



Animal Welfare

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The Welfare Farmed Rat

Animal Welfare

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The Welfare of Farmed Ratites

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Animal Welfare Series Preface

Animal welfare is attracting increasing interest worldwide, especially in developed countries where the knowledge and resources are available to (at least potentially) provide better management systems for farm animals, as well as companion, zoo and laboratory animals. The key requirements for adequate food, water, a suitable environment, companionship and health are important for animals kept for all of these purposes.

There has been increased attention given to farm animal welfare in the West in recent years. This derives largely from the fact that the relentless pursuit of financial reward and efficiency, to satisfy market demands, has led to the development of intensive animal production systems that challenge the conscience of many consumers in those countries.

In developing countries, human survival is still a daily uncertainty, so that provision for animal welfare has to be balanced against human welfare. Animal welfare is usually a priority only if it supports the output of the animal, be it food, work, clothing, sport or companionship. In principle, the welfare needs of both humans and animals can be provided for, in both developing and developed countries, if resources are properly husbanded. In reality, however, the inequitable division of the world's riches creates physical and psychological poverty for humans and animals alike in many parts of the world. Livestock is the world's biggest land users (Food and Agriculture Organisation 2002) and the farmed animal population is increasing rapidly to meet the needs of an expanding human population. This results in a tendency to allocate fewer resources to each animal and to value individual animals less, for example, in the case of farmed poultry where flocks of over 30,000 meat birds and 50,000 laying hens are common. The largest layer farms have more than one million hens in cages 12 tiers high. In these circumstances, the importance of each individual's welfare is diminished.

Increased attention to welfare issues is just as evident for companion, laboratory, wild and zoo animals. Of increasing importance is the ethical management of breeding programmes, since genetic manipulation is more feasible, but there is less public tolerance of the deliberate breeding of animals for improved productivity if it comes at the expense of animal welfare. However, the quest for producing novel genotypes has fascinated breeders for centuries. Dog and cat breeders have

produced a variety of extreme forms with adverse effects on their welfare, but nowadays the quest by breeders is most avidly pursued in the laboratory, where the mouse is genetically manipulated with equally profound effects.

The intimate connection between animals and humans that was once so essential for good animal welfare is rare nowadays, have been superseded by technologically efficient production systems where animals in farms and laboratories are tended by increasingly few humans in the drive to enhance labour efficiency. With today's busy lifestyle, companion animals too may suffer from reduced contact with humans, although their value in providing companionship, particularly for certain groups such as the elderly, is increasingly recognised. Consumers also rarely have any contact with the animals that produce their own food.

In this estranged, efficient world, people struggle to find the moral imperatives to determine the level of welfare that they should afford to animals within their charge. Some, in particular, many companion animal owners aim for what they believe to be the highest levels of welfare provision, while others, deliberately or through ignorance, keep animals in impoverished conditions where their health and well-being can be extremely poor. Today's multiplicity of moral codes for animal care and use are derived from a broad range of cultural influences, including media reports of animal abuse, guidelines on ethical consumption and campaigning and lobbying groups.

This series has been designed to help contribute towards a culture of respect for animals and their welfare by producing academic texts addressing how best to provide for the welfare of the animal species that are managed and cared for by humans. The species-focused books produced so far have not been detailed blue-prints for the management of each species, rather they have described and considered the major welfare concerns, often in relation to the wild progenitors of the managed animals. Welfare has been considered in relation to animals' needs, concentrating on nutrition, behaviour, reproduction and the physical and social environment. Economic effects of animal welfare provision were also considered where relevant, as they were key areas where further research is required.

In this volume, we continue the series focus so far of addressing the welfare of one species or a group of species. However, the group of farmed species that are the topic of this book, the ratites, are unusual because they have been farmed for a relatively short period of time, just over 100 years, and are essentially undomesticated. This brings two major problems in comparison with modern farming methods for the traditional species. First, the optimum methods for husbandry of the species in different regions of the world are still in development and, second, the lack of domestication influence and large size of the birds provides further difficulties for husbandry systems, particularly in relation to handling practices. Because of these difficulties, an innovation to the series has been included to consider ethical aspects of the farming of ratites. Pioneering research with ratites to examine their welfare has been undertaken by Dr. Phil Glatz, Senior Research Scientist in Animal Welfare at the South Australian Research and Development Institute. Dr. Glatz, with the support from Dr. Christine Lunam, Senior Lecturer, School of Medicine, Flinders University and Dr. Irek Malecki, Associate Professor,

School of Animal Biology, University of Western Australia, has organised a team of leading scientists experienced in ratite husbandry and welfare to contribute to this volume.

With the growing pace of knowledge in this new area of research, animal welfare science, it is hoped that this series will provide a timely and much-needed set of texts for researchers, lecturers, welfare advocacy groups, policy makers, practitioners and students. My thanks are particularly due to the publishers for their support, and to the authors and editors for their hard work in producing the texts on time and in good order.

St. Lucia, Australia

Clive Phillips

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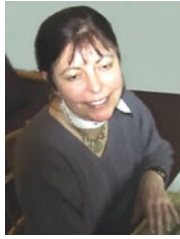
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Chapter 1

The Ethics of Farming Flightless Birds

G. Tulloch and C.J.C. Phillips

Abstract The ethics, or morality, of farming a relatively novel and undomesticated group of animals, the ratites, is considered. Ethical considerations for animal management centre on their right to life, bodily health and integrity, opportunity to use their senses and emotions, to have affiliations with conspecifics and be part of a worldwide species network, to play and to have control over one's environment. Ratites are considered to present greater ethical problems compared to conventional animal farming because of their inherent unsuitability for farming for meat and other products and their limited level of domestication. This unsuitability arises principally from their large size, slow maturation and limited social structure relative to other farmed birds. The absence of a domestication influence to reduce aggression and flight distance means that they have a significant potential to inflict damage on themselves, their handlers and conspecifics. Bodily mutilations, such as declawing may mitigate damage to others, but is ethically questionable because of potential welfare impact and offence to integrity. It is concluded that significant ethical concerns surround ratite farming that make the practice of dubious value as a means of producing food and leather with due respect to the animals' needs.

Keywords Ethics · Morality · Ostrich · Ratites

1.1 Introduction

The study of animal ethics is concerned with whether our behaviour in relation to animals is morally defensible and correct. Common ethical concerns relating to animals include their welfare, the use to which we put them, artificially reduced longevity, challenges to bodily integrity, genetic modification, the impact of animals on the environment and humans and the use of animals in religious practices

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(Phillips 2009). Our beliefs about animals are likely to have a direct influence on the way in which we conduct our behaviour towards them. Different stakeholders in the animal industries have different viewpoints and it is important to understand and consider the broad range of perspectives that may be held. For example, in the case of using ratites for food production, the views of producers, transporters, veterinarians and consumers have to be included in any assessment of the morality of the process. Typically people have views based on the utility of the outcomes or their beliefs about our responsibility to animals or some combination of these two factors. Other perspectives incorporate the view that the community in which people live is responsible for determining our actions, or that we develop a contract with animals, based on benefits to both. An understanding of the historical development of the different views may assist in identifying their importance to society.

This chapter explores the ethics of farming ratites – the family of flightless birds that includes emus, ostriches, cassowaries and moas. The first step is to consider the field of animal ethics – what it involves, and significant conceptual developments in its evolution to the present. With this groundwork laid, we will then be in a position to outline an ethical framework against which to assess the issues relating to the farming of ratites.

1.1.1 The Ethics of Human Use of Animals

Animal ethics has not always been seen as a cause for concern.

Animals have long been considered inferior to humans and different in kind, not merely in degree – though this firm boundary was problematised by Darwin’s ‘The Origin of Species’ (Darwin 1859). In Judaeo-Christian ethics, God gave humans dominion over animals – moderated by injunctions towards kindness. The mediaeval notion of the great Chain of Being, with man at the apex, expressed this. The philosopher Kant (1997) argued that animals were not rational or autonomous, and so their lives were not ends in themselves. In Kant’s view, presented in ‘Lectures on Ethics’, our duties to animals are merely indirect duties towards humanity, and if we treat animals kindly, we strengthen the disposition to behave kindly towards humans – like exercising a moral muscle on a proxy object. The corollary for Kant was that animals could appropriately be treated as means to our ends. For Kant, moral duties can only be to self-conscious beings. Only such beings can be members of the moral community. Animals could thus be relegated to beings of secondary concern – if concern at all – for want of a soul, of rationality (construed in a particular, narrow way), of autonomy or of language.

The Christian notion was, at best, one of human stewardship and at worst, human dominion over the rest of nature, including animals. This exacerbated the long-established prejudice in western culture in favour of rationality as the defining and unique characteristic of human beings.

In the Enlightenment, Descartes (1901) argued that like clocks or robots, animals were but machines that moved and made sounds but had no feelings. In such a context, it was easy to portray animals as quasi-clockwork animated robots – ‘furry

clocks'. Such a conception rationalised vivisection, for creatures with no consciousness could feel no pain.

1.1.2 Sentience

Jeremy Bentham, the founder of utilitarianism, was the first major figure in Western ethics to advocate in 1789 the direct inclusion of animals in our ethical thinking. As he memorably argued:

What else is it that should trace the insuperable line? Is it the faculty of reason or perhaps the faculty of discourse? But a full-grown horse or dog is beyond comparison a more rational, as well as a more conversable animal than an infant of a day or a week, or even a month old. But suppose they were otherwise, what would it avail? The question is not Can they reason? nor Can they talk? But Can they suffer?

In this way, Bentham (1789) addressed the issue of the boundary between human and animal and introduced the concept of sentience – or the capacity to feel pleasure and pain – as the central criterion of issues of animal ethics. This was the driving force behind the POCTA – prevention of cruelty to animals – tradition of legislation, which still prevails today. It is an animal welfare framework, evident in the RSPCA and the work of some animal activists.

Singer's (1990) work is grounded in this Benthamite tradition, and he further argues that the difference between humans and animals is one of degree, not of kind, i.e. not absolute, and that the boundary is quite porous.

1.1.3 Circles of Compassion

As early as the second century AD, the Stoic philosopher Hierocles created a vivid metaphor for extending the boundaries of our moral concern. Imagine, he argued, that each of us lives in a series of concentric circles, the nearest being our own body, and the furthest being the entire universe. The task of moral development is to move the outer circles progressively to the centre, so that one's relatives become like oneself, strangers like relatives, and so on. Singer (1990) adopts this metaphor, and argues for explicitly extending the circle of one's concern beyond the boundary of one's own species, to include animals, and, ultimately further, to the whole environment. Why we should do this is meant to be intuitively obvious; at least, learning to see it so is the path of enlightenment in some religions. Humans appear to have built-in resistance, however.

1.1.4 Speciesism

Speciesism was the second great driving idea in animal ethics after sentience. It was a term coined by Ryder in 1970s (Ryder 2005) and popularised by Singer (1990).

It means a prejudice or attitude of bias in favour of members of one's own species against those of members of another species. Speciesism obviously picks up on the unfavourable connotations of racism and sexism, and the movements to extend equal consideration to the interests of coloured people and of women.

The task to change deep-seated, unreflective notions of the species barrier is the task we face now, and it is perhaps the hardest of all, because the attitudes are so entrenched, and the economic incentives to persist with cost-cutting, production-line, inhumane treatment of animals are so great. Pope Benedict (2005) has condemned the 'industrial use of creatures, so that geese are fed in such a way as to produce as large a liver as possible, or hens live so packed together that they become just caricatures of birds'. It is in this context that the argument to expand our circle of compassion appeals to considerations of animal welfare, but also makes a transition to animal rights, as sentient beings who deserve quality of life. There may be a common perception that birds are less worthy of high standards of animal welfare than mammals, in part because we empathise more easily with the latter. Birds are rated by humans as less sentient than mammals, but more sentient than fish (Phillips and McCulloch 2005; Meng 2009; Meng et al. 2009), although there is no physiological evidence for the validity of these differences. Certainly the concept of sentience is central to attributing animals' welfare considerations, as is an opposition to cruelty, which is its corollary. But the focus of concern for many animals is primarily negative, with an indirect appeal to empathetic identification only for those animals most like us. Appealing to quality of life – whether human or animal – needs specification if it is to be more than vague.

There now seems to be an even better theoretical approach, which is more broad-ranging and specific, and grounds positive guidance for action. It is the capabilities approach, advocated by Nussbaum and Sen (1993), the latter a Nobel prize-winning economist, who pioneered a Quality of Life approach to human capabilities in the context of aid and human development, tied to the UN Declaration of Human Rights.

1.1.5 The Capabilities Approach as an Ethical Framework

The capabilities approach was first articulated in 'The Quality of Life' (Nussbaum and Sen 1993), based on their research in a World Institute for Development Economics Research (WIDER) study for the U.N. University. The book comprises papers from a 1988 Conference in Helsinki, which they organised for WIDER, where Nussbaum spent a month in the summer for 8 years in residence. Till then she had thought little about problems of global justice or feminist philosophy. Her time there transformed her work.

Aristotle's insistence on the importance of individual perception of concrete circumstances, she felt, had a contribution to make to a field that is 'frequently so pre-occupied with formal modelling and abstract theorising that it fails to come to grips with the daily reality of poor people's lives'.

WIDER's mandate is to engage in interdisciplinary research, and the 1988 conference brought together economists and philosophers around the question what is meant by 'quality of life' and what is required in terms of social policy for improving it'.

A crude measure of per capita income is generally taken as indicative of human welfare, which begs important questions such as the distribution of wealth and income, and the need to assess a number of distinct areas of human life. At the micro level, the notion of maximising an individual's utility underlies much of conventional demand theory. But this raises two questions: is utility measurable, and is it the right thing to be measuring when we are interested in assessing the quality of human lives? Nussbaum and Sen (1993) suggest we should instead measure people's capabilities, what they are able to do and to be in a variety of areas of life.

The ten capabilities listed ranged over several areas:

1. Life
2. Bodily health
3. Bodily integrity
4. Senses, imagination and thought
5. Emotions
6. Practical reason
7. Affiliation
8. Other species
9. Play
10. Control over one's environment

The influence of this approach is shown by the fact that since 1990, Human Development Reports of the UN Development Program have looked at capabilities. Nussbaum was critical of the per capita gross national product interpretation of Quality of Life on two grounds: it does not address distribution or different, non-economic aspects of human life.

In the field of animal ethics, the capabilities approach, as extended by Nussbaum and Sen (1993), appeals for animal welfare based on rights derived from their capabilities – which are outlined. The approach lists ten capabilities, nine of which also apply to animals. It stresses how much more has to be considered and provided for than is implied by sentience, and covers the whole range of animals, including in zoos, rodeos, museums and laboratories. It involves a radical paradigm shift in outlook, and has huge practical implications. It's observable, and it's easy to identify where the shortcomings fall. This makes it both the most current and the most exciting development in animal ethics.

Let us now examine in detail the capabilities, as applied to animals.

The first is *Life*, which entails animals are entitled to continue their life, whether or not they take a conscious interest in it. This puts pressure on the meat industry to reform its practices, as well as problematising killing for sport (hunting and fishing) and for fur.

Bodily health is the second entitlement, and where animals are under human control, this entails laws banning cruel treatment and neglect, confinement and ill

treatment of animals in meat and fur industries; forbidding harsh or cruel treatment for working animals, including circus animals, and regulating zoos, aquaria and parks, as well as mandating adequate nutrition and space. Nussbaum and Sen (1993) point to the anomaly that animals in the food industry are not protected as domestic animals are, and recommends that this anomaly be eliminated.

Bodily integrity is the third entitlement, which would prevent the declawing of ostriches (Meyer et al. 2002) and other mutilations, such as tail-docking, that make the animal more beautiful to humans. It would not ban forms of training that are part of the characteristic capability profile, such as training horses or border collies.

Senses, imagination, and thought constitute entitlement 4, and entail access to sources of pleasure such as free movement in an environment to please the senses, and which offers a range of characteristic activities.

Emotions are entitlement 5. Nussbaum and Sen (1993) argue that all animals experience fear, and many experience anger, resentment, gratitude, grief, envy and joy, while a small number can experience compassion. Hence they are entitled to lives where it is open to them to have attachments to others, and not have these attachments warped by isolation or fear. While this is understandable in relation to domestic animals, it is overlooked in relation to zoo and farm animals and research animals.

Practical reason (entitlement 6) is ‘a key architectonic entitlement in the case of human beings’ and has ‘no precise analogues in the case of non-human animals’. However, we should consider the extent to which the being has a capacity to frame goals, and support it if this is present, as well as providing plenty of opportunity for movement and variety of activities.

Affiliation is entitlement 7 on the capabilities list. Nussbaum and Sen (1993) argue that animals are entitled to form attachments, and to relations with humans that are rewarding rather than tyrannical, as well as to live in ‘a world public culture that respects them and treats them as dignified beings’.

Other species is capability 8, and calls for the formation of an ‘interdependent world in which all species will enjoy cooperation and mutually supportive relations with one another’. This idealistic entitlement calls, in Nussbaum and Sen’s (1993) words, ‘for the gradual supplementation of the natural by the just’.

Play is capability 9, and is central to the lives of all sentient animals. It entails adequate space, light and sensory stimulation and the presence of members of other species.

Control over one’s environment is capability 10, and has two aspects in the case of humans – political and natural. For non-human animals, it entails being respected and treated justly, even if a human guardian must go to court, as with children, to vindicate those entitlements. The analogue of human property rights is respect for the territorial integrity of their habitat, domestic or wild, and the analogue of work rights is the rights of labouring animals to dignified and respectful labour conditions.

Only Practical Reason does not fit smoothly with animals, and much of what it requires can be derived from the criteria for flourishing. However, even excluding it, if the other nine of these ten capabilities were taken seriously, it would transform the common conception of how much needs to be provided as basic conditions for

animals – not just life, health, and the maintenance of bodily integrity, but opportunities to experience the senses, imagination and thought, emotions, affiliation, relations with other species, play and control over the animal's environment. Yet it is hard to think of a single instance where these capabilities are currently allowed for.

Nussbaum and Sen (1993) recognise that these rights need international cooperation, via accords, such as the U.N. Declaration of Human Rights, as well as the ineliminability of conflict between human and animal interests. Some bad treatment of animals, she argues, can be eliminated without serious loss of human well-being. In the use of animals for food, for example, she suggests setting the threshold on focussing on good treatment during life and painless killing. In the use of animals for research, she argues much can be done to improve the lives of research animals, without stopping useful research. It is unnecessary and unacceptable for primates used in research to live in squalid and lonely conditions. Nussbaum and Sen (1993) advocate asking whether the research is really necessary; focussing on the use of less complexly sentient animals; improving the conditions of research animals including terminal palliative care; removing psychological brutality; choosing topics cautiously so no animal is harmed for a frivolous reason; and making a constant effort to develop experimental methods (such as computer simulation) that do not have bad consequences. The three Rs Replacement, Refinement and Reduction first espoused by Russell and Burch (1959) – has some affinity to Nussbaum and Sen's (1993) approach here.

Phillips (2009) recently suggested expanding the basis for an ethical framework to include the genetic integrity of animals, focussing on our duty towards animal species. He assesses our interactions with animals under the following concerns: their welfare, their ability to display choices, the use to which we put them, our impact on their longevity, challenges to their bodily and genetic integrity and the impact of animals on the environment and humans. These issues have been used as a basis for surveying attitudes to animals and indices developed to investigate these issues in different cultures (Meng et al. 2009). Contrary to this extension of our responsibilities, Roger Scruton has suggested that we should reduce our responsibilities so that, for wild animals at least, our principle duty is to animal species, not individual animals (Scruton 1996). Thus Scruton is able to justify hunting animals because individual animals are not worthy of our consideration, only species.

1.1.6 The Capabilities Approach to Ratites

Adopting the capabilities approach to the ethics of farming ratites, it is clear that the first priority is to learn about their nature and needs. At the moment, there is a glaring deficiency here, as very little is known about their needs, and such research done tends to focus on a small range of fairly obvious issues: that they are an endangered species; that their habitat is at risk; that humans feed them and by thus interfering with them, assume a responsibility for them. There is an apparent symbolic association with masculinity and violence (Nihill 2002), and – perhaps

of primary interest – they present an attractive potential for farming, as they are able to exist in a broad range of climatic conditions, although not without welfare risks as is explained later. Their meat is valued for its nutritional content: low in cholesterol, high in protein and of low fat content while their skin, feathers and oil are used widely.

1.1.7 Ethical Issues in Farming Ratites

The animals we farm for food and other products are principally species that have been domesticated to make them more amenable to the farming process. The most efficient animals to produce meat are those in the early growth stages, before growth declines and the maintenance cost of the animals assumes a significant cost. Thus animals killed for meat are usually slaughtered at approximately 50% of their mature size. To efficiently produce large numbers of offspring capable of growing rapidly to this stage the species used are naturally prolific (to minimise the number of breeding females), polygynous (to minimise the number of males in the breeding herd/flock), early maturing (minimising the cost of rearing replacement breeders), gregarious (reducing the tendency for animals to stray and allowing the animals to be herded) and herbivorous (to invoke a direct transfer of plant energy to meat energy, without the inefficiencies of passing through another process in the food chain by farming carnivores). Ratites can only be claimed to possess two of these virtues that would make them suitable for farming for food, their mainly herbivorous diet and prolificacy. They can produce many young each year, up to 100, which can be artificially reared although as noted below this raises ethical issues. They are not early maturing, with ostrich hens starting to produce eggs at about 18–36 months. They are usually bred in pairs or trios and have small social groups. Moreover, they have not been domesticated, which is the process by which wild animals are tamed to allow them to be kept more easily in intensive farming systems. Domestication allows animals to tolerate the presence of humans more readily, reduces aggression and often reduces their size so that they are more easily handled. Typically large numbers of farm animals, such as cattle or sheep, can be moved by one or two humans, perhaps with the aid of a dog. This is not possible with ratites that require very careful handling (see Chap. 10) and is prone to stress-related disorders during and after transport (Kamau et al. 2002). In addition, ostriches stand at up to eight feet tall, making them potentially dangerous animals to handle.

Ratites have not been domesticated and are naturally very aggressive (especially in the breeding season) in their relationships with humans. Chicks can be imprinted on humans, lessening their intuitive aggression towards them, but in adulthood revert to wild type and show clear evidence of aggression (Nihill 2002). Ostriches and cassowaries are the only birds that have killed humans by physical attack, and there have been many incidents of serious injury when humans have attempted to feed cassowaries or hold them in captivity (Kofron 1999). Ostriches, like other

ratites, are large compared with other farm animals, often in excess of 2 m. They are difficult to handle, often running if they are stressed, running into fences, running until exhausted (Hoffman and Lambrechts 2011). They need space to run, usually several acres, which are often not provided in intensive, feedlot-type operations. The birds are easily frightened by novel stimuli. Capture myopathy (see Chap. 11), similar to that experienced in captured wild animals, accounts for some of the serious mortality that can eventuate following transportation (Hoffman and Lambrechts 2011; Navarro and Martella 2011).

It is clear that standards for transport, feeding, intensity of housing are often not sufficiently supported by scientific research and are based primarily on expert opinion. Transport is a particularly stressful period for the birds and it should be a pre-requisite for new species farming that welfare standards are adequately evaluated *before* initiation of the practice. Some of the knowledge gained from other farmed species will benefit ratites. For example, they are now known to suffer from the same depletion of glycogen reserves, high pH and consequent dark muscle when stressed at slaughter that cattle are prone to (see Chap. 10). The research required to optimise the ratite farming systems will be less than has been conducted with cattle and sheep in the twentieth century, but still substantial in relation to the size of the industry.

The small size of the industry and difficulties in managing ratites in farming systems means there are not many skilled stockpeople that can care for the animals in new enterprises. In the absence of indigenous, inherited knowledge, training of all stockpeople should be compulsorily undertaken (see Chaps. 5, 6 and 9). This book is therefore an attempt to summarise the current state of knowledge, but it also points out gaps in the literature that need filling.

Another ethical concern relates to the removal of eggs soon after lay for artificial incubation, allowing the hen to return to lay again more rapidly (see Chaps. 4 and 11). This practice is commonplace, but the incubation is often not successful (Deeming 2011). This is comparable to calf removal and artificial rearing in the dairy industry, except that the mortality rate in this case is much lower. Still this practice has been the cause of ethical concern on account of its unnaturalness and threats to the survival of the birds unless considerable experience has been gained. Deeming (2011) raises doubt about the sentience capacity of birds in ovo and hence their capacity to suffer. However, even if unable to suffer, threats to the survival of the bird challenges other ethical values, in particular the right to life of the embryo.

Other ethical concerns include the ‘assistance’ given to birds during hatching, which can jeopardise their future survival and welfare (see Chap. 4), Nussbaum and Sen’s (1993) first capability. Periods of human interference with the birds, e.g. during transport, have a much greater effect than with domesticated poultry. This raises the ethical question as to why such birds are kept for meat, leather, feather and oil production if they are more difficult to keep in a high welfare state than other, more efficient birds. One reason is to satisfy some humans’ desire for variety in the diet, another is that it potentially allows them to claim dominance over a greater number of species.