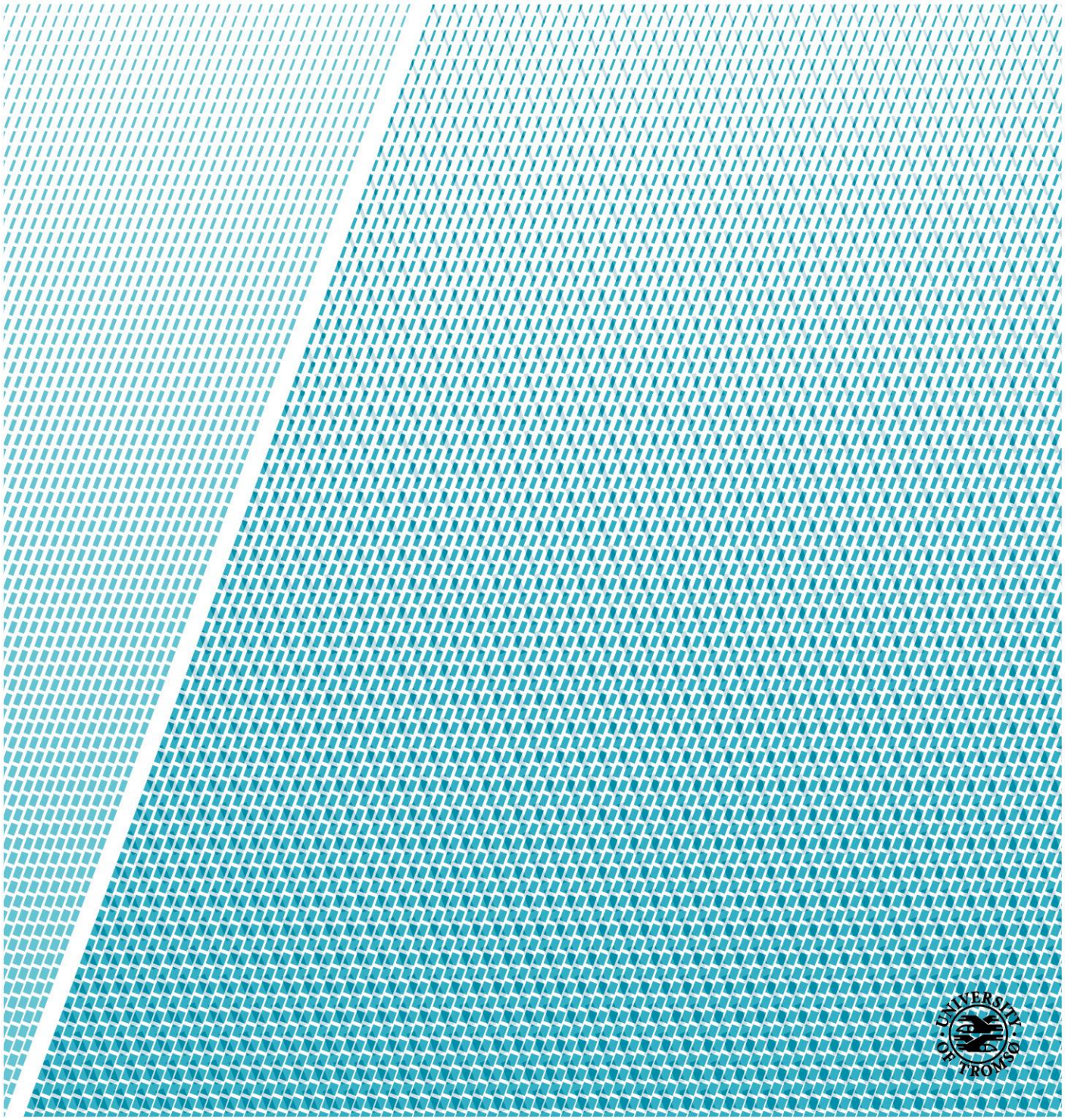

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ABSTRACT

Current debates regarding animal rights and ethics tend to remain separated from the relevant science and scientific evidence. The aim of this thesis is to therefore help fill this gap by bringing together moral philosophy and the scientific study of animal welfare in the context of industrial animal farming. Although the facts and research exist, they have so far mostly remained independent of the ethical questions industrial animal farming raises. Discussion will draw upon empirical studies and scientific theory to debate the three main areas of evolutionary closeness, pain and physical discomfort, and psychological suffering to demonstrate how the conditions and practises in industrial farming affect animal welfare. The evidence presented regarding whether animals suffer in industrial conditions is used to conclude that it is not morally acceptable to continue to industrially farm animals. The impacts of industrial animal farming upon the environment, human health, violence and animal welfare additionally demonstrate that this system is of significant relevance to the field of peace studies.

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CHAPTER 1: INTRODUCTION

Industrial animal farming (IAF), also sometimes referred to as factory farming or confined animal feeding operations (CAFO), is the biggest cause of animal abuse in the world today. Conservative estimates propose that over 53 billion animals are intensively reared and killed for consumption each year with approximately 3,000 dying in slaughterhouses every second, not including marine animals (ADAPTT, n.d). The scale is so large that to achieve a comparable amount of death in humans we would have to kill the entire human population seven times over each year (based on the current 7.4 billion world population estimate). It is not surprising then, that in order to produce and process such a high number of animals and their products, they are reared and killed in a manner which is likely to raise serious ethical questions. Given this, what is surprising is the lack of academic and scientific engagement with an issue that is worthy to be at the forefront of professional debate. Barring a few exceptions, the cause has mainly fallen upon animal activists who are left to question the conditions of the IAF system, unaided by wider criticism.

Until recent years, the movement against IAF is not one that has resulted in many highly significant changes. In some aspects the attempt to improve or change the industrial farming systems has even taken steps backwards; the UK Conservative government aimed to reduce farming regulations (Conservative Party, n.d) and even repealed some of the animal welfare codes within the chicken industry (Mason, 2016). There are several reasons why the movement for farmed animal welfare does not seem to be as successful as other movements of its kind, the main one being that unlike humans, animals are unable to mobilise and speak out for themselves. Animals are therefore dependent upon humans to speak for them which is not as effective at invoking empathy as the victims themselves detailing their suffering. There have been huge improvements in companion and exotic animal welfare as empathy has been extended, but animals used for consumption are somewhat excluded from this change. Peter Singer has proposed a number of reasons why even less consideration is given to farmed animals, these include conservatism over what we eat, the profit producers make from the system and the heavy influence of tradition and history on our perceptions of animals and food (Singer, 1975).

The fundamental concern with IAF which forms the basis of this thesis is often dismissed in academia as one for 'animal lovers' and not worthy of intellectual enquiry (Linzey, 2008). However, the issue of IAF is one over the basic concerns of oppression and use; to object to

opposing these problems when they are placed upon animals is to make them not issues in themselves but instead turn them into principles that are context dependant (Singer, 1975). This thesis is not concerned with the debate around eating meat per se; the morality of killing another being and the related issue of consuming and using animal products is a different debate, the focus is instead on the methods of production and mainly confined to addressing animal welfare. Additionally, the present thesis is not the place to question the necessity for animal products in detail (although it is relevant in assessing the necessity of IAF) but evidence suggests that diets which omit animal products are not only adequate but also massively decrease the risk of health problems such as heart disease, obesity and some cancers (e.g. Bouvard, et al., 2016; Pan, et al., 2012; Yokoyama, et al., 2014). Throughout the thesis there will be specific focus on chickens, pigs and cows but that is not to say that the industrial farming of other species is any less significant. There are many more species within the West that are intensively farmed, including fish, rabbits, sheep, lambs, horses, ducks, turkeys, geese and goats while in the East dogs and cats are commonly bred for food. However, in the West chickens, pigs and cows are the species which are most considered to be for food, yet it is worth noting that engaging in industrial animal farming regardless of species is likely to be just as problematic.

1.1 Thesis aims

The main aim of the thesis will be to provide a discussion over what scientific theory and evidence can tell us about whether animals suffer in IAF and what this in turn can contribute to the wider moral debate over whether it is morally acceptable to continue to industrially farm animals. Science can aid in determining how exactly the welfare of farmed animals is being effected by current farming practices. To do this, the capabilities of farmed animals to biologically and psychologically suffer will be addressed by presenting and discussing evidence and theories from three main areas: evolutionary closeness, pain and physical discomfort, and psychological suffering. In examining these areas there will be an attempt to relate them to the philosophical and moral debate within animal ethics.

In using scientific works and ideas from moral philosophy, there will also be an attempt to fill a gap in the current animal rights debate. Understanding whether animals have the capacities that allow them to suffer and how these are effected is an important part of the argument. However, the science and facts that inform these points have not been commonly and comprehensively presented as a strong and mainstream argument within the animal rights

debate. Although the facts and research exist, they have so far mostly remained independent of the ethical questions IAF raises. It can thus be hoped that by introducing science and facts to animal ethics not only will the issues of IAF be taken up in professional circles as an important matter of discussion but that it will also speak to a wider audience. Additionally, in integrating the areas of science and philosophy, it will also show how science can be used to support the area of animal ethics and how moral questions can also play a role in the application of science. In doing so, it is hoped that the thesis will contribute to answering the question of whether science can have anything to say with regards to moral issues.

One last aim of the thesis is to show how questions of animal ethics, specifically within IAF, are relevant to peace. For example, IAF can be argued to be responsible for a substantial amount of both direct and structural violence, which is a barrier to the attainment of both negative and positive peace. In line with aims of development and positive change (United Nations, n.d), peace and conflict studies does not benefit from its general lack of attention to issues of potential injustice done to non-human animals. Issues of animal welfare are as deserving of the attention of peace studies as much as central issues like armed conflicts and the oppression of minorities.

1.2 Method

The thesis will draw heavily upon scientific theories, methods and research to form a basis from which to understand animal suffering in IAF and its moral significance. Much of the evidence used will be based upon pre-existing literature in the form of academic research papers and studies carried out in the fields of evolutionary biology, animal pain, animal psychology and veterinary sciences. There will also be several key authors whose works and opinions will be drawn upon throughout the thesis, most notably Richard Dawkins in the realm of evolutionary origins and history and Sam Harris in relation to moral considerations. The works of academics such as Marina Stamp-Dawkins, Dr Donald Broom and Marc Bekoff will be used to inform the debates around animal experiences and the potential for physical and psychological suffering.

It is worth noting that there is downside to using this method. The sources used were gathered through either directly searching for them and topics similar to them, or through following citations within these sources. A wide variety of books were also used which again were self-selected based on relevance to the thesis topics. The main problem with this is the potential for bias with regards to the nature of the information gathered and used. For instance, based on

search terms used, sources favouring one position may be more prevalent than another and thus skew the direction of arguments, sections or even the whole thesis. However, any information bias is somewhat offset due to most of the sources being scientific in nature and therefore placing importance upon objectivity, often ensured through adherence to strict methodology's and controls.

1.3 Research questions

The two main research questions to be answered are: 1) how do conditions and practises in IAF cause animals to suffer? 2) is it morally reasonable and acceptable to subject animals to industrial farming systems? In addition to answering these two questions the thesis will simultaneously show how addressing animal welfare questions can contribute to a deeper, more encompassing understanding of peace.

Chapter 2 will begin by outlining the core philosophical concepts and ideas which will be used throughout. Chapter 3 will provide a descriptive summary of IAF including common treatments and practises as well as environmental and health implications, while chapter 4 will discuss how IAF and animal welfare concerns in general are relevant to the field of peace studies. Chapters 5 to 7 will make up the main debate and will examine the areas of evolution, biology and physiology, and psychology respectively, before ending with an overall conclusion in Chapter 8.

CHAPTER 2: PHILOSOPHICAL CONTEXT

This chapter will start by outlining some of the core philosophical terms and positions which have relevance to the field of animal ethics and the IAF debate in particular. The following section will attempt to explain how and why science and moral philosophy should each engage with the other, before moving on to establish criteria and positions for use in the assessment of welfare and moral equality in the last section.

2.1 Background to animal ethics

There are three main positions or beliefs regarding animal ethics which lie along a continuum; that animals completely lack moral status, animals possess moral status but it is lesser than that of human, and that all animals are more or less equal in moral status. The position held subsequently determines attitude towards and treatment of animals, for example, those who hold a moral orthodox view that animals have some, but not equal, status promote humane treatment in most cases but believe welfare should be compromised where it may benefit

humans (Garner, 2005). Conversely, one key approach within the moral equality position is that of utilitarianism which was founded by Jeremy Bentham (1748-1832) who stated that people should attempt to maximise the overall amount of happiness and pleasure in relation to pain and suffering, often called Bentham's Greatest Happiness Principle (Kalof & Fitzgerald, 2007, p. 4). Since then, utilitarianism has developed and expanded from the classical/hedonistic position of Bentham to include variants such as act, rule and preference utilitarianism, which differ with regards to the basis upon which equal consideration is weighed. Regardless of criteria, the primary idea is that behaviour ought to be centred towards 'maximising satisfaction of interests' overall, and therefore not just of ourselves or of Homo Sapiens (Matheny, 2006); in order to maximise overall satisfaction, the interests of all individuals involved have to be taken into account. At its simplest level, utilitarianism is a theory of moral equality that generally holds that there is no legitimate reason to award non-human animals a lesser moral position than humans (Wilson, n.d).

One of the most recognised variants of utilitarianism, especially with regards to animal rights, is preference utilitarianism and is most closely associated with Peter Singer. Preference utilitarianism emphasises that human behaviour should be centred towards the satisfaction of wants and preferences, in which equal weight should be given regardless of species membership (Hill, 1996). Singer (1975) added to this approach in introducing the principle of the equal consideration of interests; consideration should not depend on what abilities etc. a being does or does not possess so lesser importance should not be placed upon the interests of animals than those of humans, interest should instead be awarded equal weight where they are common (Wilson, n.d). Equal consideration consequently involves determining the interest present and how they are affected (Wilson, n.d), especially with regards to the universally common interest of living a life with pleasure in the absence of excessive and unnecessary pain (Singer, 1975). However, utilitarianism and equal consideration do not imply that species should be given identical treatment; there exists some differences between species that render certain rights needless, equality is instead equal consideration of common interests and may therefore result in different treatments and rights between species (Singer, 1975, p. 2). Therefore, the equal consideration of interests principle allows for the disposal of the view that species membership is what matters morally, to express an attitude otherwise can be referred to as 'speciesism'; described by Richard Ryder as a prejudice, not unlike racism or sexism, which discriminates based upon irrelevant features and characteristics (Ryder, 1991). In expanding upon this concept, Peter Singer defined speciesism as 'prejudice or attitude of bias

in favour of the interests of members of one's own species and against those of members of other species' (Singer, 1975, p. 6). To state the primacy of human concerns when one is given the chance to justify subjecting one species to something over another is a common demonstration of speciesism (Garner, 2005, p. 19).

When it comes to animal ethics and the concept of speciesism, it is briefly worth mentioning the importance of engaging in moral philosophical debate. Posner states that it is fact alone which holds the persuasive power in changing attitudes and perceptions, and that all moral and philosophical debate on an issue is ineffective as beliefs about the status of animals 'cannot be shaken by philosophy' (Singer & Posner, 2001). However, to counter the view that philosophical debate is redundant it can be argued that the point of ethics is to use a normative theory to examine the unexamined beliefs and values we hold to see if there is any valid justification for holding them (Garner, 2005), which in animal ethics are the beliefs about the status of humans and, in particular relation to IAF, the beliefs we hold about the status of farmed animals. Singer elaborates on the necessity of moral debate in addition to factual evidence by suggesting that even though evidence will go a long way in giving humans more empathy towards animals, it does not explain why we should subsequently retain and act upon such newfound empathy (Singer & Posner, 2001).

2.2 Merging science and animal ethics

It is a common belief that the areas of science and philosophy are completely separable, founded on the conviction that neither area can inform the other; scientists cannot answer philosophical questions and philosophers can add nothing to scientific disciplines (Harris, 2010a). However, this traditional view of the relationship can be challenged and reflected upon in two ways: firstly, *can* science be relevant to moral philosophy and secondly, *why* should they interact to address moral issues. With regards to the former, there have been some attempts to address this gap such as paring biology (Rodd, 1990) or cognitive ethology (Bekoff & Jamieson, 1990) with animal ethics. The general relevance of facts and science in answering moral questions is explained by Sam Harris (2010b) who maintains that the values we hold are usually, in some way, concerned with living creatures, meaning our moral and ethical positions are also directed towards conscious receivers. What most moral dilemmas have in common is that they directly engage with the wellbeing of the conscious person or people involved (Harris, 2010a); a factor which can be seen as fundamentally scientific. That is, welfare is mainly comprised of health factors both physical and mental which can be subject to objective

measurement and study using scientific theory and method (Broom, 2016). Harris therefore proposes that all human values and moral concerns essentially come down to scientific facts (Harris, 2010b).

Harris further clarifies that if there are basic factual truths about what constitutes good welfare, and assuming we generally desire to have high welfare, then there are also basic moral truths (2010a). Therefore, in following this reasoning, the general principle would be that anything which causes avoidable detriment to welfare is morally wrong. Harris does not explicitly extend these ideas to include the welfare of animals in any significant way but in using his rationale that human values are informed by facts on welfare, animals are inescapably involved; welfare applies to animals much the same way as it does to humans in that they can suffer and be affected by ill health. The moral orthodoxy, which permits some exploitations of animals, will arguably only change if animals are shown to be morally equal to humans or that 'their interest are comparable in most ways' (Garner, 2005, p. 17). Interests such as not experiencing pain or mental deprivation are also interests in not having poor welfare, thus assessments of animal welfare are a solid basis from which to examine the morality of IAF. The scientific consensus brought on by such assessments can help determine what constitutes good welfare in order to inform us which choices and actions are more morally correct.

With regards to why science and moral philosophy should interact, it can be suggested that in the case of more layered moral issues, which do not always result in clear or direct effects, informed reasoning can be beneficial. Joshua Green suggests that for those frequent occasions in which science does not provide an obvious answer to moral questions, we instead have to engage ourselves in moral reasoning (Green, 2010). Usually, people make decisions to moral dilemmas by using 'moral intuition', a set of basic, automatic rules which are a product of our biology, culture and individual experiences. Green states that in the past this kind of thinking was sufficient, as ethical dilemmas tended to be less complex and globalised. However as intuitions are less dynamic they may produce untailored moral responses which are not appropriate for maximising welfare. Therefore in addition to moral intuition, Green explains that people possess another form of moral decision making which utilises reason to engage in deeper, more informed contemplation (2010). Moral reasoning is thus the manual form of moral engagement and is conscious, deliberate and flexible. By using reasoning, responses can be customised to the unique context of the moral issue at hand, perhaps producing a more appropriate conclusion and response.

Intuition is a tool often used by philosophers in moral discussion but when it comes to questions of animal ethics and welfare, it is particularly difficult to invoke for the animal defence side of the debate (Garner, 2005, p. 17). Reaching answers to such questions thus requires intelligent analysis by paying attention to the facts and contexts involved, being informed by the science and evidence, as well as engaging in higher order thinking such as logic and critical analysis (Green, 2010). With regards to the ethical questions concerning IAF, Green suggests that we need to use our ability to think in depth about a topic as we do not have any biologically or culturally generated response which are particularly appropriate for dealing with its many impacts; the particular environmental, health and animal welfare concerns are new situations for us. Our ability to deliberately try to find the most ethical and beneficial solution, detached from emotion, is what will benefit us when faced with these new problems and it is in this way that the integration of science and moral philosophy will have one of its biggest impacts.

An additional reason why science and moral philosophy should be united is that both the causes of promoting science based reason and that of animal ethics can mutually benefit from engaging with each other. Robert Johnson (2014) states that those who work for the promotion of scientific engagement believe that the cause already has enough to concern itself with in engaging with religious extremism and secularism so are thus reluctant to become involved with alternative ethical issues. However, animal ethics has relevance to hundreds of billions of beings, including humans, and in many cases is significant in determining the life and death of many of them. It is hence worthy of the attentions of science promotion. That being said, promoting science based reason should also become involved with animal ethics, and moral questions in general, for its own sake. There are direct benefits to some of the key goals of science promotion in engaging with animal ethics, including those of progress, positive change and development; applying science to everyday life is therefore not just promoted for its own sake, but also with the desire to see improvement in current global conditions (Johnson, 2014). More specifically, challenging constructed hierarchies and speciesism is perhaps critical if we want to be able to advance our knowledge of other species and the natural world (Carroll, 2011). Since these concepts are at the very core of the justification and legitimisation of systems such as IAF, fur farming and animal tourist attractions, challenging them from a scientific perspective can inform understanding and initiate progress for moral betterment. Therefore by applying science to issues within animal ethics, it is further adding to its value as a cause which aims for and achieves positive development and the reduction of violence.

There also exists particular benefits to animal ethics itself in actively pursuing positions from a scientific perspective. Those who engage in the cause of animal ethics are reluctant to advocate another under the belief that their own cause is the most important (Johnson, 2014). However, it can be argued that this is a doing disservice to the animal ethics argument; the lack of engagement with science causes a gap in the existing debate. Failing to provide concrete evidence and scientific arguments as to why other species should not be subject to use, is to fail to provide reasons why humans should extend their empathy to other species. As Singer states, our moral concern should only ever end at the point where 'there is no awareness of pain or pleasure, and no preference of any kind' (Singer & Posner, 2001). Regarding IAF, promoting the scientific evidence can add information about what constitutes good and bad welfare, by referring to subjects such as body systems, tissue damage, effects of pathogens and physiological and psychological disorders (Broom, 1998). Additionally, incorporating the cause of science functions to add legitimacy to the attempts to engage in animal ethics for the betterment of animal welfare, including within the food industries. Bringing IAF as a moral issue into professional and academic circles will not only prompt higher rational discussion in order to inform opinion and policy, it will also perhaps dissipate the somewhat negative perception often attributed to those who speak against modern farming and which essentially damages the animal rights cause.

Overall, despite the traditional views to the contrary, science is extremely relevant to animal ethics and vice versa. While Harris (2010b) tells us that science can be relevant to animal ethics because morals are essentially truths about welfare that can factually determine what is morally right and wrong, Green (2010) explains why they should, by highlighting the importance of conscious, detached thinking about moral questions for understanding. In addition to direct relevance, science and animal ethics can both benefit their own causes by actively engaging with the other.

2.3 Criteria for judgements

In order to be able to determine what is and is not morally acceptable in IAF, it is important to clarify what is meant by certain terms, as well as establish points at which certain practises and conditions become unacceptable. When discussing the case for moral equality it should be understood that the term here refers to the principle of equal consideration of interests discussed earlier. Interests are significant as they describe what is beneficial or positive for a being, such as an interest in not feeling pain and suffering (Animal Ethics, n.d(a)). From a position of moral

equality, the capacity to suffer is not only necessary but actually sufficient in saying that animals have an interest in not suffering (Singer, 1975, pp. 7-8). There are three main areas involved in the assessment of animal welfare, all of which can be subject to scientific investigation: animal functioning, affective state (feeling or emotion) and ability of an animal to live according to its nature (von Keyserlingk, et al., 2009). These areas can be determined by paying attention to many factors including absence of pain, good health and displays of natural behaviours which, if met, indicate the presence of good welfare (ibid.). If any of these factors are compromised then, depending on to what degree, welfare can be said to be poor. Given that welfare basically comprises of health and 'happiness', being in a state of high welfare can also be seen as an interest. Therefore, exploring whether animal welfare is affected by conditions in IAF also indicates whether farmed animals have interests which are also affected, what these interests are and what implications they hold regarding moral equality.

Identifying appropriate cut off points for acceptable levels of suffering or welfare is no straightforward task. However, for present purposes there are two main questions that will be asked when considering what is morally acceptable and not: is the suffering necessary, and is it justified. Determining if a practice that causes suffering, regardless of the amount, is necessary involves looking at whether there are other available solutions to the problem; that is, are there alternatives which would not cause suffering but which would achieve the same goal, or are changes available that would render the practise in question needless. Deciding whether a practice is justified means examining if there are sufficient benefits in doing so. With regards to the animals themselves, a utilitarian approach of maximisation of benefits should be used; a practise that causes suffering can be acceptable if overall benefits to animals are higher for doing so. However, acceptability is less clear when it comes to factoring in benefits to humans. In this context, all ways in which animal suffering could be related to benefits to humans essentially comes down to how beneficial IAF is to humans. Although this is perhaps a rather complex discussion, there is no shortage of evidence that IAF has many detrimental effects on humans, something which will be discussed in detail in sections 3.2 and 4.2. Discussion in chapters 5-7 will therefore operate on the assumption that IAF as it stands is not going to prove of sufficient benefit to humans to justify low animal welfare.

From a more personal perspective, it is felt that IAF is a method which has high potential to be detrimental to animal welfare, humans and the environment and is one which, due to its methods and goals, cannot realistically be prevented from being so. Given this, the only sustainable and compassionate solution seems to lie in ending the practice of industrial farming

which would mean ending our dependence on meat, eggs and dairy. Although completely eliminating animal products from our diets may seem at first a rather extreme position to take, it is in fact in line with the principles of anti-speciesism. Even in the unlikely event that conditions within IAFs were improved sufficiently so that farmed animals seemed to no longer suffer up until the point of slaughter, some critical facts would remain. In such a likelihood, it would still be acceptable for certain species to be bred, taken from others of their kind, deprived of a natural environment and killed prematurely. Therefore, the ideal would be to end all intensive animal agriculture as it is speciesist in nature, regardless of how it is improved. However, the elimination of all activities which can be considered speciesist is highly unlikely or will at best take a very long time. In the meantime, IAF's continue to operate, which is why despite the anti-speciesist position stated above, it is important to take a more orthodox animal welfare approach in order to encourage improvement in the present. It can then be hoped that with improved welfare and increased exposure to the realities of IAF, societal attitudes with regards to food and animal welfare will move in a more compassionate direction.

CHAPTER 3: BACKGROUND TO IAF

The current chapter will provide background information which will form a basis from which to assess the morality of IAF in further chapters. The first section will provide a brief description of IAF including the standard treatment for chickens, cows and pigs. The second section will then detail some of the wider impacts IAF has on the environment and human health.

3.1 Industrial animal farming (IAF)

Industrial animal farming is a method of producing animals used in consumption, either directly for meat or for animal derived foods, mainly milk and eggs. IAF's are standardised systems characterised by high animal density, intensive production, use of modern machinery and a subsequent high output (Gurian-Sherman, 2008). The turn to industrialised methods in the production of animals for food was sparked by the development of modern technologies in the mid-20th century, in which newly discovered methods of production were applied to food (Singer, 1975). Intensification and subsequent growth in expectations led to a massive increase in the amount of meat needed to keep up with demand, in which smaller scale methods of animals farming were not sufficient (ibid.). In fact, it has been estimated that the number of animals produced and slaughtered for consumption is ten times what it was in the 1940's, and continues to grow (Imhoff, 2010); chickens raised for meat in the US alone have increased by

500% since 1966 (Gurian-Sherman, 2008). Contrary to the misconception, farmed animals have not always been kept and reared intensively. Although the domestication of wild animals into high yielding farmed animals did occur during the agricultural revolution around 12,000 years ago, the scale, intensity and methods we see today are a relatively modern invention (Harari, 2015).

Despite the animal rights revolution in the 1970s' sparked by the publication of a number of key works such as *Animal Liberation* (Singer, 1975) and *Animal Machines* (Harrison, 1964), the prevalence of IAF continues to grow. The rising level of public and media attention towards the food industry has led some of the biggest meat producers in the world, such as Tyson Foods and Cargill, to take steps in commitments to animal welfare (e.g. Tyson Foods, inc., 2015; Cargill, n.d). Key developments include the publication of audit results, farm assurance schemes, increased regulations on antibiotic use and annual training for employees working with animals. Attempts at improvement have also been made at the international level, such as the 2012 EU ban on conventional battery cages for hens and the 2006 ban on veal crates which traditionally kept calves anaemic and immobile until slaughter. On the other hand, these improvements can be criticised as far from adequate in assuring high animal welfare; subsequent 'enriched' and colony cages offer no improvement in overall conditions or treatment (Animal Aid, n.d(a)) while veal calves can still be subject to barren confinement and deprivation of exercise (HSUS, 2012a). Therefore, although farmed animals used for agricultural purposes are afforded protections by the EU (Council of Europe, 1976), and to a lesser extent in the US by legislation such as the Humane Slaughter Act (USDA, 1978), in reality they are often far from adequate in providing significant improvement.

Before moving on to detail the specific practises that occur in the production of chickens, pigs and cows, it is worth mentioning some of the wider welfare concerns present in animal agriculture in general. Firstly, regardless of how each species is raised and slaughtered they all suffer the potential for abuse and neglect by the individuals employed either at factory farms or slaughterhouses. There have been numerous undercover investigations conducted in recent years which have revealed abuse by employees in a wide range of animals and locations. Although there are too many such operations to mention here they include instances such as pigs being scalded alive at a Belgium slaughterhouse in 2017 (Animal Rights, n.d), chickens so roughly handled for packing their wings are broken (Animal Aid, 2014), dairy cows with lameness and open sores having to lie down in their own waste (CIWF, 2012), and pigs in Spain being kicked, beaten with metal poles, stabbed with swords and even disembowelled

alive (Animal Equality, 2012). These investigations reveal that deliberate neglect, abuse and cruelty is a somewhat common occurrence in IAF and is mostly unmonitored. An additional problem faced by all factory farmed animals are the long transport durations which, in the EU, can legally last for up to 29 hours at a time in crowded conditions in which dehydration, hunger, stress and crushing causes prolonged suffering and even death (Robinson, et al., 2015a). Lastly, farmed animals are more vulnerable to death from factory fires, transport accidents and natural disasters; in the UK alone there are hundreds of case studies in which animals have been killed as a result of overturned lorries, floods, exposure and starvation after being stranded (Martin, 2014). All farmed animals in a system with inadequate welfare protection and lack of monitoring are therefore vulnerable to suffering at any stage of the rearing, transportation and slaughter processes. However, there are additional, unique welfare issues present within the production of each farmed animal.

3.1.1 Chickens

By far the most frequently farmed animals are chickens, with meat and egg industries producing more than 50 billion worldwide per year (CIWF, n.d(a)). Chickens produced for meat, or 'broilers', are typically confined to large housing units which contain anything from 10,000 to 50,000 birds per shed where they stay from 1 day old until about 6-7 weeks before slaughter (RSPCA, n.d(a)). Overcrowding means broilers are often afflicted with a number of health issues. Some of these include: ammonia burns from high levels of faeces, feather loss from abrasion and pecking as well as frequent cases of trampling and cannibalism. Additionally, since chickens reared for meat are bred and fed in such a way as for them to gain as much weight as possible as fast as possible they are often unable to support their own weight, hence many are lame or unable to move in order to feed (CIWF, 2013). Once broilers have reached a profitable weight to be sold they, like all meat producing animals, are transported to a slaughterhouse where they are pre-stunned, slaughtered on an automated blade and passed through a scalding bath to loosen and remove feathers. Although it is required by EU law that all chickens be stunned prior to slaughter, typically through an electrically charged water bath or gas stunning, a lot of the time it is ineffective in rendering the chickens unconscious (Animal Aid, n.d(b)).

Egg laying hens are also subject to high levels of confinement throughout their lives. Despite the progress in phasing out 'battery' cages in the EU the majority of hens are still typically confined to so-called 'enriched' cages. These consist of 'colonies' in which cages hold 60-80 hens, each having approximately the size of an A4 piece of paper to move (Animal Aid, n.d(a)).

One of the standard practices within egg-laying flocks is that of beak trimming which involves cutting or burning away the front of the beaks to avoid injurious pecking between birds, but which also effects feeding and preening (Bowles, et al., 2015). The male chicks produced in the egg industry are not considered profitable so are killed en masse on their first day of life usually by being macerated , gassed or simply piled into containers where they are crushed or suffocated (Tyler, 2011). When hens pass their egg-laying peak they are often then sent to slaughterhouses where they go through a similar process to broilers but are instead used for cheap pre-made foods (Singer, 1975, p. 118).

3.1.2 Cows

The last 50 years or so has seen an increasing intensification in milk production with 250 million cows currently producing milk globally, 23 million of which are in the EU alone (CIWF, n.d(b)). Increasing demand for milk has led to increased confinement and, more recently, a growing number of 'zero grazing' dairy farms. Zero grazing systems do not allow any time grazing outdoors and, despite still only making up a minority of dairy farms, are becoming increasing popular within the US and the UK (CIWF, n.d(e)). Most standard dairy farms do allow cows to spend part of the year outside although they are confined to cubicles for the other part. Both types of system however, generate potential welfare problems for the health of the cows although it has been found that 'zero grazing' farms have a higher prevalence of lameness, mastitis, nutritional deficiency and overall poor bodily health (CIWF, Eurogroup for Animals, 2015). Frequent disfigurement in dairy cow joints and hips can be observed due to weak bones and unnatural udder size which have been genetically selected for maximum yield. Most dairy cows hold a life span of around 4-5 years (as opposed to 25 year natural life expectancy) because they are typically sent to slaughter when they are unable to continue the cycle of insemination, pregnancy, birth and lactation. As with hens, dairy cows give birth to around 50% male offspring which are less useful to the milk industry than the females. Increasingly these calves are being used for meat despite not being as profitable as calves bred for the purpose but over 50,000 male calves are still killed at birth per year in the UK alone (CIWF, n.d(c)).

It is also worth briefly mentioning cows produced for meat, both for beef and calves used for veal. Traditionally, calves destined to be killed at a young age for veal were permanently confined to 'veal crates' or barren wooden stall where they were then kept anaemic, fed a liquid diet and tied down to stop them moving and building up muscle (Singer, 1975). Although 'veal crates' have now been banned throughout the EU, the persistence of barren, confined

conditions and relatively young ages of slaughter in veal production would still not meet legal requirements in many European countries (RSPCA, n.d(b)). Those cows raised for beef and veal are also subject to castration, often without anaesthetic, by either applying rubber rings to the scrotum or through surgery (Tyler, 2011). Cows reared for beef are killed at around 18-22 months but are granted more grazing time than most industrially farmed animals and spend most of their lives outdoors in feedlots (Explore beef, 2009). Both beef and dairy cows are slaughtered similarly by stunning with a captive bolt gun before they are killed by severing a major artery (Robinson, et al., 2015b). Cattle used for milk and meat are therefore subject to some form of genetic manipulation and sent to slaughter as soon as productivity wanes or potential profit is at its highest.

3.1.3 Pigs

Over half of the world's 1.3 billion population of pigs reared for meat are done so industrially, mainly in China and the West (CIWF, n.d(d)). In order to produce such high numbers sows are continuously bred and so, as with dairy cows, are only able to remain productive for 4-5 years before they become exhausted and are sent to slaughter. Although nearly all industrially farmed pigs are reared indoors and spend all or most of their lives in sheds, breeding sows are confined to farrowing crates and sow stalls for weeks before, after and during pregnancy. These crates are individual confinement spaces in which sows are unable to move or turn around, from this position piglets can be systematically fed. Despite an EU ban on sow stalls, they are still permitted to be used for up to four weeks after a sow has been inseminated and farrowing crates continue to be widely used (RSPCA, n.d(c)). Piglets also undergo a number of mutilations before being placed in close confinement. These include teeth clipping, tail amputation ('tail docking') and castration of male piglets, all of which are performed in the absence of any pain medication. Premature death in pigs is relatively high compared to other industrially farmed animals with an estimated 12% dying from neglect, disease and psychological stress (Tyler, 2011). Those that do survive rearing and transport to arrive at the slaughterhouse then go through the slaughter process which in itself may compromise welfare. For example, electrical pre-stunning may in some cases take multiple electrocutions to incapacitate the animals or the time left before killing may be left too long so that the animals are not unconscious before they are slaughtered (Robinson, et al., 2015b). Pigs are therefore subject to highly intensive confinement and are kept in conditions which may exasperate the development and spread of bacteria and disease.

3.2 Effects of IAF

Beyond the direct impacts that IAF has on farmed animal welfare there are also huge alternative costs which warrant significant consideration, the most noteworthy of which concern the environmental and human health.

3.2.1 Environment

Intensification has a large impact upon the environment, for which there are a number of major ecological consequences. The first of these is the high level of deforestation due to land clearance to feed and raise cattle, making the needs of IAF one of the biggest causes of deforestation. Other than the obvious destruction and loss of nature involved in deforestation there a couple of other direct effects, the first of which is contribution to global warming. Clearing large areas of trees for land is the source of 11% of human greenhouse gas production as not only do dead trees, stumps and leaves produce CO_2, the lower amounts of overall flora means less CO_2 absorption and O_2 production (Conservation International, n.d). Animal agriculture and its by-products are in fact the biggest contributor to greenhouse gas emissions equalling 51% of the global output (Goodland & Anhang, 2009), this is significantly more than the 14% contribution to emissions from all human transport put together (IPCC, 2014).

Additionally, deforestation is also the largest cause of decreasing global biodiversity and loss of plant and animal species in recent decades. This specific effect is not surprising given that 80% of the worlds land animal and plant species live in forests (WWF, n.d), any large scale clearance of habitat is thus going to destroy their means of survival. Even in countries which no longer witness a high level of deforestation, such as the UK, conversion of the natural environment to fields and farmland has had an increasingly negative effect on the local wildlife. According to the most recent RSPB State of Nature report the UK has seen a decline in 56% of its species, 15% of which have been so severe they are under threat of extinction from the UK altogether (Hayhow, et al., 2016). The overall loss of biodiversity impacts both local and global ecosystems, is a detriment to the environment as it causes widespread destruction of wilderness (Monbiot, 2013), thus is an obvious cause for concern.

The last of the wider environmental impacts of IAF is perhaps one of the most critical; ocean pollution. IAF's produce pollution from chemical and manure run-off, as well as dumping fish offal and fat back into the sea, which results in ocean degradation. The combined effects of this and overfishing cause huge ocean 'deadzones' or areas of algae boom which are so polluted and toxic they are unable to support life (Lymbery & Oakeshott, 2014a, p. 97). Although IAF

does not seem initially linked to the problem of overfishing it does in fact create a significant contribution in that the industry uses fishmeal for animal feed and fish oil for fish farming. Nearly a third of all global fish catch is used in these process (Animal Aid, 2013), much of which is made from actual marketable fish and not just the waste and offal as often thought (Lymbery & Oakeshott, 2014a, p. 83). The overall effects upon the ocean jeopardise sustainability, global ecosystems, food production and health and is therefore a serious issue to be faced now and in the future. Other direct human costs to environmental destruction concern the further inefficient use of resources. The crops produced on deforested land are mainly used to produce animal feed for IAF's. In fact 90% of all worldwide soya and one third of all cereals produced go directly to sustaining the animals raised for meat, instead of being used to feed people directly (Lymbery & Oakeshott, 2014a, p. 5). Therefore, the impacts of deforestation, global warming, loss of wildlife biodiversity and the degradation of the oceans are all intensified by IAF. Environmental destruction is a factor that is becoming of increasing concern but it is not the only cost created by IAF's that can be felt by humans.

3.2.2 Health

Not only does IAF impact humans through consequences to the environment, it also generates a multitude of direct and indirect health costs. Some of the more direct health problems are often a result of living in close proximity to industrial farms. Although direct links are difficult to determine there have been a number of correlations between asthma, birth defects and diseases and living close to factory farms (Lymbery & Oakeshott, 2014a, p. 23). The high levels of chemicals, manure spray, viruses and bacteria involved in keeping live animals in highly confined conditions may spread and affect those in in the local areas. In addition to possible contamination of drinking water there are issues of chemical smog and the manifestation of toxic waste lagoons which cause families to have to choose between leaving their homes, if even possible, or enduring potentially dangerous conditions (Lymbery & Oakeshott, 2014b).

A less direct yet larger health cost concerns the levels of nutrition in modern industrially farmed meat. Most farmed animal raised for consumption are done so in a manner which encourages production of as much volume/weight as possible, often through the use of artificial selection, steroids and reduced exercise. These methods mean animal meat and milk contains high levels of fat which, in the case of broiler chickens, is almost double the levels produced in 1940 before specific genetic selection for mass (Purvis, 2005). The high fat and chemical content in both meat and dairy, in addition to increased Western consumption is a problem when considering

the clear links between high mortality rates and animal proteins (Song, et al., 2016) including processed meat (Fields, et al., 2016) and even possibly milk (Michaëlsson, et al., 2014). These relationships are not only problems in themselves but also place a large strain upon state economies.

The final health concern worth mentioning is the problem of antibiotic resistance. Although the excessive use of antibiotics by humans is one cause of this effect, 50% of all antibiotics are used by the farming industry meaning it is a massive contributor to the growing resistance (Nathan, 2004). Antibiotic use on farmed animals is mainly done to stimulate growth and prevent disease. Antibiotic resistance is a pressing issue as it is increasingly leading to the development of resistant bacteria which cause illness and which are harboured in the animals and can then fairly easily spread to humans (Horrigan, et al., 2010; CDC, 2013). Despite uncertainty over the origins of many superbugs, the recent scares over 'bird flu', 'swine flu' and MRSA all demonstrate that regardless of origins, the issue of superbugs caused by antibiotic overuse is a one which has the potential to affect everyone. The fact that the uses of antibiotics in IAF's may not be a necessary, inevitable solution over improved conditions demonstrates that one of the most pressing medical issues of the 21st century could have in part been avoided.

Overall, the industrialisation of animal agriculture has led to large scale, systematic farms which potentially compromise animal welfare in many ways. In addition to direct concerns about farmed animals, intensification continues to have a negative impact upon the environment; effecting both the natural world and efficiency in resource allocation and use. IAF also contributes to pollution, unhealthy food and the crisis in antibiotic resistance all of which directly affect human health.

CHAPTER 4: PEACE RELEVANCE

The current chapter will discuss the ways in which IAF is of relevance to peace and conflict studies and the role it plays in the goal of attaining peace on various levels. IAF may be of particular relevance to a number of theories and concepts in the field, as well as playing a significant role in the creation and maintenance of some forms of structural violence.

4.1 Achieving peace

There are implications for the field of peace studies in the possibility that IAF may act as a barrier to the realisation of some of the key aims in peace and conflict research. The argument

put forward by Steven Pinker (2011) and declinists in general, that violence today is at its lowest level ever and that the 20th and 21st centuries are the most peaceful to date, can be questioned when faced with the realities of industrial animal farming. Overall, Pinker's extensive presentation of data and analysis in support of this theory makes it a hard fact to dispute in terms of conflict, war and even human rights but falters with regards to any other species but our own. Although Pinker does make some effort to address the conditions of other species by concluding that the rights and protections of animals have improved, he seems only to focus on those species kept as companions or which are considered exotic and endangered. This perspective therefore forgets the billions of farmed animals who are denied adequate protection laws and are subject to potentially cruel and invasive treatment at a rate which has actually massively *increased* in the past decades (Fraser, 2005). If then, the most common species of animals are to be included in the declinist calculation, of which there is no justifiable reason why they should not, it is difficult to maintain that the world is indeed less violent.

The questions around IAF can also be placed into the context of Galtungs' theories (1969: 1996) on violence and peace. The key concepts most worth mentioning are those of negative peace and positive peace. Given that Galtung states that the opposite of peace is violence (and not conflict) one way peace can be defined is as the absence of direct or overt violence, termed 'negative peace'. However, there are many other ways in which a population may not have peace despite not experiencing high levels of direct violence, such as those living with injustice. As a result, the concept of positive peace refers to integration, brought about mainly through social justice and harmony. It is only in the presence of both negative and positive peace that the more encompassing and ideal idea of 'peace' can be thought to exist. One additional concept significant for the realisation of positive peace is the concept of structural violence which will be discussed further in the following section.

The problem with attempting to relate Galtung's concepts of peace to the issue of IAF is that they do not seem to have been explicitly extended to any species beyond humans; the concepts of negative and positive peace do not traditionally include mention of the positions of other animals, included farmed animals. However, that is not to say that these concepts cannot or should not be considered with regards to other species. For instance, it can be suggested that the existence of IAF is a barrier to achieving negative peace as the system applied to animals for consumption is potentially one of physical and mental violence. Even if conditions for these species were to improve sufficiently so as to eradicate direct violence and suffering, there would still remain the question of positive peace. Again, the typical definition of positive peace

is specifically *human* integration, suggesting the conditions of animals is irrelevant. However, this seems a somewhat poor definition of ideal peace for even in the absence of direct violence, the continued production, confinement and use of farmed animals can be argued to be an unjust system in which the presence of suffering is likely. The ideas of peace put forward by Galtung and Pinker can be realised but only if we aim to achieve peace for humans alone, regardless of what happens to other species; an arguably poor goal for peace studies to limit itself to.

To expand the conditions of attaining positive peace to include harmony for animals and the natural environment would be to reframe Galtung's traditionally anthropocentric theory into one which could also encompass ecocentric concerns. Anthropocentrism is the view that humans are the only ones that hold intrinsic value and are the most important element of existence, meaning human interests come before all other concerns (Brennan & Lo, 2016). The ecocentric position on the other hand, holds that the natural environment and all living organisms do hold intrinsic value therefore human concerns are not to be placed over those of animals and nature (DesJardins, n.d). The objection to IAF over animal welfare considerations is of course following an ecocentric position but that is not to say that holding an anthropocentric position is to inevitably support IAF. On the contrary, although the two positions are often at odds they can both be used to argue against IAF. Beyond the direct effects upon farmed animals, objections can be raised over of the wider negative effects upon the environment, wildlife and ecosystems. Ecocentrism would object on the basis of the intrinsic value of nature while anthropocentrism can be used to argue that the degradation of the natural world is a loss to humans themselves; human enjoyment of natural landscapes and wildlife is reason enough to preserve it. Additionally, environmental destruction is a direct threat to human survival, and at the very least human potential, meaning IAF's contribution is an obvious anthropocentric concern. Therefore although ecocentrism is the main position here, both direct concerns for other organisms and for humans are significant in discussing IAF.

4.2 Structural violence

IAF creates an additional barrier to attaining peace by exasperating conditions of structural violence. Structural violence is perpetrated by institutions, systems or structures which cause either direct harm or prevent people from living to their full potential (Galtung, 1969) and may include exploitation, starvation, oppression or even lack of access to services such as education and healthcare. Instances of structural violence caused by agricultural industrialisation can be observed in less developed countries where local small-scale farming and fishing is often a

livelihood (Anderson, 2006). As large multi-national corporations expand and monopolise the food industry and developing countries begin to consume more meat, the produce from local establishments is becoming redundant. In places where farming or fishing is the only way to make a living, the removal of this is to remove not only means to an income but also a way of life, especially as many farmers are not equipped with the necessary skills for urban jobs (Kwa, 2001). Even in those cases where small farms accept the new rearing techniques and technologies, farmers still suffer as a result of the high levels of chemicals, poor animal conditions and environmental damage the new methods cause (Lymbery & Oakeshott, 2014a, p. 254). Therefore, the domination of large scale factory farms in agriculture causes the direct loss of livelihood, employment and income as well as pushing the industry towards ever more systematic and polluting methods.

Structural violence is also present on a more global scale in the form of unequal food distribution and food waste. There are currently 795 million chronically undernourished people in the world today, most of them inhabiting the 'southern' countries afflicted by low economic development (AO, IFAD, WFP, 2015). This is in contrast to the growth in prevalence of obesity in the developed world, caused by an excess of high calorie, fatty foods. The inequality in distribution of food means that although there is currently enough food produced worldwide to eradicate hunger and undernourishment (Holt-Giménez, et al., 2012), the richer countries get considerably more than poorer ones (Leathers & Foster, 2009). This system is an incredibly unjust one, especially considering the amount of food wasted globally, estimates which range from one third to as high as 50% of all food produced (Lipinski, et al., 2013). Food waste occurs at all points in the production process, the highest being disposal by consumers themselves. With regards to animal products specifically, the annual global losses and waste of meat is around 20% which is the equivalent to 75 million cows (FAO, n.d(a)). Not only is this a waste of food in a world where so many are ill-nourished but the plants grown to sustain the meat and dairy industry could instead be used more efficiently and sustainably as a direct food source for humans. These crops and the animal products they allow are not only put to inadequate use in feeding less developed countries they also, as mentioned earlier, contribute to environmental damage. Similarly, this wider contribution to climate change is also a form of structural violence upon the people in less developed countries who are unable to protect themselves against the effects.

IAF is of clear relevance to the field of peace and conflict as it arguably poses significant threats to attaining and maintaining peace. Industrial animal agriculture is especially salient in creating

structural violence as overproduction of meat, dairy and eggs not only takes away the livelihoods of people in developing countries but also contributes to the high levels of waste in the West. Nevertheless, the limitations placed upon the achievement of peace by IAF do have the potential to be removed in light of a global attitude change towards farmed animals and animals in general, including humans, of which science and welfare studies can play an important role.

CHAPTER 5: EVOLUTION

The first place science can be applied to animal ethics is through evolution and genetic similarity. A benefit to using evolution for refuting speciesism is that it has the potential to break down some of the constructions that humans possess about the status and role of their own species and of farmed animals. This chapter will therefore attempt to provide some answers to the question of whether it is morally reasonable to subject animals to IAF (research question 2) based on species categorisation. The first section will provide the background to evolution and the following two sections will address issues in the beliefs around essentialism/discontinuity and the superiority of Homo sapiens. As the chapter draws heavily on the work of Richard Dawkins, section three will provide a critical discussion of Dawkins in the context of applying evolution to the question of IAF.

5.1 Evolution and common ancestors

Charles Darwin's (1809-1882) theory of evolution was presented in 1859 in his now most famous work *On the Origin of Species* and was built upon in a subsequent book *The Descent of Man* in 1871. According to Darwin the term evolution refers to the change of organisms over time driven by the process of natural selection. Natural selection means that those organisms who possess abilities and characteristics which are better suited to their environment are more capable of survival, which in turn allows them to reproduce and pass on these characteristics to their offspring (Ridley, 2004a). Those who possess maladaptive characterises will likely die, not passing on their characteristics to future generations. Similarly, those who do not possess any beneficial characteristics that allow them to better acquire food, shelter and a mate will also lose out against those who do. As characterises which aid survival accumulate over generations, organisms become more adept at survival and reproduction within their environment in a process called 'adaptation'. Evolution therefore depends upon the external environment but also upon the existence of genetic variation within a species (Ridley, 2004a).

In order to be classed as a separate species of animal a population must be different enough that they cannot and do not interbreed in nature (Ridley, 2004a). However, the term 'species' is not as straightforward as it may seem. Breeding must occur in nature and not be forced or in artificial settings; two animals in constricted environments may still breed even though they may not be the same species. Additionally, offspring produced from interbreeding must also be fertile. This phenomenon can be observed in mules, the infertile offspring of a horse and a donkey. Even so, there are rare cases of different species interbreeding in nature and producing fertile offspring – sometimes called hybridisation (Stebbins, 1959). Species is thus a term which should not be taken as reflecting rigid naturally occurring rules in nature.

All species that exist today are descendant from common ancestors and have had approximately the same amount of time to evolve (Dawkins, 2004a), meaning that no one species is more advanced or 'more evolved' than any other. Evolution is not a linear process but is instead branched and complex with many evolutionary splits and species extinctions. Visual representations of evolution are therefore often depicted as a tree, the phylogenetic tree or 'tree of life' with billions of potential branches (species), each which can be traced back in time to reveal shared ancestors with every other species that exists or has existed (Zimmer, 2016).

Evolutionary origins and time are not the only things shared as the genetic patterns of most species are also remarkably similar. If we take one living relative of Homo sapiens, say gorillas, and compare the genetic codes of both it can be shown that they share 98.4% of their genomes, a rate only beaten by bonobos and chimpanzees (Dunham, 2016). The difference is therefore tiny but accounts for all of the observable differences between humans and gorillas. Genetic similarity is of course going to be closest between humans and primates but even so the difference is not very large even between those animals humans see as less similar to themselves. For example, cows share an 80% similarity with humans (Bovine Genome Sequencing and Analysis Consortium, et al., 2009) and even birds share the majority, with estimates of chicken-human parallels at approximately 60% (Spencer & Westerhouse, 2004).

5.2 Discontinuous mind

One way in which the knowledge obtained in understanding evolution can be applied to the issue of IAF is through considering the use of essentialism when classing and perceiving other animals. Essentialist thinking is the belief that all things have properties that are essential to making them what they are, they each possess an 'essence' (Robertson & Atkins, 2016). Also called 'discontinuous thinking' (Dawkins, 2011), it is also present in how we categorise and

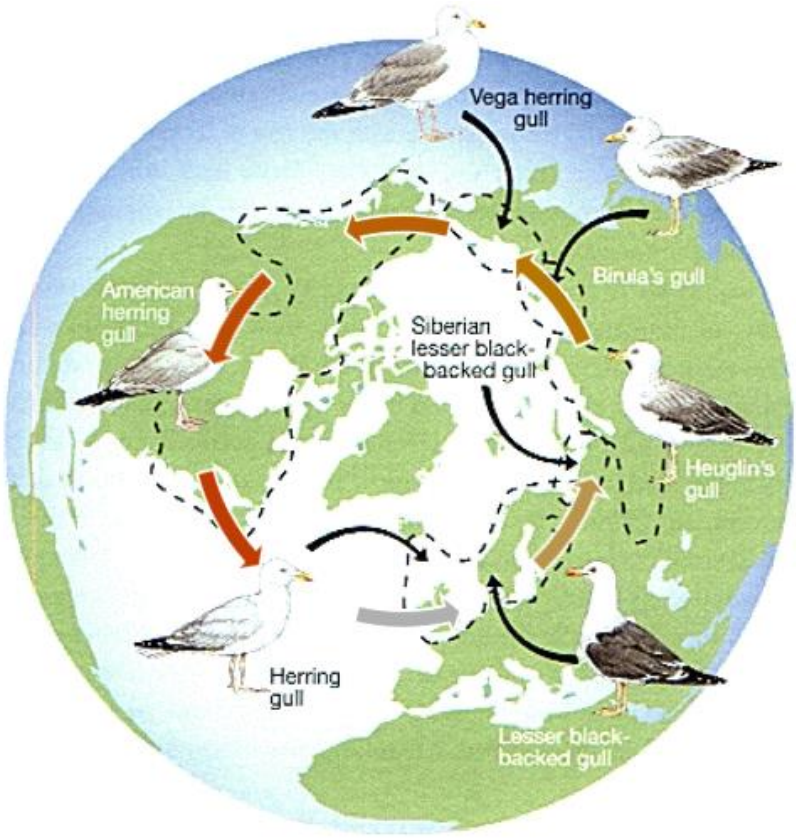

Figure 1-Geographical populations of gull around the northern hemisphere. Grey arrow indicates point at which interbreeding is not possible. Adapted from Darwiniana and Evolution (n.d)

perceive animals, including those we use for food. However, what the science suggests is that the species labels we use on other organisms and ourselves may actually be somewhat fictitious. The belief that a pig is a member of a discreet group fundamentally separate from humans and all other animal groups can be argued to be an inaccurate construction. The essentialist way of thinking with regards to living beings has also been called the 'tyranny of the discontinuous mind' by Richard Dawkins as it is the tendency to stick to ridged categories and deny continuity which has often led to great suffering (2011). Constructions of species can be analysed by paying attention to certain phenomena found in evolutionary patterns.

The existence of these constructs can be revealed by first paying attention to the existence of 'ring species'. Ring species are animal populations which are classed as separate species, they cannot interbreed, but are connected by a line (or geographical ring) of interbreeding populations (Ridley, 2004b). The classic example of a ring species which exists today is that of the Herring Gull and the black-backed Gull. Both types of bird are classed as distinct non-interbreeding species of Gull whose populations live in close proximity to one another (Dawkins, 2004b). However, if the population groups of the Herring Gull are observed around the world in the northern hemisphere each population is noticeably different from the departing

species and more like the other; this continues until the end of the ring is reached at the black backed Gull with the important factor being that this line is continuously linked by successfully interbreeding populations up until the 'species' split in the UK (Dawkins, 2004b) (see Figure 1). There is no point along the chain that one population group is unable to interbreed with the other meaning there is also no cut off point in which one population ceases to be one species and becomes the other. As there is no point where these species can be classed as completely separable the rigidity of essentialist classifications is called into question.

The unbroken linkage seen in the example of ring species is also present between humans and chimpanzees and, by extension, between humans and all other animals. This is not immediately clear on a day to day basis because all of the intermediates between most species happen to be extinct, minus a few rare cases such as the Gulls. In this case it is necessary to observe evolution through time as opposed to geographical distance in order to be able to see the indistinct connections. The continuous line of interbreeding intermediates between all species actually goes back to the common ancestor of any said species before continuing back up the genetic tree to the organisms we see today (Dawkins, 2004b). There is therefore a V-shape of indistinct populations which links humans to all farmed animals and it is only through chance that the intermediates between humans and, say cows, are extinct that we are able to see and maintain them to be very separate, very distinct species. This is even true for fish, which are seen as so fundamentally different from humans they are not even afforded basic welfare protections (Animal Aid, 2013). The last common ancestor of humans and fish existed during the Devonian period around 400 million years ago, which although may seem like a vast amount of time are linked by continuous generations to both modern day humans and fish (Nakamura, et al., 2016). Humans, pigs, cows, chickens and fish were all therefore linked by a continuous chain of organisms in which none ever changed from one species to the other. Such statements may be criticised as speculation as they are not directly observable, however evidence of these chains comes from extensive fossil records and similarities between species, both physically and genetically (Ridley, 2004b).

To further explain, it is worth pointing out that discontinuous thinking is not only at work when it comes to animals but also with regards to race. Although it is now determined that there are no significant biological differences between different races of humans it has often been thought otherwise throughout various times and places (e.g., US southern states). Following years of genome research it is clear that racial distinctions serve no great purpose as they are not indicative of significant biological differences, and in fact may be more harmful than useful

(Yudell, et al., 2016). In the past these perceived biological differences were used to justify discrimination and persecution of varying degrees. Although race can be argued to be mainly a social construction (Gannon, 2016), race labelling categories continue to be used as part of everyday life. Where the example of race differs from the case of farmed animals is that, in the West at least, race labelling does not in itself lead to acceptable widespread violence whereas species labelling does. Certain species labels are more loaded than others, such as 'cow', 'pig', 'chicken' and 'fish'; the most common of the animals consumed in the West. These labels are indicative of animals that should not be 'protected', left to live wild or even afforded the comforts of basic health and daily care and seem to denote 'use' only.

The main purpose in considering evolution is to highlight the closeness of species to one another and to show that we are in fact all branches stemming from multitudes of common ancestors. Therefore, if the intermediates between humans and the animals used in IAF's were not dead, would farmed animals would continue to be perceived mainly as products to be bred, confined and consumed? In the presence of intermediates, our attempt to separate chickens from pigs and pigs from human would be extremely difficult, if not impossible. At the very least, humans would have to alter their perceptions of animals to match what evolution tells us, which may in turn encourage us to re-evaluate our position on the morality of subjecting them to the conditions of industrial farms. On the other hand, it is not just the perception of non-human animals which evolutionary understanding may change, but that of Homo sapiens also.

5.3 Mediocrity of man

One of the biggest tools for justifying speciesism and hence IAF is the belief that humans are superior over all other species. The entitlement that humans give themselves and which most see as almost self-evident can be questioned under the scrutiny of evolutionary studies. Determining the sacredness of the human species is significant as humans are so far the only animal granted 'personhood', a status which awards legal protections to ensure such things as equality and freedom; there are numerous proposed attributes which may qualify a being as possessing personhood including rationality, relationships and autonomy (Rutkin, 2016). Humans are therefore not only constructed as completely unlike other species but superior, a privilege which seems to bestow exclusive rights.

Despite such constructs about the position of Homo sapiens there is little evidence in evolutionary biology or genetics which supports the notion we are a special species in such a way as to justify the exploitation of members of other species. As we have seen, science has

informed us of the shared lineages, genetic similarities and continuous linkages between humans and those species subject to IAF. However, understanding evolution can also reveal that Homo sapiens are embedded in the ape phylogeny: humans are not descendant from apes or closely linked to apes, humans are apes (Dawkins, 1993). In fact, humans are members of the 'great ape' category along with chimpanzees and gorillas and, in terms of evolutionary time, our shared ancestor with chimpanzees lived not that long ago, approximately 6 million years. Even though this seems a long gulf between us and our link to chimpanzees there have only passed around 500,000 unbroken, interbreeding generations from our ancestor to now (Dawkins, 1993). According to Dawkins, at no point would there have been a moment when one species gave birth to another species creating 'humans', there was no instant when a monkey became a man. In questioning at what point a human becomes an ape the boundaries between the traditional concepts of human and animal are blurred. Dawkins further suggests that if zoological labelling insists of ordering the natural world into taxonomic categories then there is no way to accurately remove the human species from the 'ape' category. This suggests that there is no absolute concept of 'human-ness' or any real basis for the unyielding 'us' and 'them' distinction that humans draw between their own species and others.

The difficulty of trying to define exactly what a human is and what it is not also demonstrates the absence of any singular human 'essence'. Humans are defined based on what is observable today but we only have to acknowledge that our own species was not the only 'type' of human to ever have existed in order to call these definitions into question. The current species of humans from which everyone living today belongs to, Homo sapiens, have only been around in isolation for around 10,000 years, having lived alongside other species also belonging to the *Homo* genus (Harari, 2011). There have been at least six other species of humans to have inhabited the earth, including Homo soloensis, Homo erectus and Homo neanderthalensis, all of which went extinct not very long ago (Harari, 2011, pp. 5-9). There are also numerous intermediates between humans and those animals classified as apes which have been and continue to be discovered (e.g. Shreeve, 2015). In addition to these, it is understood that some hybridisation between human 'species' occurred, especially between Homo sapiens and Homo neanderthalensis with Europeans and Asians possessing between 1% to 4% Neanderthal DNA (Viegas, 2013). Each of the species discovered in the Homo genus resembles 'us' to varying degrees, with some looking more like the other non-human species of great apes.

If we imagine that all of the species of human still existed and lived alongside Homo sapiens today or even if an extensive and complete fossil record of all these various beings were

amassed – what would be classed as human? It would remain to be decided where the cut off point for 'human' and 'personhood' are and how such a point would be decided. Would it be on which organisms mostly resemble Homo sapiens in appearance or in cognitive functioning? This question is a significant one as the answer would consequently decide who receives legal protection, human rights and the status of personhood, and who would be consigned to labs and zoos. There would be significant decisions based on arbitrary characteristics as to who would be classed as uniquely 'human' as to be afforded special treatment over all other species. Of course, the point here is not to say that questions about the status of Neanderthals also means we must necessarily do the same with regards to the status of farmed species; it is instead to highlight possible ambiguity present in the definition of human. In having to rethink the whole concept of human and what it is that is 'unique' about Homo sapiens we would be forced to see that the distinctions we make as a species are not as fixed or important as we make them out to be.

In turning to science it is indeed clear that 'speciesism has no proper basis in evolutionary biology' (Dawkins, 1989, p. 142) and thus breaks down our species based excuses for the suffering inflicted in IAF. If we are not so set apart from the animals our species subjects to farming but are in fact, one of them, is it still morally acceptable to continue to use them to our own ends? The sense of 'us' and 'other' Homo sapiens maintain is therefore the mechanism by which we justify the double standards displayed in our treatment of all animals but especially in IAF, where not only are objections seldom heard but it seen as our 'right' to factory farm animals. That is, in perceiving humans as a superior species it encourages us to see human desires as more important when considering needs and interests.

5.4 Limitations

It has so far been shown that by paying attention to evolutionary processes, origins and genetics it can be deduced that humans do not possess a biological endowed special position, that they are in fact embedded in animal phylogeny. In observing the interconnectedness of all species it could be expected that to logically apply this knowledge to animal ethics would be to reject the act of placing animals in conditions that may cause them to suffer. However, this is not often the case and even those in full few of the scientific facts do not then automatically believe they hold moral and ethical implications. There exists instead an overall lack of engagement with farmed animal welfare and the morality of IAF's by scientists and veterinarians in general (Siegle, 2014). This is possibly linked to the bigger issue of the separation of general science

and ethics, yet there appears to be a resistance within evolutionary and veterinary studies to really applying rational thinking to the reality of industrial farming. Richard Dawkins himself is no exception and there are a number of criticisms and limitations in his reasoning with regards to the application of science to the morality of IAF.

Firstly, Dawkins seems to see no wrong in using farmed animals for their meat, eggs and milk. Although he expresses a desire for 'humane slaughter' he pays quiet acceptance to intensive rearing by offering no criticism. One of the reasons Dawkins gives for subjecting animals to farming is the 'obvious differences that justify us eating them' (Dawkins, 2011). Of course, he is not explicitly supporting the conditions of factory farms, but to consume meat in the modern developed world is to almost unavoidably do so. The apparent differences that justify subjecting animals to farming are not disclosed by Dawkins but it is a statement which does not seem to support his conviction that animals can and do suffer (Dawkins, 2014). Although he provides a lot of the rationale for not subjecting animals to suffering, he does not apply this in any meaningful sense. Indeed, he explicitly states that pigs can clearly suffer, that humans are not 'indefinitely separate from all other species' and that our own double standards are arbitrary (Dawkins, 2014). Dawkins takes this one step further to say that understanding basic evolutionary implications makes it difficult to sustain speciesism (Brodie, 2004). By extension this would also have to mean it is difficult to morally uphold the exploitation of farmed animals.

The best justification Dawkins provides for factory farming non-human species but not our own is that humans would suffer knowing that they were going to die; humans who possess the knowledge that they are about to be slaughtered will suffer in a way that most animals, assumedly, do not (Brodie, 2004). However, there are various ways that this argument can be broken down, the first and most obvious being that animals led to slaughter may have some awareness of what is happening (Hill, 1996, p. 43; Craggs, 2016). At the very least the animals will have some awareness of danger when faced with those conditions as nearly all organisms possess the basic instincts to feel fear which produces the subsequent need to flee, fight or freeze (Broom, 1998, p. 383). Of course it is impossible to say for sure whether farmed animals in slaughterhouses are fully aware of what is going to happen but considering the severity of the mistreatment if they do and the only downside being minor inconvenience to us, it is perhaps the most morally acceptable thing in this case is to assume that they do.

Additionally, if it were determined that farmed animals had no awareness that they were to be killed at the end of their confinement, it does not then justify doing so. As Dawkins stressed,

most humans would know what was about to happen but this does not mean to suggest that it would therefore be acceptable to subject those humans who do not possess awareness, such as babies and toddlers, to similar treatment. Humans who do not possess the capacity for awareness of death are simply no different from Dawkins perception of farmed animals in that regard. Yet it would be met with widespread moral outrage to suggest that this lack of awareness is a good reason for doing similar things to unaware humans. A wider point worth making here is that given the current realities of IAF it is an almost marginal point whether farmed animals or humans would be able to detect their imminent deaths. The bigger issues are the poor conditions and confinement experienced before eventual slaughter. To draw upon such a small perceived difference between animals and humans is to grasp at a justification that is not there in light of evolutionary knowledge. It certainly makes a weak argument for dismissing the lessons of evolution and the discontinuous mind in favour of continuing to intensively farm certain species.

How then, can it be acceptable to inflict such conditions upon farmed animals but not on humans on the basis that they are another species? Seeing no wrong in farming animals for food is to contradict the anti-speciesist lessons detailed. Dawkins does not take further steps to say evolutionary biology reveals the illegitimacy of intensively farming animals and in doing so holds a somewhat contradictory position or at best a position which does not apply evolutionary understanding to such an encompassing issue. Although Dawkins advocates retiring the discontinuous mind with regards to species and acknowledges that we should instead start thinking in terms of continuous classifications based on whether each species can suffer, love etc. he avoids taking that small but crucial step to linking this to the conditions in IAF.

5.5 Conclusion

The results of scientific inquiry tell us that the human need for essentialism has veiled the fact that we construct discreet categories in which to place animals into species which allows us to believe that they are inescapably different from humans. In addition, the high species status that humans award themselves can be partially dismantled when considering our place among the great apes and the existence of other forms of ‘human’. Both of these arguments are informed by the fact that not only are we animals with many shared origins and genetic compositions but that Humans as a species are not in any biologically or genetically based special category set apart from others. It is only through unfortunate chance that the human

species is able to maintain its perceptions that the world is categorised into species separated by such gulfs as to make it justifiable to subject them to IAF.

However, another critical point raised by Dawkins is that giving animals the same consideration as humans when it comes to suffering needs more than just the knowledge that we share close cousinship with them (Dawkins, 1993). Dawkins therefore displays a view similar to Posner in that there needs to be direct evidence that animals possess the abilities that allow them to suffer (Singer & Posner, 2001). Most people now do not deny our evolutionary origins and our humble place within the phylogenetic tree. Instead, many now turn to particular characteristics and abilities that are considered unique to Homo sapiens in order to maintain our superiority over other species, which too can be addressed by science.

CHAPTER 6: BIOLOGY AND PHYSIOLOGY

Science can be applied to questions of animal ethics through the areas of biology and anatomy. One aim of this chapter is to partially answer how animals suffer in IAF as a result of conditions and practises (1.3), more specifically how they suffer *physically* through pain and discomfort. Part of doing this also means determining the extent to which animals feel pain and how they experience it which, although at first may seem unnecessary, is important to reinforce in light of scepticism over biological suffering in animals (Bermond, 1997; Singer & Posner, 2001). There will also be moral discussion around each of the practises detailed in an attempt to determine whether we can reasonably argue that they are acceptable.

This chapter will begin by addressing the potential for direct pain in the practise of certain mutilations common to the IAF industry. It will then focus on specific aspects of the slaughter day that may raise concern, especially the debate around the pre-stunning of farmed animals and welfare implications of religious slaughter. Lastly, the role of genetic selection for increased yield will be assessed with regards to animal welfare. The areas of concern covered in the current section are far from comprehensive of all of the possible ways farmed animals may experience pain and suffering in IAF but it will instead focus on some of the most common.

6.1 Pain

Before exploring the ways in which standard IAF practises may cause pain to farmed animals it is first worth briefly detailing the basic biological structures that create the experience of

pain. According to the Oxford medical dictionary pain is 'an unpleasant sensation ranging from mild discomfort to agonised distress, associated with real or potential tissue damage' (Anon., 2010) Pain can often be described as 'acute' or 'chronic' depending on the properties of the sensation being experienced. Acute pain is associated with tissue damage and is relatively short term pending healing, while chronic pain is more long-term and not necessarily associated with obvious injury or disease (Grichkin & Ferrante, 1991). The main components involved in nociception (pain perception) are the Central Nervous System (CNS), the peripheral neurons and nociceptors. In the presence of thermal, mechanical or chemical stimuli that exceed the threshold level of the nociceptors (noxious stimuli), electrical impulses are transmitted through nerves to the spinal column before reaching the brain where they are registered and felt as painful sensations (Dubin & Patapoutain, 2010). The last significant component relevant to measuring pain is cortisol; a hormone commonly released during high stress experiences (Society for Endocrinology, n.d).

The pain system is what allows humans to feel pain on a daily basis, from cuts and burns to muscle cramps and headaches and, as a result of our shared ancestry, is a structure shared by all mammals (Broom, 2001a). This system does not just detect pain from direct and violent body trauma but also pain caused by discomfort and bodily stress in the joints, bones, muscles and in some cases, the organs. With regards to actually determining pain in non-human animals, measurement takes the form of three main approaches: general bodily functioning, physiological responses and behaviours (Weary, et al., 2006). More specific areas which can be subject to measurement include behaviour, physiology, brain function, immune system function and damage (Broom, 2008). Although there remains the issue of direct cause and effect between the results of these measurement and the actual experience of pain, which remains private, the strength of evidence from ancestry, anatomy, biological structure and function, and analogy (Weary, et al., 2006) more than justifies the study of pain and pain experiences.

6.2 Mutilations

The most common way that animals on industrial farms are potentially exposed to pain are through the standardised use of mutilation. Mutilations are actions that cause injury or disfigurement by removing or damaging parts of the body (Anon., n.d(a)). The vast majority of mutilations on farmed animals are usually carried out on the basis that they increase welfare,

though some are openly used to increase profit by aiding in efficiency and farm management (Pickett, et al., 2014). The main forms of mutilations covered here include castration, tail docking and beak trimming yet this list is not comprehensive as de-horning, teeth clipping, ear tags, ear notching, branding and nose rings are also common. Each of these practises causes direct bodily damage and should therefore be considered with regards to their potential to cause pain and the morality of continuing to perform them.

6.2.1 Castration

The first practise to consider is that of castration, which is carried out on most large farmed animals and is essentially the removal of the testicles or the elimination of their function (Rault, et al., 2011). The method of castration differs from animal to animal, but the methods covered in this section will be those most commonly used in IAF: the surgical method for piglets and rubber rings for calves. Surgical castration involves placing one or two incisions in the scrotum, removing both testicles and severing the spermatic cords which is done through either cutting, twisting, crushing or simply pulling (Fredriksen, et al., 2009). The procedure is almost always done in the absence of anaesthetic (Rault, et al., 2011, p. 216) hence piglets are subject to the full range of sensations that surgical castration may cause. It is therefore important to also pay attention to behavioural indicators of pain in castrated piglets.

The most obvious behavioural evidence that piglets feel pain comes from vocalisations, struggle and level of activity, all of which have been shown to increase during castration (von Borell, et al., 2009). Vocal indicators such as increased frequency and pitch of squeals seem to be the strongest behavioural indictor but there is also evidence of physiological reactions; cortisol levels significantly increase following the procedure (Carroll, et al., 2006). The general scientific consensus is that piglets *do* experience pain caused by castration (von Borell, et al., 2009) but it is a position that can be challenged from a methodological point of view. Performing castration requires high levels of direct human contact so it can be suggested that increased handling and the unusual situation are the real causes of any abnormal behavioural responses. The strange situation piglets are placed in cannot be ignored as it is likely to cause them to feel stress and display fear responses which may be similar to pain responses. However, in order to determine if behavioural responses are a result of increased invasiveness and not a specific response to pain *per se*, a study by Taylor and Weary (2000) compared two groups of piglets': one group was castrated while the other acted as a control. The control group were put

through the same procedure, matched in time and handing, minus actual physical castration. The control group showed significantly less vocalisation, suggesting that the intense reactions from the castrated group were indeed in response to direct bodily damage. Taylor and Weary were additionally able to single out the parts of the overall castration process which caused the most amount of pain. By measuring the frequency and amount of calling at each stage of the procedure it was concluded that the scrotal incision and severing were the most painful to the piglets.

A further issue to consider when assessing the ethics of castrating piglets is that of the duration and consistency of pain. Since it is done at a very young age, around one to seven days old (CIWF, n.d(e)), it can be suggested that pain is only immediate and relatively low compared to if castration was performed on adult pigs, though whether this is a welfare improvement is questionable. Following the initial pain of the castration itself, there is some evidence that discomfort continues to be experienced in the long-term. Piglets have been observed to display pain-related behaviour such as trembling, huddling, spasms and avoiding certain sitting positons throughout the day of the procedure (Moya, et al., 2008) with indications that pain lasts into the fourth and fifth days after castration (Hay, et al., 2003). Although duration of castration pain has not been widely studied, pigs who have not been castrated do not engage in behaviour like rump scratching or tail wagging to the same degree or frequency as those who have (Hay, et al., 2003). The possibility that piglets continue to feel pain after the procedure has implications for the suggestions that welfare can be sufficiently improved in the presence of anaesthetic (European Commission, 2010). While this may seem like a considerable improvement it is likely to result in extra stress due to increased handing and the actual administration of the anaesthetic (Leidig, et al., 2009). This extra step will also have little impact on pain felt during the days following castration. Therefore castration seems to cause both immediate and long-term acute pain in piglets.

Although many adult cows may also go through surgical castration, calves are generally subject to the rubber band method. This involves placing a small rubber band around the scrotum which acts to cut off the blood supply to the cells eventually leading to necrosis (death) and removal of the testicles (Capucille, et al., 2002). From an animal welfare standpoint this method may be preferable to the surgical method as the potential for immediate pain is obviously less. However, welfare may actually be worse due to duration of pain. High levels of abnormal behaviours such as slow tail movement, back leg stomping and head turning toward the injured

area can all be observed hours after the application of rubber bands and which may increase for up to 48 days; typically these types of behaviour are not observed in healthy cows and their gradual increase in cows undergoing rubber band castration correlates with increasing degradation of the testicles (Molony, et al., 1995). Since the removal of the testicles is not immediate and the potential for pain much longer, the application of anaesthetic is not as useful as it could be for surgical castration. Additionally, improper application of the band or mishandling, especially when applied by those who do not have the proper training, can lead to swelling, infection and haemorrhages, all of which may escalate pain and increase the healing time (HSUS, 2012b). Therefore pain as a result of rubber band castration seems to be a more chronic and enduring one relative to the surgical method and is often discouraged as an alternative (HSUS, 2012b, p. 3), making it no improvement from a welfare perspective.

Surgical and rubber ring castration both cause high levels of distress and pain, with and without anaesthetic, and may lead to further health issues if done incorrectly. It would therefore only seem morally justified to subject any being to it if it were for another equally significant moral reason. To argue that castration is done for beneficial reasons, one may draw an analogy with the routine castration of dogs and cats in the West, which is actually endorsed as good pet ownership. However, the castration of companion animals differs in two ways from the castration of farmed animals. Cats and dogs are typically taken to a vet for a surgical castration where they are anaesthetised and rendered unconscious before the procedure. This is done presumably because it would otherwise cause pain and stress to the animal in question, a consideration strangely omitted when performing castration upon farmed animals. The second, and arguably more significant, difference concerns the underlying reasons for castration. Castrating companion animals is done to reduce the number of strays or unwanted litters which are often abandoned or simply euthanized by a vet. It is therefore done as an attempt to aid animal welfare and prevent needless suffering. Conversely, the castration of pigs and calves reduces aggression and affects the taste of the resulting meat (Rault, et al., 2011). There is something to be said for the argument that castration of pigs and cows aids welfare as it decreases aggression between the animals and hence injury from fighting, however, meat quality is an arguably less powerful reason for compromising welfare. Although castration is seen as a necessity within the industry, it is hard to argue that variation in taste is an interest which is equal to the one in not experiencing unnecessary pain and distresses. Overall, evidence suggests that castration is detrimental to welfare but is done for reasons related to profit and manageability, and is therefore not a practise which is morally defensible.

6.2.2 Tail Docking

Another form of mutilation practised in IAF is tail docking and is performed on pigs, cows and sheep. Tail docking is a husbandry practise that involves removing a portion of the tail using a variety of methods depending on the species. Docking in calves involves removing one to two thirds of the tail by applying a rubber band to a joint section of the tail for approximately 3-7 weeks or until constriction causes the tissue to die and the tail to eventually fall off (HSUS, 2012c). In some cases the tail is manually cut off after about a week of band constriction. For pigs the tail is usually removed immediately using clippers, scissors or a scalpel (Sutherland & Tucker, 2011) and so, as with castration, is likely going to cause a high level of acute pain which is typical of major bodily trauma. Both are often performed without the benefit of anaesthetic so, again, the full range sensations caused will be experienced.

The strongest evidence for determining the presence of tail docking pain comes from a range of behavioural indicators. Behavioural responses can be compared and contrasted between animals who have undergone the procedure and those who have not. In general, cows experiencing discomfort tend to adopt a more static posture and engage in less movement than those who are healthy, with cows who have undergone tail docking often displaying the former (HSUS, 2012c, p. 2). More specifically, those cows who undergo rubber ring amputation show a tendency to keep the injured tail pressed close to their bodies, perhaps indicating that any pain is exasperated by movement (Tom, et al., 2002). Conversely, pain in pigs has been found to be associated with an *increase* in particular movements, such as tail wagging and flicking behaviours (Sutherland, et al., 2008). Of course behavioural observations can come under scrutiny as a method when attempting to determine the impact of tail docking as the strange sensation from the sudden loss of an appendage may in fact be the real cause of increased activity in that area. If pain were not present then it could be expected that in most others ways a piglet's behaviour would not differ significantly from those not tail docked. Yet, a study by Sutherland et al. (2008) has shown that not only do docked pigs display increased flicking and tail-to-body pressing but that they also avoid sitting in positions which would cause contact with the tail stump. Additionally, the same vocal indicators seen in pigs subject to castration were also observed during tail docking but which differed significantly from piglet control groups who were handled only (Noonan, et al., 1994; Marchant-Forde, et al., 2009).

Behavioural evidence seems to support that pigs and cows experience pain from the immediate sensations caused by tail amputation.

Other than the immediate pain caused by the procedure itself it is also worth noting that tail docking can lead to other forms of discomfort such as the development of infections, increased sensitivity of the tail stump (neuroma) and, in cows, irritation caused by the inability to swipe away flies (Sutherland & Tucker, 2011). Additionally there is also the potential for docked farmed animals to experience phantom limbs, a discomfort often felt by humans who have lost a limb or an appendage. There has in fact been some research which directly indicates that the role of the stumped tail and its effects upon the body with regards to phantom sensations are very similar to ones observed in human amputees (Eicher, et al., 2006), which includes sensations and pain where the lost limb should be (Jensen, et al., 1983). These additional consequences imply that not only is tail docking painful while it is performed but can potentially inflict long-term suffering in the form of increased sensitivity and negative sensations.

There has been research in recent years which not only points to the welfare issues related to tail docking but also to the absence of any real benefits of it (Stull, et al., 2002). Considering that the evidence indicates tail docking causes both short and long term pain it must thus be considered with regards to animal welfare and whether it is necessary. Tail docking in dairy cows is carried out for a number of reasons such as ease for the farmers, cleanliness and to reduce the risk of mastitis (Stull, et al., 2002). On the other hand, pigs have their tails docked in order to reduce aggressive tail biting which may lead to injury, infection or even cannibalism (Sutherland & Tucker, 2011). Although the reasons given for tail docking are stronger and more numerous that those given for castration, ultimately they all come down to housing conditions. For cows, tail docking is about cleanliness while pigs are docked to minimise the effects of aggression but both of these issues may be caused by inadequate conditions on factory farms. The close confinement, barren environments and high stress that pigs are subject to are the main causes of aggression in the first place, while cows are subject to poor sanitation and improper care. The underlying issues are thus left unaddressed while tail docking is performed simply to minimise some of the worse effects of these issues. The question remains then whether it is morally correct to perform a painful procedure simply to minimise the effects of issues caused by poor welfare as opposed to taking measures to improve conditions and raise welfare in the first place. In the case of tail docking, welfare does seem to be of minimal

importance and as it does not seem a completely necessary practise or justified over benefits to the animals themselves, the moral acceptability of tail docking is thus highly questionable.

6.2.3 Beak Trimming

Mutilations on industrial farms are not just confined to pigs and cattle as one of the most common mutilations is beak trimming (sometimes called beak amputation or de-beaking). The vast majority of chickens have part of their beaks cut away when they are young with many flocks undergoing additional trimming later in life due to the potential for full or partial regrowth. Trimming is typically carried out by inserting the chick into a machine where a hot blade is used to cut away and cauterise a certain amount of the beak (Glatz, 2000). The question as to whether chicks feel any pain during this procedure can be debated because the beak itself is not made of soft tissue, hence tempting the belief that they can be fully compared to hair or nails. However, not far in from the tip of the beak are soft tissue layers which contain blood vessels and nerve endings (Kuenzel, 2007), structures which are almost always damaged during beak trimming. The complexity and the abundance of nerves present in the beak demonstrate that they are far from insensitive to pain and should therefore be given the same consideration as any other body part when contemplating the effects of mutilations.

Researchers who have studied the effects of beak trimming on chickens have not only observed the difference in behaviour between chickens who have and have not had the procedure but also the changes between before and after the procedure. As can be expected from chickens experiencing pain in their beaks, those who had been trimmed engaged in less feeding, drinking, pecking and preening in the long-term (Glatz, 2000, p. 10). This raises the question as to whether chickens feel chronic pain which continues after the immediate procedure. Studies aiming to determine this have generally found mixed results with some research showing that chickens with trimmed beaks display a marked reduction in beak use, head movement and general activity which can be observed for two weeks after the procedure (Gentle, et al., 1997) with evidence that significant pain related behaviour persists for up to six weeks (Gentle, et al., 1990). Although the reduction of beak use in trimmed chickens may seem at first to be an obvious indication that beak use causes pain due to damaged tissue and increased sensitivity, it can also be speculated that such behaviours are caused by the loss of the beak itself. As with tail docking, any abnormal behaviour related to the amputated area may just be a response to the strange sensation of loss and not a reaction to pain per se. However,

the fact that an overall decrease in activity and movement is a more general indication of chronic pain in many animals, including chickens, (National Research Council (US), 2009) indicates that pain was a significant factor.

The age at which beak trimming occurs may also affect the experience of pain and so be an important consideration when assessing if it is morally acceptable. Studies done on chicks who undergo beak trimming at only a few days old have found that they do not display pain or avoidance related behaviour in the time immediately following the procedure (Gentle, 2011, p. 253). Such an effect may be either due to quicker healing and beak regeneration or possibly because the blade does not reach as far into the nerved area of the beak as it would in adult chickens. The possibility that very young chicks do not feel any discomfort after the procedure and are able to quickly recover relative to older chickens is a strong argument for ensuring beak trimming is done at preferably no more than 2-3 days old. Even so, there are other potential welfare concerns beyond acute and chronic pain as suffering can be caused by a decreased ability to feed effectively, if at all. In many cases chickens who have had their beaks trimmed lose weight as a result and, although less engagement in feeding behaviour as a direct response to pain may be one possible explanation, there is some evidence that this is not necessarily the main cause for weight loss. A study by Gentle et al. (1982) found that de-beaked hens *did* engage in feeding behaviours and made active effort to consume food but were prevented from effectively doing so due to the unpractical and unfamiliar shape of their beaks. Therefore although the welfare of chicks may not be compromised after the procedure with regards to pain the high potential beak trimming has to lead to long-term hunger, stress and weakness does create moral concern.

The evidence for absence of beak pain in young chicks coupled with the justifications for performing this specific mutilation in the first place can perhaps provide a strong moral argument for its continuation. Many in the egg and chicken industry believe that carrying out beak trimming in their flocks actually leads to better animal welfare (Glatz, 2000). Pecking between birds is fairly common and can therefore often lead to severe feather loss, injury and cannibalism (Jendral & Robinson, 2004). Within the specific context of IAF's it seems to be more beneficial to chicken welfare to trim their beaks as opposed to not doing so, especially if it is done so at a very young age. There are however, additional factors to consider within this debate. It must first be remembered that even if there is no pain following amputation and recovery for chicks is fast, this still does not dismiss the intense pain likely to be felt during the

actual procedure. As described earlier, the anatomy of a chick's beak leaves little doubt that removal without anaesthetic would stimulate similar pain responses as removing any other body part. Beak trimming does therefore cause pain and distress in at least one way with the potential for further stressful consequences. Given this, to render beak trimming morally justifiable it would have to be the last resort for avoiding injurious pecking. Unfortunately this is most often not the case as this type of aggressive behaviour is caused by a combination of stress, frustration and unnatural environments (Bowles, et al., 2015). Chickens kept in higher welfare conditions that provide more space, lighting and monitoring, have been shown to engage in less injurious pecking and aggression, even with intact beaks (Bowles, et al., 2015). The fact that chickens with intact beaks can be kept without compromising their health makes the welfare argument for beak trimming a hard one to maintain. The ability to spare chickens the pain and stress of amputation and possible hunger by simply improving conditions means using beak trimming in place of this cannot be concluded to be morally defensible.

Overall, although there are a number of both farming and welfare benefits to the mutilations of castration, tail docking and beak trimming, they also have the potential to cause acute and chronic pain, distress, infection and injury when undertaken. The negative effects upon animal welfare coupled with reasoning which indicates that they are practises which are neither necessary nor justified means mutilations are therefore not a morally acceptable part of IAF.

6.3 The slaughter process

Animals raised in the IAF industry have greatly reduced lifespans in comparison to their natural life expectancy as, even in the absence of premature death by disease, injury etc., they are sent to slaughter relatively early in their lives. To demonstrate, the average cow's life expectancy is approximately 15-20 years yet those used to produce milk are killed at 4 years old and those used for meat, 'beef' cows, at around 18 months. Pigs have a natural lifespan of 10-12 years and a chicken 8 years but which are slaughtered at 6 months and 5-7 weeks respectively (AussieAbattoirs, n.d). Once sent to slaughter there are a number of possible areas of welfare concern throughout the slaughter process including food deprivation, rough handling, injury, heat stroke (Terlouw, et al., 2008), use of electric prods and stress conditions such as fatigue syndrome (Thomson, et al., 2015). However, only a few issues will be addressed here starting with common slaughter methods and the welfare consequences of ineffective slaughter. The second section will handle the debate around the pre-stunning of animals and religious

slaughter, specifically Kosher and Halal, which place restrictions upon stunning before slaughter.

6.3.1 Slaughter

The question of whether farmed animals experience pain during slaughter is an obvious one when it comes to ethics and animal agriculture. This question is referring to the definition of slaughter as given by the Oxford dictionary as 'the killing of animals for food' (Stevenson, 2010). The methods of slaughter differ across species but remain fairly consistent across industrial farms, particularly in the West. Slaughter can be assessed in terms of welfare, and thus morality, by paying attention to 1) the presence of pain and 2) the time it takes for unconsciousness and death to occur.

Pigs are typically killed through a method called 'sticking' which is the penetration of the chest and heart with a long knife. Pain during sticking can mainly be measured by the efficiency with which it is carried out (Brandt & Aaslyng, 2015) but if done correctly, is justified on welfare grounds as it produces rapid loss of consciousness thus decreasing the length of time pain can be felt. Consequently, 'sticking' can be argued to be more ethical than alternatives such as blunt head trauma or throat incisions. Pigs do not have particularly prominent throats in comparison to other species so attempting to slaughter them by neck incision would run the risk of improper severance of key veins making it both unreliable and likely to cause prolonged suffering. The administration of blunt head trauma would also raise too many ethical questions due to the unreliable effect of human administered impact, making the possibility of waking during the next stage both high and unpredictable. However, the relatively high ethical standing of sticking as a slaughter method is dependent upon the quality of the procedure, which can be assessed by paying attention to levels of consciousness. Factors that effect the quality of sticking include the length of the blade, longer blades induce faster blood loss (Anil, et al., 2000), and skill of the slaughterer. A post mortem study by Anil et al. (2000) supports the significance of these factors as it was found that in many pigs the knife had penetrated only some of the key structures needed to induce rapid blood loss. The welfare implications of these results are that it can take a while after the incision for pigs to die or lose consciousness. There is in fact evidence that over 1% of pigs regain consciousness a full three minutes after sticking (Troeger, et al., 2005). Since slow loss of consciousness or the regaining of conscious compromises welfare it can instead be argued that this method has just as much potential to

cause suffering as the 'less ethical' alternatives, suggesting there may be no entirely ethical way to slaughter pigs.

On the other hand, due to the mechanical way chickens are slaughtered human error is perhaps less of an ethical issue than in pigs. Chickens are typically hung inverted and passed over an automatic blade which severs their throats. However, the effectiveness of this method is still dependent upon the successful severing of certain vessels, mainly the carotid and jugular; birds whose carotid artery had not been severed successfully took longer to lose consciousness and die, a state which sometimes persisted for up to 180 seconds after incision (Cranley, 2017). The main reasons chickens may be subject to high chances of improper slaughter are the high processing numbers and aversive movements which compromise the efficiency of the blade. In many factories, improper slaughter is so frequent that workers are assigned to manually cut the throat of any birds who have avoided the blade (Raj, 2010, p. 269). Therefore, even when using slaughter methods with little chance of human error there is still danger of slow loss of consciousness and thus danger to welfare.

It can be argued that if pigs and chickens do experience pain upon slaughter, the current methods widely employed are still the most efficient possible so any pain experienced is kept to a minimal. It is true that there are many ways in which farmed animals can be killed in IAF which are worse for welfare than those recommended but at this point it is important to take a closer look at some of the realities of slaughter in IAF. The potential for botched slaughter mentioned previously is incredibly high: the high number of animals which have to be processed each day in most factories means little time and attention is given to each individual animal to ensure proper slaughter. In addition to the studies just mentioned, information from both the logistics of slaughterhouse processing times and from worker accounts indicate that it is common that animals are not 'stuck' or 'cut' effectively or are missed out altogether, so go on to the next part of the process alive and conscious (Warrick, 2001; Eisnitz, 2007). The consequences of this are particularly high because the next stage of the process for pigs and chickens is immersion in scalding tanks; vats of high temperature water designed to loosen hair or feathers (FAO, n.d(b)). Both may therefore be submerged in scalding water while still alive and conscious, which can be determined through physical reactions like thrashing and kicking (Eisnitz, 2007) and biological ones such as a reddened skin appearance (Raj, 2010, p. 269).

Consequently, even though sticking and neck incision are the methods that in themselves ensure the highest level of welfare at slaughter, their practice still creates serious costs for the animals involved. Problems with speed and worker inefficiency are particular features of industrial agricultural systems where high output and low costs are vital, but that is not to say that they justified. In going back to the idea of basic moral truths (Harris, 2010b), low welfare during slaughter already makes IAF slaughter processes morally questionable. If the issue were to be contemplated further using moral reasoning, they can also be deemed unnecessary. Continued agricultural intensification, producer demands and the presence of unskilled workers (Hutchinson, 2014; Food Empowerment Project, n.d) means the frequency of improper slaughter is likely to continue to increase, yet it can be argued that adequate training of workers and less intense production goals would allow for the potential to create better conditions such as more attention given to each animal. Although such an outcome is not guaranteed, these compromises are relatively small when considering the moral implications on welfare of not doing. It could be countered that high processing and low costs *are* necessary in order to keep up with demand, yet such an argument is an anthropocentric one. To hold this view is to suggest that the preference for cheap and plentiful meat, eggs and dairy holds higher importance over the potential of prolonged suffering in other species. Showing that welfare is compromised to such a degree coupled with the conclusion that it is unnecessary supports indications that IAF is not morally acceptable.

6.3.2 Pre-stunning and religious slaughter

The vast majority of industrial farms use pre-stunning techniques which are meant to render animals unconscious before they are slaughtered, consequently alleviating them from experiencing pain or distress. Unfortunately, pre-stunning can be ineffective in rendering animals unconscious and can instead be a direct cause of pain. For example, evidence indicates that death or stunning of pigs using CO^2 poisoning is painful (Conlee, et al., 2005), creates feelings of asphyxia (Becerill-Herrera, et al., 2009) and may also allow for the recovery of consciousness (Hartung, et al., 2002). The pre-stunning method considered most humane across all farmed animals is the application of electricity to the head, intended to induce generalised epilepsy thus causing little to no pain (Raj, 2006, p. 468; Farouk, 2013, p. 809). However, that this method only causes a painless seizure has been subject to some doubt with research indicating that it may cause pain, anxiety and fractures, and can be likened to the experience of electroconvulsive therapy (Zivotofsky & Strous, 2012). Electric stunning is a

particular problem when used on chickens as there are indications that in up to one third of cases the voltage used is not enough to induce unconsciousness (Boyd, 1994), while in the US chickens are exempt for the Humane Slaughter Act and so are only temporarily paralysed by the shock, not anesthetised (Gregory, 1986). On the other hand, in many cases religious restrictions mean pre-stunning is not performed at all, a practise which sparks debate over animal welfare.

Considering the grave welfare problems that may occur with pre-stunning, the argument is whether religious non-stunning slaughter is therefore a more humane alternative to conventional slaughter processes. As both the Islamic and Jewish faiths allow for the consumption of cows for meat, the slaughter of cows will mainly be discussed for the purposes of this debate. Slaughter according to the rules of Halal (Muslim) and Kosher (Jewish) must be done through venereal neck incision which must severe the major veins and blood vessels in one continuous cut (Farouk, 2013). The rules of Kosher do not allow for any form of pre-stunning while Halal does allow the use of methods which have zero chance of killing the animal prematurely; Halal slaughter therefore requires the animals alive while Kosher requires them both alive and conscious. The Jewish and Islamic faiths argue that animals slaughtered following the rules of the religion suffer less than those pre-stunned as throat incision quickly diverts blood from the brain causing rapid loss of consciousness (Farouk, 2013). In fact, Halal slaughter is argued to cause immediate anesthetisation and therefore cause no pain to animals (Department of Halal Certification, n.d), a statement supported by some evidence which suggested that if carried out correctly, cows show little to no behavioural response following incision (Grandin & Regenstein, 1994).

On the other hand, much research has been conducted to determine the level of welfare at slaughter. Gregory et al. (2012) examined scientific studies on religious slaughter in cattle and found that a number of welfare issues may occur including delay in collapse and consciousness, slowed bleeding due to false aneurism, and blood in the respiratory tract. Frequent complications in bleed out mean that animals may take a significant amount of time to lose consciousness, ranging from twenty seconds to four minutes (Gregory, et al., 2012) with 14% of cattle standing up again following the first collapse (Gregory, et al., 2010). The findings of these studies counter the statement that the methods of religious slaughter are more humane because they cause fast loss of consciousness. Slow loss of consciousness after slaughter is a high welfare risk as it may cause mental stress, pain and respiratory distress (Gregory, et al.,

2012). With regards to respiratory distress, the issue occurs because animals that are not pre-stunned continue to breathe afterwards, meaning they may suffer irritation and blockage in the lungs and airways from blood (Gregory, et al., 2010). A study by (Agbeniga & Webb, 2012) compared the levels of blood splash in various parts of the respiratory system between kosher and conventionally slaughter animals; it was found that at all stages blood levels were much higher in the kosher slaughtered animals, for example 65% of kosher animals but only 0.7% of pre-stunned animals had blood splash in the lungs. The main welfare problem with this is that there is a high chance it causes unpleasant sensory sensation, including stress and panic, as animals try to breathe (Gregory, et al., 2012). Despite the claim of immediate anesthetisation, there has been little research into the pain aspect of religious slaughter. One notable exception by Gibson et al. (2009), performed EEG scans on claves as they were slaughtered and found that electrical signals corresponding to pain were active following slaughter and up until they lost consciousness, which was not immediate. When stunning was carried out either before or after slaughter the pain signals stopped, leading the authors to conclude that pain is felt in non-stunning slaughter.

Opinions on how long it takes for consciousness to fade therefore seem to differ between immediately (See Department of Halal Certification, n.d; Nakyinsige, et al., 2013) and, as detailed above, a significant amount of time. These discrepancies may come down to methodological and procedural issues. However, even if the evidence did strongly indicate immediate loss of consciousness and a complete absence of pain when performed correctly, the Kosher and Halal meat industries are still billion dollar businesses (Farouk, 2013) and as a result, the animals subject to it are still processed on an industrial scale as they are in conventional slaughterhouses. As in conventional slaughterhouses, slaughter may not be carried out to an ideal standard, where mistakes and oversights will occur. Malpractice observed in religious slaughterhouses include the use of blunted knives, improper throat cutting, stressful restraint and animals hoisted up by one leg while fully conscious (Nakyinsige, et al., 2013). Therefore due to the nature of IAF it can be suggested that welfare is likely to be compromised regardless of the debate over which method is most humane.

Evidence overall seems to indicate that religious slaughter does not seem to provide a more humane alternative to conventional slaughter. The majority of scientific studies carried out on the topic show that farmed animals are affected by pain and distress when slaughtered in the absence of pre-stunning and in many cases welfare may be lower than in conventional systems;

it should therefore be asked whether slaughter in the absence of pre-stunning is a necessary practise. The blood of non-stunned animals is thought to drain better than those that have been stunned, making the meat cleaner and therefore in line with religious requirements which state that no blood should be left in the carcass (Coghlan, 2009; Department of Halal Certification, n.d). However, this assumption has been questioned by research which demonstrated that the bleed out of cattle who were stunned showed no significant difference from those who were not (Anil, et al., 2006), casting doubt upon the necessity for conscious slaughter. Regardless of whether bleed out is better or not, it is doubtful as to whether religious beliefs are an adequate justification. Based on the evidence that religious slaughter does significantly affect animal welfare, it can be questioned whether risking high levels of suffering is on balance with the need for religious preferences regarding food. In line with the utilitarian principle of overall benefit, avoiding potential pain, mental stress and respiratory distress of perhaps millions of animals can be seen to far outweigh most other needs, meaning religious slaughter does not pose a morally acceptable alternative to pre-stunning.

6.4 Genetic engineering

Genetic engineering in itself far from inherently bad but with specific regards to industrial farming, genetic manipulation has traditionally only been done to aid productivity and profit with little attention to animal welfare (Greger, 2010). Some of the ways farmed animal have been genetically engineered include selection for rapid growth and high mass, decreased aggression, leaner meat, and improved reproduction potential (NCBI, 2002). However, one of the most significant roles the development and use of genetic engineering has played in IAF has been the increase in yield.

6.4.1 Yield

While genetic manipulation is carried out on all farmed animals, including those produced for meat, selection with regards to breeding in female animals effects both the females themselves and the offspring produced. Genetic selection in sows has led to increased leanness of the mother, less nutritional milk, larger litter sizes and, consequently, an increased piglet mortality rate (HSUS, 2009), yet there are a number of features of creating high yield in hens and dairy cows that are unique. This section will thus assess welfare and morality with regards to yield in the production of eggs and milk.

Less than one hundred years ago an average hen laid around 100 eggs per year yet in industrial farms genetic selection has led to an average of 300 eggs per hen per year (HSUS, n.d). The development of eggs relies on having sufficient calcium within the body, if output is too high the 'reservoir' of calcium within a hens bones is depleted, leading to the development of osteoporosis (Riddell, 1992). Observations have shown that approximately 70% of laying hens have osteoporosis (D'Silva & Stevenson, 1995) due to calcium deficiency. Although it is not considered to be painful in itself it still has welfare implications as it weakens bones making them increasingly prone to breakages (HSUS, n.d). Evidence of osteoporosis in hens comes from the high level of fractured and broken bones in chickens at various stages of the production and slaughter process; 16-25% of hens experience broken bones during removal from cages, 31% during transport and shacking (HSUS, n.d, p. 2) and over 40% have keel bone fractures at some point (Sandilands, et al., 2005). It is hard to accurately determine whether chickens feel pain from broken or fractured bones as there has been a marked absence of studies examining this, but Gentle (2011) states that the anatomical, biochemical and physiological mechanisms of pain are shared between birds and humans to the extent that pain experiences from broken bones in humans can be inferred to be similar in chickens. Additional welfare issues caused by abnormally frequent egg laying include infections, tumours and prolapses, all of which can lead to premature death (Keshavarz, 1990). High density and the absence of appropriate nesting areas often means hens may also peck at the prolapses and wounds leading to further injury, cannibalism, infections and haemorrhages (HSUS, n.d). As a result there are very high welfare costs to increasing egg productivity to such a degree, a pattern which is not just limited to hens.

Dairy cows are selectively bred to produce much more milk than is natural, just in the last 40 years alone the average milk yield per cow has doubled (Oltenacu & Broom, 2010) with cows in the UK and US producing 22 and 30 litres per day respectively (CIWF, n.d(b)). Doubt over the suitability of a cow's body to cope with the uneven resource allocation this causes (Broom, 2009) is supported by correlations between high milk yield and an increased risk of reproductive problems, lameness and infections such as mastitis (Broom, 2001b). Mastitis effects around 30% of cows with some studies indicating an incidence of up to 71 cases per 100 cows (Animal Aid, n.d(c)) and is generally characterised by udder swelling, redness, heat and abnormalities in the milk such as clots or pus (AHDB, n.d). Consequently, moderate to severe mastitis is considered to be painful and may cause a number of symptoms detrimental to welfare such as diarrhoea, dehydration, lessened appetite and decreased mobility due to

udder pain and sensitivity (AHDB, n.d). Additionally, the repeated cycle of insemination, pregnancy, birth and lactation has a more general effect upon a cow's body; dairy cows are usually killed at around 5 years old, after 3-4 lactation cycles, as it is at this point that their yield and health begin to wane. That is, resources used in the body to maintain general health are instead redirected towards the production of abnormally high levels of milk, causing poor health such as malnutrition, starvation and decreased longevity (Oltenacu & Broom, 2010). Broom has thus done extensive research into genetic selection for high milk yield (e.g. Broom, 2001b; Broom, 2009; Oltenacu & Broom, 2010), by measuring physiological response and observations for behavioural abnormality, and consistently found that the problems mentioned all negatively affect cow welfare.

Genetic manipulation for high yields of milk and eggs is very closely linked to surplus offspring. Given that a cow must be pregnant in order for her body to produce milk, the dairy industry is dependent upon the birth of offspring to create and maintain high levels of production. Females born this way will be used for milk production while the males may be sold for meat or killed because they do not produce enough meat to be worth raising (Animal Aid, n.d(c)). The egg industry also creates billions of surplus male chicks per year in its endeavour to breed hens for eggs. Almost all are disposed of as soon as they hatch; in the UK recommended methods include CO^2 gassing or quick maceration in shredding machines (RSPCA, 2016). Maceration is considered the most humane as gassing may leave chicks alive for up to two minutes after administration and, as mentioned in the previous section on pre-stunning prior to slaughter, death by CO^2 poisoning may be both painful and distressing in pigs (Becerill-Herrera, et al., 2009) which, given shared physiology, is likely to create similar responses in chickens. Distress during this process can also be seen through the presence of behaviours that are indicative of discomfort such as gasping and head shaking (RSPCA, 2016). Although the science behind all of these methods cannot be examined here they often do not result in immediate or painless death and so cannot be considered humane by any welfare standards.

In the egg and dairy industries, increasing productivity and thus the potential for welfare problems seems to be on the rise (Gurian-Sherman, 2008; HSUS, n.d), making genetic selection an area that needs urgent attention to prevent worsening impact on welfare. There exists a tension between the fact that science can be used to highlight and inform upon biological suffering caused by genetic engineering and the fact that it is scientific research which has

made genetic engineering possible. None of this is to say that genetic manipulation in farmed animals is always directly detrimental to welfare. For instance, advancements in breeding pigs resistant to certain viruses has reduced pig mortality from diseases which, taken in isolation, is a significant improvement in welfare (NCBI, 2002). However, this advancement has allowed for an increase in animal density and intensification. One way to consider this development from a moral standpoint is to look at the reasons for such high incidence of disease in the first place; poor conditions and sanitation alongside confinement leads to sickness which can then be rapidly spread from pig to pig. The development of pigs who are more resistant to such viruses allows both producers and farmers to ignore the fundamental problems in conditions and thus ignore additional welfare issues such conditions cause. It can thus be suggested that genetic manipulations in farmed animals rarely benefit the welfare of the animals involved and in fact often directly results in poor welfare. This statement is particularly applicable with regards to traits selected for yield which is done purely for productivity and ultimately profit (Greger, 2010; D'Silva & Stevenson, 1995). Even in the absence of conclusive evidence of the biological consequences of genetic manipulation, can it be said to be morally correct to sacrifice welfare in exchange for productivity? Given the environmental costs of such intensive production (see 3.2.1) and the amount of produce currently wasted in the West (Lipinski, et al., 2013) in addition to problems of animal welfare, it is difficult to argue such an exchange is morally reasonable.

6.5 Conclusion

It seems that for the practices mentioned in this chapter, evidence indicates that farmed animals do feel pain and are subject to low welfare as a result. Research into both physiological and behavioural indicators of pain have suggested that direct pain is caused by mutilations such as castration, tail docking and beak trimming. The potential for acute pain and distress is also particularly high during slaughter due to either improper administration or the absence of pre-stunning techniques. Despite the claim that kosher and halal slaughter is more humane than in conventional slaughterhouses, evidence into welfare at the time of slaughter does not seem to support this. More indirect forms of pain and discomfort exist as a result of genetic selection issues as, although genetic selection can have benefits to farmed animals welfare, the priority given to yield creates multiple health problems for hens and dairy cows.

Thus the need for scientific evidence on the biological capacities of animals to physically suffer expressed by the likes of Posner (Singer & Posner, 2001) and Bermond (1997) is in fact present. The current chapter has attempted to present some of this work and has in turn found indications that all of the practices discussed have varying levels of impact upon the welfare on the animals they are done to. Although how much pain and distress is caused cannot be conclusively determined, it can still be seen that welfare is compromised to at least some degree. Therefore to render the continuation of these practices morally acceptable there would have to be a clear, justifiable reasons to do so. Unfortunately, many of the practices specified throughout this chapter, such as disease, stress and injuries, can potentially be avoided through improvements to conditions. Although a decrease in demand may cause a decrease in intensification which in turn may aid the creation of conditions of higher welfare, this is far from certain. Decreased demand may mean less animals are subject to IAF but those that still remain may be no better off. Such as possibility and the fact that better conditions do not completely eliminate welfare issues (slaughter, forced breeding etc. would still remain) means the best current solution, beyond complete elimination of animal products, may lie in active effort to place a greater focus on animal welfare across all IAF systems.

On the other hand, it would seem that instead of accepting that the conditions and practices placed upon animals are detrimental to their welfare and taking action to change this, effort seems directed towards simply alleviating physiological discomfort directly. Most effort is with treating those symptoms which have a knock on effect on productivity and not on the causes of the symptoms themselves. This is a pattern not only seen in producers and farmers but one which is present throughout the scientific literature also (e.g. Kansas State University, 2014; Elliott, 2014). Physiological discomfort which does not have an impact upon productivity is often ignored while any literature that does concern itself with welfare directly is often worded so as to propose a benefit to producers (e.g. Warnick, et al., 2001; Ferguson & Warner, 2008). However, with an increased awareness of the potential farmed animals have to suffer and the lack of moral reasons for the conditions of IAF, it can be hoped that physical welfare can become a cause for concern in itself and thus invite more direct study and effort to create change. Nevertheless, physical factors are not the only dimension to consider when assessing the conditions of farmed animals; the ability to experience mental distress is also important to welfare and moral debate.

CHAPTER 7: PSYCHOLOGY

Marian Stamp Dawkins states that when it comes to changing people's perceptions regarding animal ethics and morals, four key features must be demonstrated: the first two are that animals can feel pain and are aware of it and its causes, the third is the ability to demonstrate cleverness/thinking while the fourth concerns full consciousness on the same level as humans (Dawkins, 1993, p. 6). The last three features relate to psychological based abilities and are the main focus of this chapter which aims to determine if and how animals psychologically suffer in IAF, through using reasoning, and whether any effects upon welfare are morally acceptable. The main focus is therefore upon psychological welfare which can be summarised as the absence of negative feelings such as fear and frustration, but may also include the presence of positive feelings or 'pleasure' (Duncan, 2005). It is thus an important debate regarding the principle of equal consideration of interests and, consequently, the morality of IAF.

The importance of using scientific theory and research when discussing the psychology and psychological health of animals goes someway to avoiding the criticism of anthropomorphism; the attribution of human characteristics to non-human things, in this case non-human species. Objective measurement from scientific research can counter personal projections that may occur when discussing particularly subjective psychological dimensions. Therefore, the assumptions here are not ones of anthropomorphism, nor are they of complete and unbridgeable difference, but are instead somewhere in between. This discussion therefore operates on the assumptions that other animals are both psychologically very different but also very similar to humans. The chapter will be split into three sections: emotion, cognition, and consciousness. Each section will assess which dimensions of these abilities exits in animals, how they can play a role in awareness and suffering and if they therefore effect welfare in IAF.

7.1 Emotions

Physiologically, emotions are electrical and neuro-chemical activity in the autonomic nervous system (ANS) and the brain. Although not fully agreed upon, basic emotions more or less consist of anger, disgust, fear, happiness, sadness, and surprise (Ekman, 1992), but more complex emotions such as distrust, contempt, guilt and grief also exist. The question of whether non-human animals have emotions has particular importance for the welfare of animals in IAF, as emotions are one of the core factors for the experience of positive and negative feelings. This section will thus start by examining the evidence around whether non-human animals possess emotions before moving onto how they may play an important role on animal welfare

in IAF. The section will end with a moral and critical debate around emotional welfare in industrially farmed animals.

7.1.1 Emotions in animals

Unlike other species, we as humans can determine emotions are present by communicating how we feel through spoken language; however, spoken language is not the only way emotions can be communicated and in the absence of this, cues can instead be taken from actions and behaviour. As seen in the previous chapter, abnormal behaviour and behavioural change is a frequent measure of pain and physical discomfort, but it can also indicate the presence of emotional experience in animals. Evidence of emotions through behavioural change can arguably be seen most strongly in manifestations of sadness or grief. There are many cases of significant behavioural changes in animals dealing with the death of another and who seem to be affected by grief (Bekoff, 2009), including chimpanzees, who display tailored reactions depending their relationship to the deceased (van Leeuwen, et al., 2016). Dolphins also seem to engage in mourning behaviours following the death of a pod member or a calf (Hooper, 2011). Behavioural observations thus seem to indicate that in some species at least, something more than nothing is present, particularly with regards to the emotional elements of death.

Further demonstrations of emotion beyond behavioural observation can be seen in what animals prefer to do or not do when given the choice. According to Dawkins (1993), one important aspect of emotion is that something matters to us, indicated through preferences and interests which can be communicated through behaviour. Preference tests therefore simply measure what an organism choses to do when given options for certain variables (e.g. Blom, et al., 1992). Although preference tests tell us that something matters, and that there are perhaps some negative and positive emotions attached these interests, the actual strength of those emotions can be revealed further by how much it costs to achieve a certain thing; it is speculated that the further a being is willing to go to achieve something, the higher it is valued. Higher value also suggests that any related emotions are also stronger (Dawkins, 1993). Simple preference studies will therefore measure what animals in various situations will move away from or towards depending on their needs, while cost-preference studies communicate the importance of these goals. For instance, research using cost-preference tests have found that rats are willing to pay the cost of learning and performing certain behaviours in order to help another rat, rather than going for food (Bartal, et al., 2011). In this case, alleviating the distress of the other rat was of greater interest than easily accessible food, perhaps indicating that a stronger emotional experience was associated with the latter.

The existence of the emotional aspects of experiences in animals can further be demonstrated when using stress as an emotional indictor and as a form of measurement. In his theory on stress and emotions, Broom (2001c) proposes that when an animal faces a challenge in their environment, systems respond with various coping mechanisms which, if successful, mean the animal in question is coping. However, if these mechanisms fail then mental and bodily stability is not maintained and the animal is 'stressed'. The significant element here is that one of the most important aspects of such coping mechanisms are emotions (Broom, 2003). Since emotions are difficult to objectify and measure there is advantage in being able to instead measure stress as an indirect measure of emotions as opposed to simple behavioural changes. Stress can reliably be determined by correlating data from different sources such as behaviour, heart rate, cortisol levels and post mortem muscle metabolism levels (Terlouw, et al., 2012). Additionally, evidence exists that stress in animals has very similar emotional and psychological dimensions as it does in humans (Mason, 1974; Terlouw, 2005). In understanding that positive and negative emotions occur alongside the experience of stress, the presence of stress can be assessed with regards to psychological welfare and has big implications for those studies identifying stress in farmed animals, including the almost inevitable stress at the time of slaughter (Terlouw, et al., 2008).

The last place to look for evidence of emotions in animals comes from evolutionary and biological analogies with humans. The essential role that emotions play in survival and the concept of evolutionary continuity increases the likelihood that the experiences humans have are not limited to this one species. The emotion of fear can perhaps best be used to demonstrate the logic behind evolutionary continuity. That is, fear is the body's way of attempting to remove us from situations that are potentially life threatening (Broom, 2001c) and manifests in response to stimuli that are recognised and perceived as high risk. Common behavioural responses in humans are the fight and flight actions but in animals also involves 'freezing'; remaining motionless to be invisible to the threat (Broom, 1998). The freezing response is apparent in many animals and may shed light on why there is reluctance to entertain the notion that other animals may fear just as profoundly as humans do. After all, being motionless is harder to detect as an overt sign of fear than active struggle is. Experiencing fear arguably plays a major role in creating appropriate behavioural responses to maintain survival, a fact which is shared across many species, especially mammals. Although the evolutionary benefits of all of the basic emotions cannot be discussed here, the example of fear and the fact that it aids survival shows that the presence of emotions in other species has an intrinsic logic.

In summary, evidence for emotions in animals comes from behavioural studies, preference and cost tests, and biological analogy. Although none of these methods on their own provide conclusive proof of emotions in animals, their findings converge to suggest that at the very least other species do possess basic emotions, which can act as a foundation from which to consider emotional dimensions of welfare.

7.1.2 Emotions and welfare in IAF

With regards to farmed animals in particular, basic behavioural observations seem to show they can be effected by some core emotions. In comparing the behaviour of calves before and after debudding (removing or preventing the growth of horns) they were found to be fearful of humans, expressed through distancing behaviours which persisted for up to several weeks (Lürzel, et al., 2015). Additional observations in chickens also suggests they experience happiness associated with dustbathing and that it may be done for the pleasure of doing so (Widowski & Duncan, 2000). As for grief in IAF, the clearest example can be seen in the separation of calves and mothers, where mothers may bellow and search for days or even weeks following the removal of a calf (Joy, 2010, pp. 50, 61). Behavioural changes in farmed animals before and after certain events is of course always going to be unique and subject to the interpretation of the observer, but it is also a method which controls for anthropomorphism (King, 2016) as standardised measures are created from which researchers can objectively identify and categorise behaviour.

Cost-preference studies have also revealed that farmed animals have interests and are often willing to pay to pursue them. When given the choice, hens will choose housing that has more space, and flooring which is made up of loose shavings as opposed to barren or wire flooring (Shields & Duncan, 2009). This preference is significant because hens in traditional IAF systems are confined to small areas of space, often fitted with wire flooring to make the removal of waste easier (Lay Jr., et al., 2011). Another classic example of a cost experiment was conducted with pigs who were taught to push a panel in order to achieve various rewards (Dawkins, 1993, p. 157). Each time the pigs received their reward the 'cost' increased and they were required to push the panel more often. How much the pigs valued each reward, and possibly how happy it made them, was indicted in how much they were willing to keep pushing to keep achieving it. It was found that the pigs were willing to pay a high cost for certain things like food, over others such as social contact showing that in this particular instance food made them happier than contact. When trying to answer the question of whether farmed animals experience emotions by using scientific study, it raises the methodological question as to

whether preference and costs tests are valid tests of emotion. Cost behaviour however, is a major part of emotion in humans; humans have negative emotions associated with deprivations of food, confinement and injury which encourages us act to reduce and avoid such instances. Therefore, the parallels between humans and other animals in this regard adds weight to the validity of preference as an indicator of emotional experiences.

As suggested by Broom's (Broom, 2001c) theory on stress and emotions, the emotional welfare of farmed animals can also be subject to study by directly measuring the presence of stress. Stress responses such as behavioural, psychological and physical changes can develop and worsen to manifest in animals as trauma and specific psychological illnesses. Trauma is defined as an emotional response to a terrible event with both short-term and long-term psychological consequences (American Psychological Association, n.d). Situations that may cause trauma in industrial animals are numerous and include the mutilations mentioned in the previous chapter but can also be caused by practises such as early weaning (Joy, 2010) and intensive confinement. Pigs have been shown to suffer from an extreme form of trauma called Porcine Stress Syndrome (PSS) in which they may display abnormal behaviours, stereotypies (repeated patterns of behaviour that seem to hold no observable function) and self-mutilation (McCormick Donaldson, n.d). It is noteworthy that PSS has many shared psychological symptoms with post-traumatic stress disorder (PTSD): a diagnosis applied to humans who display certain physical and psychological disturbances following a traumatic event (World Health Organisation, 1993). Both PSS and PTSD are responses to trauma, both may cause distressing emotional and psychological symptoms and both share a mixture of environmental and genetic basis (Joy, 2010, p. 43). Although it cannot conclusively be said that these disorders are the same, or that extreme response to trauma is experienced the same in each species, what they do share suggests that pigs suffer emotionally and psychologically from trauma and PSS. Given that emotions are one mechanism for attempting to cope with stress (Broom, 2001c), psychological illnesses caused by stress such as PSS are likely to co-occur with strong emotional experiences. Overall, there seem to be many ways which farmed animals emotionally suffer in IAF, indicating that emotions are a psychological dimension which may lead to poor welfare.

7.1.3 Moral relevance of emotions

Emotions do seem to exist in non-human animals to some extent and as shown, negative emotions may be experienced in farmed animals in IAF, consequently compromising welfare. This statement raises the inevitable question as to whether the emotional distress caused by

IAF is morally acceptable. It can be argued that regardless of whether animal emotions are identical to those felt by humans, they should not continue to be treated in a way which disregards their potential for emotional distress. Nevertheless, this statement should be subject to further reasoning given the disparity that currently exists over how exactly farmed animals experience emotions and if they can be negatively affected by them.

One of the biggest criticism of the emotions debate which has the potential to influence the wider moral discussion concerns validity of the scientific evidence used. Behavioural observations, cost-preference tests and biology do not necessary tell us that animals are *consciously* experiencing their emotions. For humans, emotions are more than just how we respond to them but also if and how we 'feel' them. 'Feelings' are the conscious experiences of emotions and are a much harder dimension to measure and understand (Dawkins, 2008), especially in non-human animals. The main reason for this is that conscious experiences and feelings must be communicated through common language and in this regard the gap between species is too big for analogy with humans to bridge. Although one human can never fully know the conscious emotional experience of another human, analogy is still used between ourselves and others to understand them: an assumption which seems logical and in most cases seems to work well enough (Dawkins, 1993). Yet this analogy stops when comparing different species for fear that the differences between species are too great and to express a view otherwise is likely either anthropomorphism or unprofessionalism. This issue is significant as it limits what can be said about the welfare impact of negative emotions upon animals in IAF.

On the other hand, these doubts can be addressed by paying attention to biological similarities. All mammals seem to possess the same neurological, molecular and physiological basis for the basic experience of emotions as well as expressing comparable patterns of activity in specific brain regions when emotionally stimulated (Panksepp, 2005). Consequently, Michael Cabanac (1979) believes that the theoretical step which would allow for the inclusion of non-human animals as conscious experiencers of emotions is not so large; 'feelings' share a functional connection with the physiological and behavioural dimensions of emotions, and given that human and non-human share many behavioural and physiological elements of emotion, the chances that conscious feelings are also shared is very high. It cannot be said conclusively that this is the case but the important point to make here is that extrapolating what we know of human emotional experience to animals is not as illogical or unfounded as it is often seen in scientific research, it should therefore be given due consideration and perhaps not dismissed as human projection.

To address the criticism that it is anthropomorphic and incorrect to attribute 'human emotions' to other animals it should be noted that not only is there converging evidence from biological science, evolution and the logic of behaviour that emotions are strikingly similar across mammals, it should also be bore in mind that humans are animals thus human sensations are animal sensations (Safina, 2015). It is wrong to project human experiences onto farmed animals yet the academic and professional insistence on being so rigid on the matter arguably damages animal science. To insist that farmed animals possess nothing or very little in the way of emotions is a misunderstanding and is, according to Safina (2015), attempting to make our species seem special. Of course, one cannot completely disagree with Marian Stamp Dawkins that it is possible animals may have emotional states in the absence of subjective experiences of feelings (Dawkins, 2000). However, given the considerable welfare issues which exist if farmed animals do indeed suffer from conscious feelings of grief, sadness and fear, is it not arguably the morally correct option to act as if they do? To illustrate, human grief is heightened by the ability to contemplate and anticipate death, but it remains doubtful as to whether other species are affected by this (King, 2016). Nonetheless, unique features of grief, sadness and fear such as these do not consequently mean that other animals suffer a less profound experience of emotions than humans.

Although scientific research into animal emotions is not able to conclude the existence of full conscious feelings in non-human animals, it does make clear that the basis for conscious experience at least exists, meaning conscious feelings in animals are possible. Science and current understanding does not, and possibly never will, allow an individual to fully understand another mind other than their own but that does not mean science should have no say, especially where moral issues are concerned. Science makes theories and predictions based on what the evidence indicates (Broom, 1998), an approach applied to all areas of science and study, including those concerned with human functioning. It can thus be argued that it is important, especially when studying something as difficult as animal emotions, to be willing to listen to the weight of evidence and act accordingly (Panksepp, 2005); the tendency to wait for the presentation of inarguable proof before acting upon information which has moral relevance can potentially have huge implications.

7.2 Cognition

The next area which can be considered with regards to psychological welfare in farmed animals is cognitive functioning. Cognition is a psychological term which refers to the features and

processes of knowing or 'thinking' (Gerrig & Zimbardo, 2002). Examples of processes and features of cognition include memories, problem solving, reasoning, attention and mental concepts. The aim of this section is not to argue that animals we may deem to possess low intelligence have less value than those with high intelligence or that our moral consideration toward them should be any less. The aim is instead to assess whether levels of cognitive functioning affect awareness: a trait which has implications for the psychological welfare of farmed animals in IAF. The specific cognitive abilities discussed here will include intelligence, learning and language with the goal of evaluating the role they play in the welfare of farmed animals. The last section will look at some of the broader issues in attempting to use current scientific understanding and methods to measure cognition in other species.

7.2.1 Intelligence

Non-human animals do not seem to display the same levels of intelligent reasoning as humans but that does not mean they are unintelligent or that complex functions are not present. Recent developments in psychology, biology and veterinary science have revealed that most species are indeed misunderstood with regards to intelligence, including those subject to farming. Intelligence is an ambiguous term but will be defined here as the 'ability to acquire and apply new knowledge and skills' (Anon., n.d(b)) and not the narrower definition of the abilities measured through IQ tests.

There are several animal species which are commonly considered to be fairly intelligent, such as whales, dogs and primates. Less commonly known is the intelligence of pigs, who are now understood to be one of the most intelligent species outside of the primate groups. Recent behavioural research has shown that pigs are able to perform tasks that human infants cannot, like the ability to use a mirror to deduce the location of hidden food (Broom, et al., 2009). The importance of this study is that it shows that pigs possess an awareness of themselves, their surroundings and the changing features in their environment. Neurological studies have also highlighted their intelligence; the brains of piglets have been compared those of human infants with regards to growth, development and anatomy (Conrad, et al., 2012; Conrad, et al., 2014) and are considered so similar that piglets are often used in place of human infants in studies of development (University of Illinois College of Agricultural, Consumer and Environmental Sciences , 2012). Pigs are therefore closely compared to humans on a scientific scale yet are not awarded equal moral consideration with regards to the potential to psychologically suffer. Pigs show a uniqueness in intelligence as well as demonstrating the presence of some higher intellectual functions in a farmed species. Although this cannot be generalised to all other non-

human animals it does show that a species frequently subject to low psychological welfare of IAF systems are in fact intellectually sophisticated.

Another farmed animal worth considering with regards to intelligence are chickens. Birds in general are perhaps some of the most cognitively underrated of animals. Recent studies have revealed their incredible cognitive capacity, including facial recognition (Stephan, et al., 2012), human voice recognition (Wascher, et al., 2012), Theory of Mind (Jackson, 2016) and even certain indications of abstract thought and conceptual reasoning (Martinho III & Kacelnik, 2016). With regards to chickens, they display a high ability for recognition of their own species (Dawkins, 1995) and for the facial recognition of humans (Davis & Taylor, 2001). The sophisticated levels of memory chickens seem to possess are probably a significant part of the large and complex social hierarchies they form if given more natural conditions. However, it is perhaps demonstrations of higher order abilities which are the more surprising properties of their cognitive functioning. There exists evidence that chickens can exhibit self-control and the capacity to anticipate the future (Abeyesinghe, et al., 2005). Additional findings that chickens seem to be able to recognise their own pain and actively attempt minimise it (Danbury, et al., 2000) has particular relevance to the discussion of pain and welfare in IAF. The ability to understand that they are in pain indicates that chickens in industrial farms who are vulnerable to injuries and mutilations (see Chapter 6), may also suffer psychologically as a result. On the other hand, a simpler explanation must be entertained; that chickens who seem to try to minimise their pain are simply acting in a programmed manner with no necessary recognition or awareness (Dawkins, 2006).

It is at this point that the importance of the ability to learn is brought into the analysis. If other species besides humans can demonstrate learning and behavioural change, it counters the belief that their behaviour is ruled by innate automatic responses in the absence of deeper thought. The study of chickens carrying out self-selection for pain relief used a method in which they had to learn which courses of action would lead to a reduction in pain and which would not, often multiple times (Danbury, et al., 2000); demonstrating that they could recognise the consequences of their behaviour and adapt it accordingly to achieve a desired result. Similar capacities have also been found in pigs who have been known to learn to accurately play a simple target game (Martz, 1997) as well as perform certain actions for rewards and adjust this behaviour depending on the reward (Matthews & Ladewig, 1987). Despite these advancements, chickens in particular are still considered to be so radically different from humans that they are awarded the least consideration of farmed animals after fish. The

sentiment is perhaps best summed up by Marian Dawkins who states that humans are inflicted with an unfortunately common form of prejudice when we 'assume that the more the animal looks like and interacts with us the cleverer it must be' (Dawkins, 1993, p. 127). Despite this prejudice, there are strong indications that farmed animals possess deep levels of thinking making them more than just automatic responses. Unfortunately, higher intelligence may also mean there is a higher potential for psychological suffering, whether due to increased awareness or a higher need for stimulation.

7.2.2 Language

Language is an ability which, for some, demonstrates the presence of a unique intelligence existent only in humans (Marshall, 2013), yet there is evidence that the origin of spoken language is not exclusive to humans; orangutans are known to be able to mimic the pitch and tone of human voices (Lameira, et al., 2016). Although this does not necessarily mean they could form words and speech to the same extent as humans, it does suggest that language is not an ability that can demonstrate human superiority and originality. This position is supported by the growing number of studies showing that species other than humans possess language in some form or another. For example, groups of monkeys are able convey very specific information through a series of different grunts which researchers were not able to distinguish or differentiate (Dawkins, 1993, pp. 22-24). Whale communication has also been found to contain complex organisation and features which resemble forms of grammar (Suzuki, et al., 2006). Even though many species do display their own unique forms of vocal language, communication may also come in the form of signs, actions and body language. For instance, human babies are not able to talk yet can be understood through other means, such as body language and crying. It therefore remains unsurprising that animals may also convey information in the absence of 'speech'. In light of this knowledge, it can be argued that language is not *missing* in other species but just exists in different forms to our own, forms which humans may not fully be able to understand (Dawkins, 1993).

Farmed species are no exception when it comes to recent discoveries in animal language abilities. Research on cows has shown for the first time how mothers and their calves communicate; mothers use low and high frequency calls depending on the proximity of their calves (Padilla de la Torrea, et al., 2015) and is supported by observations of high pitched bellows from dairy cows following the removal of their young (Joy, 2010, pp. 50, 61). An additional, and perhaps more significant, finding of the study by Padilla de la Torrea et al. (2015) is that cows use distinct, individualised calls to communicate with each other making it

possible to distinguish between individual cows by their vocalisations. Similar discoveries have also been made in pigs and chickens. Chickens have over 30 unique calls each conveying different information (Cornish, 2013), while the grunts made by pigs vary depending on their differing personalities (Friel, et al., 2016). Information on the communication of pigs was obtained by manipulating the environment to reflect poor-quality or enriched housing, finding that vocalisations were reduced in poor-quality conditions. Variations in pig communication have been found to be an indicator of welfare as certain sounds may convey information regarding emotional, psychological and motivational wellbeing (ibid). This, and the outcome of the study suggests that poor-quality environments are a detriment to psychological health which has implications for the welfare of pigs confined in IAF systems.

Evidence suggests that animals do possess various levels of language capabilities but that humans may very well miss the communications passing between other species and continue to assume they possess an overall lack of cognitive ability. Instead of assuming humans are the only species with a more complex vocal language an attempt should be made to understand that the languages used by other species may just be harder for us to detect and understand. Although the possession of language does not necessarily directly affect whether farmed animals suffer in IAF or not, it is relevant to welfare questions in other ways. Firstly, understanding more about farmed animal language can give researchers possible indictors of physical and psychological states which can be used to measure welfare in various conditions and determine which practises are specifically detrimental. Additionally, language is a cognitive ability which indicates complexity, intelligence and awareness, all of which increase the capacity to suffer from low psychological welfare. Despite observations of wide cognitive abilities in animals, conclusive statements are still more difficult to make than when studying physical welfare due to several methodological and epistemological issues.

7.2.3 Limitations of science in animal cognition

When assessing animals in terms of cognitive functioning it is worth noting that one cannot fully measure and consider many cognitive abilities in comparable ways to humans. This statement is especially true with regards to intelligence, which for most people refers to IQ and the abilities measured by IQ tests, but as IQ is not applicable to non-human animals, it cannot be compared. Once removed from a human context, intelligence can instead be regarded as many things and so it can be argued that animals display greater intelligence than humans in a number of areas.

One rather well known example is that of Clever Hans, the horse who was thought to possess unusual levels of intelligence as he seemed to be able to count and correctly answer simple mathematical sums (Boakes, 1984). Following close observation Hans was in fact found to be intelligent in an altogether different way; instead of being able to perform arithmetic he was picking up on very small subtle cues from the humans around him to deduce the correct answers. Those who worked with Hans were not even consciously aware of the cues they were giving and even made active effort to avoid them, yet Hans was still able to pick up on signs to give the right answers (Dawkins, 1993, pp. 68-71). The ability to pick up on small and unconscious cues to consistently produce the correct response demonstrates a form of intelligence far removed from the human concept of IQ. Although the example of clever Hans is a case study and is thus not generalisable to others of his species, the wider point is that intelligence can take on a broader definition. Intelligence can instead be argued to be high levels of ability in things which benefit the creature who possesses it; cognitive capacities that somehow aid survival do not necessarily have to be shared between species to be something worthy of being called intelligent.

The possibility of specialised intelligences in other species highlights the fact that there is a lot we do not know or understand about animals and animal cognition. Even with the aid of science and the scientific method, there remains aspects of animal psychology which we cannot currently measure or quantify and perhaps never will. Recent discoveries about the workings of other species have often produced unexpected results and challenged some of the common perceptions held. For example, contrary to the belief that sheep are dumb, evidence suggests that their well-known mimicry behaviour is in fact a display of collective intelligence which allows them to share and act on information about predators (CNRS, 2015; Constable, 2017). Additionally, something akin to culture and cultural transmission has been found to exist in non-human animals for the first time (Balter, 2013). Yet for all the new knowledge uncovered, there remain aspects of animal behaviour and psychology that we cannot understand or predict. A good example of our lack of insight is found in grouse mating habits; females are able to detect something in their perspective mates that indicates which males will survive and which will not (Dawkins, 1993, p. 14). Despite keen observation and study this variable is not known to researchers, suggesting there may be more complex processes happening between grouse which are not easily detected by other species. The abilities and capacities which are not known or understood fully by humans may also mean that farmed animals possess levels of awareness much higher than we credit them for.

Although there is much ambiguity and disagreement with regards to which cognitive functions farmed animals have, strong scientific evidence suggests that many species besides humans do possess significant levels of intelligence, including the ability to learn and communicate in unique and possibly complex languages. Even though there are many things science does not tell us regarding animal psychology, recent discoveries indicate that they are in fact more complex than automatic and purely instinct based. Such evidence and studies which have revealed our ignorance of animal cognition (e.g. grouse mating habits, monkey grunts) simultaneously highlight why humans should give farmed animals the benefit of the doubt when it comes to the capacity to psychologically suffer.

7.3 Consciousness

Determining levels of consciousness is significant in the debate on animal welfare in IAF as being able to personally experience and understand one's conditions may alter the degree to which one can psychologically suffer. Throughout academia and research, the terms 'consciousness' and 'sentience' refer to different things but for the purposes of this thesis the corresponding terms of 'access consciousness' and 'phenomenal consciousness' will be used. Phenomenal consciousness compromises of basic senses and experiences such as feeling pain or emotions. Access consciousness refers to the higher order experiences which allow for deeper thought and discussion on past and present memories (Davies & Humphreys, 1993). The previous sections on emotion and cognition have presented evidence which perhaps covers many aspects of phenomenal consciousness, but the question still remains as to whether non-human animals have self-awareness and can subjectively experience their lives. This section will therefore discuss some of the scientific evidence around the existence of consciousness in other species while simultaneously assessing the extent to which methodological flaws hamper the understanding of consciousness. The section will finish with a broader debate around whether it is actually possible to determine access consciousness and whether it is therefore possible to know its role on animal welfare in IAF.

7.3.1 Evidence of consciousness

One method of distinguishing whether consciousness is present in animals is through observation and study of behavioural markers. Cabanac et al. (2009) states that there are certain behaviours that indicate an organism is conscious: play, expression of emotions, emotional fever, expression of sensory pleasure and taste aversion. It is further suggested that these behaviours are common to all amniotes, and therefore farmed animals, due to an early shared evolutionary origin. However, behavioural studies should be handled with caution when used

alone as evidence of consciousness. The reason being that it is hard to distinguish conscious responses from automatic ones when observing behaviour; a species that *seems* to show awareness of its environment and itself does not necessarily make it a species that has complex personal processes (Seth, et al., 2005). Conversely, the argument that other species do possess consciousness is not founded on behavioural research alone but is also supported by biological evidence. To start, the rationale behind the ideas on consciousness of Cabanac et al. (2009) is that all animals which share these markers have also been shown to share similar anatomical, chemical and functional components of these behaviours.

The presence of basic biological elements of consciousness across species is solidified by homology. All mammals have the same neurological processing activity and development within the thalamocortical complex which has been found to be essential to human consciousness (Seth, et al., 2005). The strength of the scientific evidence is summed up in the Cambridge Declaration on Consciousness (Low, 2012), a document formulated by prominent scientists specialising in various branches of neuro-science. The main purpose of the declaration is to affirm that non-human mammals do display intentional conscious behaviours and possess the neuroanatomical, chemical and physiological substrates for consciousness. The Cambridge Declaration further states that there is a high chance that conscious awareness extends beyond mammals as evidence is strong that similar neural activity is also present in birds. There does seem to be more variation across bird species than there are across mammal species but overall, avian structures related to consciousness seem homologous with those of mammals. The implications of the evidence supported by the declaration is that farmed animals, including pigs, cows and chickens, all possess the biological components of consciousness.

A criticism of the conclusion of the Cambridge Declaration, and with homology in general, is that comparison of brain structure and processes with humans is only concluding that other species can react to pleasant and noxious stimuli. In general, the method is considered a rather superficial one which apparently fails to tell us anything because observable behaviours and biological features do not guarantee that the underlying cognition is the same (Povinelli & Giambrone, 1999); there is more to psychological functions like consciousness than the measurable biological structures and anatomy that underlie them. Homology does not therefore necessarily inform us of conscious *experiences*, and as such can be seen as weak evidence for access consciousness. Yet homology and the declaration are far from useless as evidence because at the very least they inform us that other species possess the same biology as us, which

is a start for measuring consciousness. It is evidence that points more towards the possibility that animals do possess subjective awareness than that they do not and is therefore far from redundant as evidence.

It is no straightforward feat to measure consciousness with science as it is not a concept which can be easily objectified and strongly defined. The reason being that consciousness is an *internal* aspect of people and is therefore limited to oneself, so determining whether humans are the only species with the concept of 'I' is often considered impossible. Although this is a significant methodological problem, uncovering consciousness in animals is based on the convergence of behavioural, evolutionary, neurological, chemical and anatomical evidence. The pooling of information and evidence acts to strengthen the validity of each individual method while providing a relatively reliable indication of consciousness. Even so, the collaborating evidence is often not enough to convince those who maintain that the study of consciousness is destined to failure, as it can never be known for certain what other species experience internally, a view which plays an important part in the broader debate on the nature of consciousness.

7.3.2 Can consciousness ever be determined?

Despite scientific evidence indicating that animals do hold consciousness, the topic still seems to be highly debated in professional circles. The weight of evidence alone, from biological analogy, observations and evolutionary origins seems to tip the balance in favour of arguing that other species do indeed possess consciousness. However, there also exists the debate that the current evidence on animal consciousness is not yet conclusive, consequently making it incorrect to assume that awareness is present. One key proponent of this position is Marian Dawkins, who states that it cannot ever be known for sure if non-human animals are conscious due to its internal and thus immeasurable nature (Dawkins, 2008). She denounces evidence such as behavioural observations and case studies as speculative and thus biocentrically anthropomorphic. As the majority of evidence for animal consciousness stems from these methods, Dawkins (Dawkins, 2012, pp. 171-172) argues that the knowledge gap with regards to animal consciousness has yet to be filled or even significantly reduced. However, what is known of animal consciousness has not purely been deduced from observations of case studies alone. As detailed above, evidence also comes from the logic of evolutionary continuity, behavioural indicators and species similarities with regards to aspects of the brain which are considered to be indicators of consciousness.

On the other hand, there arguably does still remain an element of anthropomorphism in biological homology and behavioural comparisons. Dawkins strongly criticises allowing the presence of anthropomorphic thinking into animal studies because it is fundamentally detrimental to animals (Dawkins, 2012). To do so is to risk misinterpreting non-human animals to the extent that we also misunderstand their needs, interests etc. She therefore raises an important point in suggesting that animals subject to scientific study should be allowed to speak for themselves instead of relying on making comparisons to humans. Methods which allow for this include preference and cost-preference tests, examples of which have been detailed previously in the study of non-human animal emotions and cognition (sections 7.1 and 7.2). However, such methods are not as applicable when studying something as abstract and internal as consciousness. There is possibly no verified reliable and valid way of directly testing for consciousness but the current methods of observations and biological comparisons are arguably the best available, there may thus be no benefit in not acknowledging what this evidence implies.

In contrast to the view held by Dawkins, Professor Marc Bekoff holds the position that it is in fact continuous scepticism and denial of evidence on animal psychological capabilities that is actually detrimental to welfare (Bekoff, 2012). The rationale behind this is that denying animal consciousness, at even the most basic levels is to consequently discount all of the supporting scientific evidence. Although demonstrating rigidity, scepticism and thoroughness in scientific research is generally a positive approach, it can also show a lack of flexibility and openness to the currently available evidence. In fact, Bekoff argues that to demand ever more ridged and controlled scientific study despite the current evidence, is to also encourage more invasive and potentially harmful research on animals (Bekoff, 2012); somewhat of a contradiction given that much of the study of animal consciousness is to ultimately aid understanding of animals and animal welfare (Bekoff, 2012). It should be noted that Bekoff and those who hold similar positions do not suggest that the evidence on animal consciousness should be taken as proof, only that it should instead be treated with the same level of caution as all scientific research and not dismissed. The fundamental concern is that in the attempt to avoid all potential cases of anthropomorphism, there is a danger of missing what the data might be communicating.

It cannot be answered here whether any non-human animal is fully conscious but the evidence that is available can still be considered with regards to animal welfare in IAF and questions of animal ethics in general. The scientific study of animal consciousness comes down to determining facts and generating evidence on various biological and chemical functions so, in

going back to Harris's (Harris, 2010a) proposition that facts lie at the core of moral issues, such information is of strong relevance to the moral assessment of IAF. The pursuit of facts concerning whether non-human animals are conscious, which ones and to what extent is significant in the debate over to what degree animals can psychologically suffer. The significance of consciousness and sentience lies in the belief that it is these features which allow a being to really 'experience' life, and therefore their surroundings, as opposed to being a simple rule-based organism only. To lean on the idea that animals are purely instinctual and 'mechanical' and are not negatively affected by the unnatural conditions humans subject them to is to believe that psychological welfare of farmed animals is not compromised in IAF.

Conversely, it can be argued that level of consciousness is irrelevant in the welfare debate as it is not necessary in feeling pain and discomfort. Even in the absence of full awareness, the degree to which farmed animals have the capacity to experience pain and psychological suffering in IAF are still significant factors in contemplating our moral obligations towards other species. Based on the evidence presented for emotions, cognition and consciousness, what is conclusive is that is that farmed animals do experience *something*. Nevertheless, if access consciousness did happen to be absolutely necessary in experiencing suffering, would it not be best to listen to the weight of the evidence and assume animals possess it as opposed to assuming they do not? Even if the current evidence concerning animal consciousness was balanced, surely more weight should be given to the supporting evidence; it would be difficult to morally justify acting as if animals possess no subjective awareness when welfare is affected to such a degree if they do so.

In summary, despite its methodological limitations, the behavioural and biological evidence concerning animal consciousness converges to indicate that it is in fact present in non-humans, to at least some degree. Yet, this conclusion depends upon the assumption that consciousness can be known and measured, an assumption which is highly doubted when it comes to species other than humans. The debate which exists within the scientific community is not conclusive on whether consciousness can be determined, yet high levels of professional ambiguity have implications for farmed animals. Even though evidence is relatively high, scientists remain extremely cautious and refrain from making strong statements for non-human animal consciousness (Martinho, 2106). Yet this position arguably encourages further animal testing and has welfare and moral implications for the animals in IAF.

7.4 Conclusion

Overall, scientific research seems to show that IAF is a detriment to farmed animals as many of the practises and conditions negatively affect psychological welfare. Evidence from studies using a variety of scientific methods have shown that animals seem to possess and display a wide array of emotions; farmed animals are no exception and therefore potentially suffer in a number of ways from negative emotions in IAF. Animals also possess many surprising cognitive abilities which, although may not be quite how humans use them, demonstrate that many animals possess high levels of intelligence and awareness. Lastly, the chapter demonstrated that all mammals and possibly birds possess the known biological components, and some behavioural, markers of consciousness. Although there exists doubt as to whether they have full self-awareness, it is difficult to say conclusively due to difficulties in measuring consciousness. Either way, even though consciousness can potentially enhance the ways in which animals can psychologically suffer it is not essential for suffering.

Although there is a certain amount of ambiguity and uncertainty regarding non-human psychological properties, it can be stated that farmed animals can and do suffer low psychological welfare in IAF which is affected by the presence of these characteristics. That is, the significance is not on the possession of characteristics like language and cognition, as these are arbitrary boundaries for not extending moral consideration (Singer, 1975), but how these characteristics allow and enhance suffering. Once this effect is understood there is no moral justification for not taking psychological suffering into account. From then, it can be reasoned whether compromising welfare by inflicting psychological suffering is justified or necessary. Psychological suffering may be less obvious than physical suffering but is arguably no less important to consider from a moral point of view. In many cases of psychological suffering, like frustration and extreme boredom, welfare may be improved through amendments such as environmental enrichment and better housing. However, the majority of psychological suffering in IAF is almost unavoidable. The separation of mother and offspring, fear and stress at slaughter, and distress from deprivation of natural environment are all caused by features which are essential parts of the system. If low welfare is not necessary, assessing moral acceptability from a perspective of psychology consequently means looking at whether such welfare compromises are justified. It is at this point that the ‘welfare’ approach fails; no improvements to conditions will remove poor psychological welfare without completely changing the nature of IAF. Moral reasoning again leads to the question of overall benefit of

IAF, which has been established to be insufficient in most considerations, including against health, violence, biological and psychological animal suffering. Ending this form of suffering almost surely means ending IAF.

CHAPTER 8: CONCLUSION

The first research question, how animals suffer due to conditions and practises in IAF, has been addressed in this thesis by showing that cows, pigs and chickens are all subject to procedures which often hugely compromise welfare. Empirical evidence has shown that animals in IAF can and do physically suffer; demonstrated through paying attention to a number of particular practises and conditions in which pain and stress to the body was evident. The potential for farmed animals to psychologically suffer was also revealed to be high, by showing that most animals possess many features and indications of emotion, cognition and consciousness, many of which are affected in IAF.

Each of the areas covered come together to address the second research question of whether it is morally reasonable and acceptable to subject animals to industrial farming, which concludes that from a scientific perspective, it is not. Scientific evidence and theory tells us that humans and other animals are much closer in the phylogenetic tree than is commonly understood. Most criteria used to establish the ridged categories we hold regarding ourselves and farmed species are in fact rather weak constructs. In following the principles of utilitarianism, if humans and farmed animals share interests and we award them both equal weight, the moral acceptability of IAF comes down to the two questions of necessity and justification. As seen throughout the discussion, there are often alternatives to many IAF practises including altering animal conditions which would, for instance, reduce aggression and render some practices needless. Additionally, the negative effects upon humans of not carrying out these practices would have to be significantly higher than the effects doing them has upon the animals. However, having seen the degree and scale of suffering such activities have upon farmed animal welfare the balance is far from proportional. As mentioned previously, most of these practices are done so for reasons such as meat quality, ease of handling and cost-effectiveness and are therefore far from critical. They arguably do little to compromise human welfare while those that do, mainly handling issues for farmers, may perhaps be improved with the placement of extra safety measures, training and improvement to animal environments. Given that IAF is neither necessary nor justified it is strongly suggested to be morally unacceptable.

There has also been effort to address the additional aim of demonstrating that science and philosophy should not be kept separate when discussing moral issues. Scientific evidence, such as the research presented, has been instrumental over the past decade in changing the way countries, producers and retailers approach the welfare of farmed animals (Broom, 2003). Facts and science are thus invaluable in the IAF debate around moral acceptability but they are not the definitive arbiters of ethical questions (Garner, 2005), moral philosophical discussion is just as important. This is because even if morals are in fact about welfare, it does not in any way determine how we should act or what values we should hold, as the science which can inform moral questions are not definitive rules on how we should behave. Engagement with utilitarianism and ideas of equal consideration of interest help provide reasons as to why the scientific outputs about the lives of farmed animals should be acknowledged and acted upon. For instance, the evidence that farmed animals have interests in not feeling pain, physical discomfort and psychological distress means that from the position of utilitarianism it is clear that these interests are both greater than the human preference for cheap meat and also highly disregarded in in IAF. The common interests between humans and non-human animals which are affected in farmed animals means that to equally consider their interests, IAF must cease to continue to operate, regardless of proposed or actual welfare changes. It is therefore highly useful for both scientists and philosophers to present what they find, to create a convergent body of knowledge which can inform people about animals, their functions and their situations (Broom, 2016).

Lastly, there has been an attempt to show how the problem of IAF is a relevant concern to those working for peace. IAF not only harms farmed animals but also damages people, wildlife and ecosystems. IAF is therefore a topic which is particularly relevant to the achievement of peace; this is because in addition to welfare, health and environmental impacts, IAF plays a significant part in the creation of structural violence. What engaging in science and moral reasoning therefore reveals, is that IAF causes significant, prolonged and needless suffering, a fact which should outweigh societal beliefs and desires. IAF is thus clearly a problem which is a big barrier to attaining peace for both humans and other animals and it not one which should be widely ignored by the public or disregarded in academic circles.

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