

Fair or fowl?

The state and future of farmed
animal welfare in the UK

Jake Shepherd
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Aveek Bhattacharya

SMF

**Social Market
Foundation**

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EXECUTIVE SUMMARY

This report is the first in a series exploring the potential impact of alternative proteins on animals

- Alternative proteins could dramatically reshape our food systems, and significantly reduce the animal suffering involved in farming. This report is the first of three investigating the likelihood and potential of such change.
- The following two will look at i) public attitudes to meat substitutes and measures to reduce meat consumption, and ii) how far alternative proteins can promote animal welfare, and how likely they are to succeed.
- Before that, though, this report attempts to identify a working definition and practical measure of animal welfare to identify the status quo, and how it might evolve in a ‘do nothing’ scenario without adoption of alternative proteins.
- These findings will help us to understand, in subsequent reports, how well public attitudes reflect the current state of animal welfare, and how well placed alternative proteins are to addressing the greatest challenges in animal welfare.

Robust comparable data on farm animal welfare is hard to come by

- There are broadly three ways of judging animal welfare – testing physical health, gauging psychological status or comparing conditions to those preferred in behavioural tests – all are tricky to do at scale.
- Assessment of animal welfare standards is highly influenced by the UK Farm Animal Welfare Council’s ‘Five Freedoms’ framework:
 - Freedom from hunger and thirst
 - Freedom from discomfort
 - Freedom from pain, injury and disease
 - Freedom to express normal behaviour
 - Freedom from fear and distress.
- These objectives are reflected in checklists like AssureWel, used by farmers and others to assess their farms, and by labelling schemes such as RSPCA Assured.
- While such tools are good guides to welfare on individual farms, they do not provide adequate data to develop a national picture:
 - Little data is publicly available
 - Many farms do not participate in the schemes, leaving them with skewed samples.

As a result, our analysis is based on an admittedly crude ‘factory’/‘non-factory’ farmed distinction

- We acknowledge that it is theoretically invalid to conflate systems of production with welfare outcomes – a farm’s economic model does not map perfectly to animal conditions.
- For the most part, though, it is a reasonable proxy, and in the absence of any better data, it is the one we have to rely on.

- For our purposes, we have chosen to equate ‘lower welfare’ with ‘factory farming’.
- By ‘factory farming’ we mean systems of rearing livestock using highly intensive methods.
- Given the sorts of practices prevalent in such farms – most notably restricted space, but also things like beak trimming, tail docking, lesions, heat stress and premature deaths – we believe this approach is justified.

Nevertheless, it is clear that farm animal welfare is overwhelmingly an issue of intensively farmed chicken

- In the UK today, we estimate there are 155 million factory farmed animals (two-thirds of all terrestrial animals), of which 98% are poultry.
 - 120 million (77%) are chickens reared for slaughter.
- Over a billion factory farmed chickens are slaughtered every year – no other animal comes close to that number, with 17 million factory farmed fish next on the list.
- That is partly weight of numbers – there are almost twice as many chickens as humans in the UK at any one point in time – but also because they experience the worst conditions: 95% of chickens are factory farmed.
- Some argue that the lives of birds and fish should count for less than mammals, either because we should show greater moral concern for animals like us or because they are less psychologically complex and thus have less capacity for suffering.
- Even if that were true, applying ‘moral weights’ to different species according to the number of neurons in their brains or public perceptions of their worth does not change the overall story – chickens still dominate the numbers.

There is little clear evidence that things are improving

- We do not have adequate data to say with any confidence whether standards overall have been improving.
- The growth of chicken production (up by a quarter in the last decade), and an increase in the number of large intensive ‘megafarms’, indicates more animals are experiencing lower welfare conditions.
- At the same, the number of organically farmed chickens and free-range egg-laying hens has increased – suggesting a degree of polarisation in the poultry market.
 - This trend may, though, be in reverse because of the cost of living crisis.
- However, such positive developments are just a drop in the ocean, since:
 - Only 2% of farm animals are organic, receiving the highest level of welfare standards
 - Overall, 12% of all farm animals are reared under the RSPCA Assured scheme, but just over 1% of broiler chickens.

The situation could get worse if current trends continue

- The farm animal population grew by 14% in the last decade, and broiler chickens by a quarter – if that is repeated in the next decade, it would mean at least another 28 million factory farmed animals in the UK.
- A concerted effort at reducing meat consumption – e.g. matching the 12% drop in Germany over the past decade – could reduce the number of intensively farmed animals by 19 million, but only if that reduction includes chicken (unlike Germany).
- The RSPCA's ambition of rearing at least half of all farm animals to its standards by 2030 would be transformational, saving 78 million animals (again mostly poultry) from factory conditions – but this would require a massive acceleration in its progress, as the RSPCA Assured scheme recognises in its growth plans.

If we care about animal welfare, we should collect better data

- What gets measured matters: to understand the scale of our problems, and to hold government and industry to account.
- DEFRA should aim to produce, based on representative samples of farms, estimates of the welfare status of each farmed animal in the UK, allowing us to categorise (in the Farm Animal Welfare Committee's terms), whether they have a 'good life', 'life worth living' or a 'life not worth living'.

Animal welfare improvement is about chickens first and foremost – that may be in tension with other meat reduction goals

- From an animal welfare perspective, reducing consumption of intensively-reared chicken is the key objective.
- Yet from an environmental perspective, beef and dairy are a far greater source of carbon emissions, and indeed the Climate Change Committee has implied that shifting consumption from red meat to chicken could be beneficial to net zero transition.
- Animal welfare advocates may have a role to play to ensure that alternative proteins seek to displace intensively-reared chicken as well as the anticipated replacement of beef and lamb consumption.

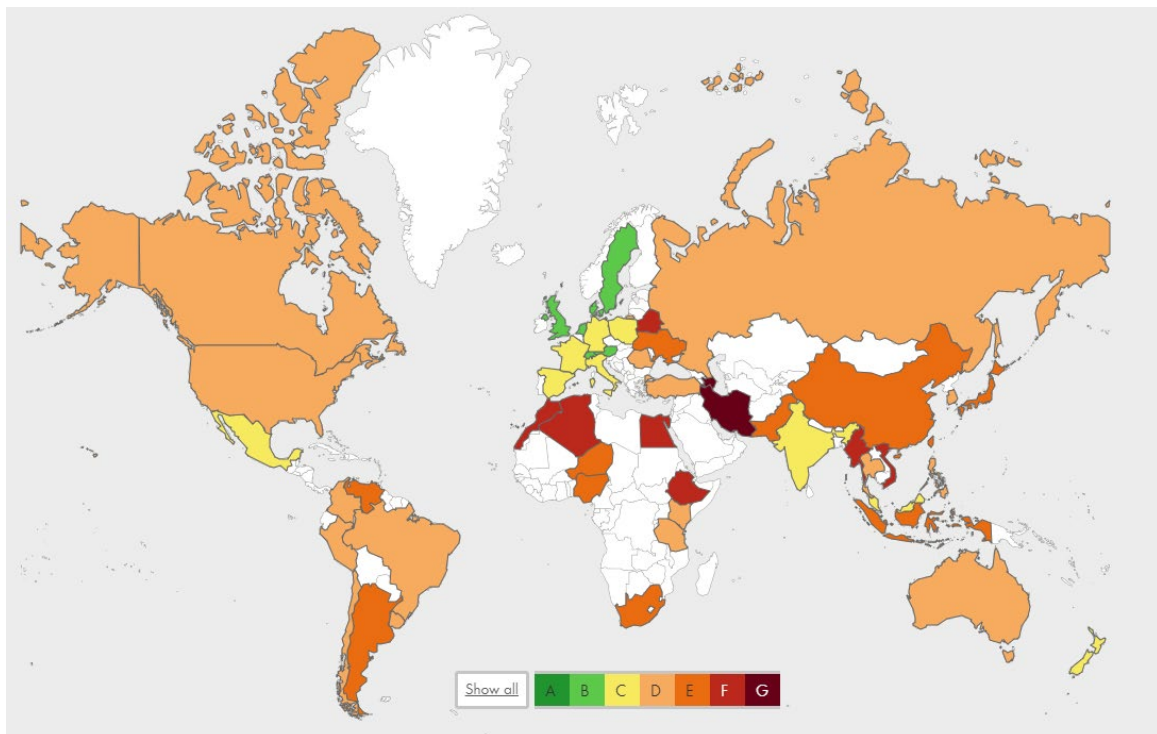
CHAPTER ONE – INTRODUCTION

Farmed animal welfare is an issue of great potential political significance

It is a common cliché to observe that the UK likes to think of itself as a nation of animal lovers. Yet that self-perception has some basis in fact: 69% of British people describe themselves as animal lovers, and only 3% say they do not like animals.¹

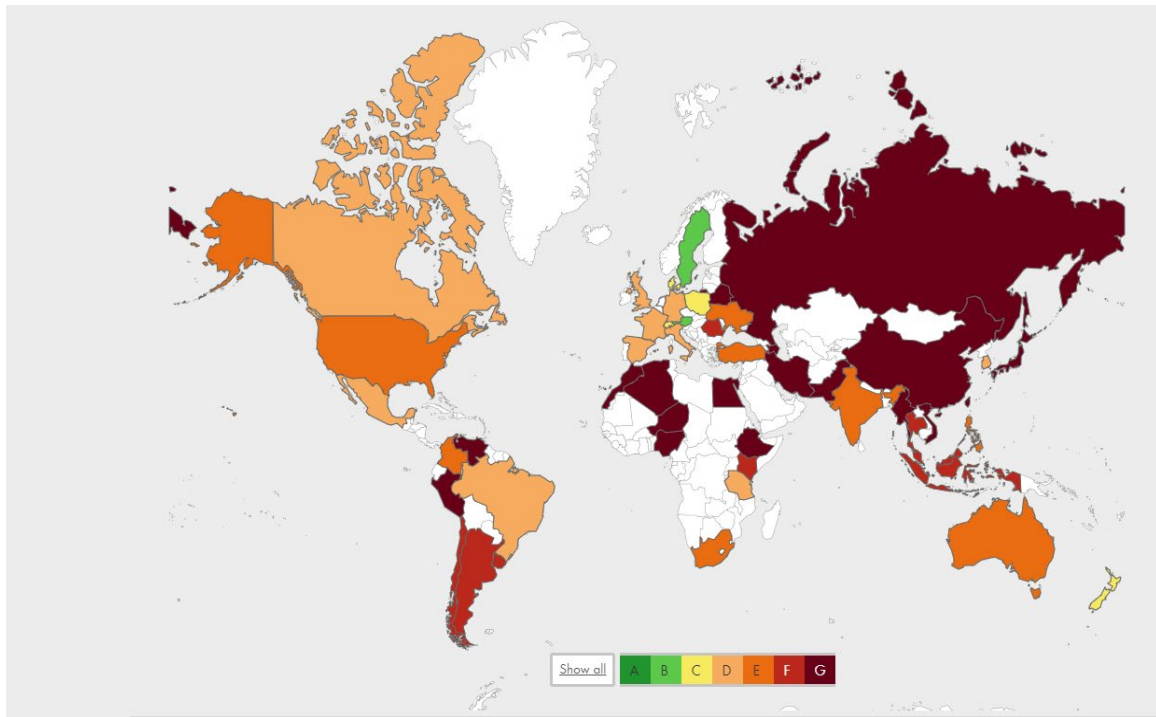
It is scarcely less of a cliché to say that this concern for our fellow creatures does not extend sufficiently to the animals that we eat. This is a more complex issue. It is certainly the case, as we shall see in this report, that there is substantial animal suffering involved in producing the meat that lines our supermarket shelves. According to the Animal Protection Index, a joint initiative of a group of leading animal welfare charities, the UK gets a grade B overall for the way that animals' interests are recognised in law and policy – the joint highest grade of any country. Yet when it comes to protecting *farm* animals, the UK's grade falls to a D.

Figure 1: Animal Protection Index: Overall Grade, 2020



Source: Animal Protection Index

Figure 2: Animal Protection Index: Protecting Animals Used in Farming Grade, 2020



Source: *Animal Protection Index*

That does not mean that the public, or even politicians, are indifferent to the position of farmed animals. For example, 31% of people say they have reduced or eliminated meat in their diet in the past year, and 23% say they have bought products with higher animal welfare standards.² A 2017 House of Lords report claimed that “The UK has some of the highest farm animal welfare standards in the world”, and that “UK producers are rightly proud of these standards”.³ Indeed, the UK was an early pioneer in regulating animal welfare, for example banning veal cratesⁱ in 1990, and dry sow stallsⁱⁱ in 1999, long before they were banned across the European Union. Along with the rest of the EU, the UK banned battery cages for egg-laying hens, moving to a system of enriched cages that offer 20% more space, nest boxes, litter, perch space and scratching materials.⁴

ⁱ Veal crates are individual pens which restrict calves’ ability to move, turn around or lie down.

ⁱⁱ Sow stalls, or gestation crates, are metal enclosures in which pigs are enclosed for the duration of their pregnancy (around four months), giving them minimal opportunity for movement. Illegal in the EU, they are the subject of an ongoing Supreme Court case in the US over whether the state of California may ban the sale of pork produced using sow stalls. Sow stalls should not be confused with farrowing crates, pens in which sows are confined usually for a week before birth until the piglets are weaned at four weeks. Farrowing crates are legal in the UK, though there has been some discussion of the possibility of a ban.

Rather than active rejection of the interests of farm animals, then, the state of British policy and public opinion, seems more uncertain and dissonant. More generally, farm animal welfare seems like an almost dormant political issue, with the potential to explode. Wild animal issues seem to have played a significant role in the 2017 General Election. A perceived u-turn in the Conservative manifesto on banning ivory sales was widely shared on social media, and was noticed by 14% of people, including a third of 18-24 year olds.⁵ Labour's pledge to maintain the ban on fox hunting was their most popular manifesto commitment according to one poll.⁶

That experience, in turn, seems to have contributed⁷ to the Conservative government's 2021 Action Plan for Animal Welfare.⁸ The first element of this was the Animal Welfare (Sentience) Act, which legally recognised the sentience of animals and established an Animal Sentience Committee to ensure government policy recognises their interests. It also presented proposals to improve welfare for pets, wild animals and animals abroad (including implementation of the Ivory Act, which bans the trade). In relation to farmed animals, it pledged to end the export of live animals for fattening and slaughter, introduce measures to improve welfare during transport, examine the use of cages for poultry and farrowing crates for pigs, improve slaughter methods and incentivise farmers to promote animal welfare.

The possible impact of alternative proteins on animal welfare is radical but uncertain

In this context, the emergence of alternative proteins could have radical implications for animal welfare. Alternative proteins are those protein-rich food products which derive their protein content from non-animal (e.g. plants) or non-traditional (e.g. cultivated animal cells) sources. Two recent SMF reports have evaluated the environmental, economic and health benefits that could accrue from increased consumer substitution of convention animal meat for alternative meat, dairy and seafood products.⁹ We have not, as yet, given sustained attention to the potential impact of alternative proteins on animal welfare.

On the face of it, alternative proteins have the potential to substantially reduce animal suffering, having emerged as genuine challengers to conventional convenience foods dependent on high-intensity welfare-compromising farming and processing methods. Today, the UK alternative protein market has an estimated value of around £1.3 billion – having doubled between 2016-2020 – whilst the global market is predicted to be worth between \$77-153 billion (£62-123 billion) by 2030.¹⁰

In this project, we seek to explore that potential, and better understand the relationship between alternative proteins and animal welfare. How likely is it that alternative proteins will have a genuinely transformational effect on our diets? To the extent that they displace meat consumption, will they be a substitute for higher or lower welfare meat? What role can and should policy play in supporting the alternative protein sector to improve animal welfare? Ultimately – how far are alternative proteins an alternative strategy to promoting animal welfare, a complement to existing efforts to improve farming, or a distraction?

This is the first of three reports – focusing on diagnosis and underlying trends

However, this report will barely discuss alternative proteins. Before we can investigate the possible impact of alternative proteins on animal welfare, we need to better understand what we mean by animal welfare, the current state of it, and how it is likely to develop in the absence of alternative proteins. This report, therefore, seeks to answer two questions:

- *What is the scale and nature of animal suffering caused by present animal protein consumption in the UK?*
- *What is the potential future scale and nature of animal suffering under different animal protein consumption scenarios in the UK?*

This report is the first of three, with the others following later this year. The second report will explore public attitudes to meat, alternative proteins and how they relate to policies that seek to promote animal welfare. The third will look specifically at how APs can help to improve animal welfare in the UK – how likely they are to displace meat consumption, what sort of consumption they displace, and how supporting APs compares to more traditional animal welfare measures.

Before that, this report looks at where we are now, and where we might be going. In order to understand the possible or likely impact of alternative proteins on animal welfare we should understand what we mean by ‘animal welfare’, and how we can measure it – in other words, what success would look like. This report also considers trends in animal welfare to provide a picture of the ‘do nothing’ scenario – what is likely to happen without substantial growth in alternative proteins?

The report proceeds as follows:

- **Chapter Two** explores how we might define, compare and measure animal welfare.
- **Chapter Three** sets out our best estimates of the current state of farmed animal welfare in the UK.
- **Chapter Four** examines the question of how we can compare welfare across species, and how different assumptions on that question affect our perceptions of farm animal welfare.
- **Chapter Five** discusses trends in farmed animal welfare, and provides some projections for the future.
- **Chapter Six** discusses these findings and their implications, and makes some recommendations for action.

CHAPTER TWO – DEFINING AND MEASURING FARMED ANIMAL WELFARE

This chapter addresses the key theoretical issues around how to conceptualise animal welfare, as well as the practical challenges of measuring and comparing it. It begins by asking what we mean by 'welfare', and how we might be able to identify whether an animal is thriving or suffering.

It then goes on to review different frameworks and indicators for evaluating welfare, before landing on the approach that we follow in this report – using factory farming as a proxy for lower welfare. While we recognise this is far from ideal, and takes a long way from the sophistication and granularity of more theoretical or small scale approaches to animal welfare, it turns out to be the only one we can operationalise at the level of a whole country like the UK.

There are two main theoretical approaches to animal welfare – focusing on their feelings or bodies – but the practical difference is minimal

What do we mean by 'animal welfare'? What is it that makes an animal's life better or worse, or more or less worth living? The question is not purely scientific, but draws in a range of ethical questions.¹¹ This makes life tricky for those, like us, who want to measure welfare in order to compare the potential impacts of interventions and inform policy decisions.¹² There are, broadly speaking, two ways that researchers have approached the question: the 'biological functioning' approach, and the 'feelings' approach.¹³ The biological functioning school of thought defines welfare primarily in physical terms, by looking at animals' bodies. In contrast, the feelings school proposes that animal welfare should focus on animals' affective states, or feelings. Historically, this has tended to focus on alleviating strong negative states, or feelings of 'suffering', although more work has recently explored the importance of promoting positive welfare states, or feelings of 'pleasure'.¹⁴

Both schools of thought make perfect sense in theory, but face difficulties in practice when it comes to measuring welfare. The biological functioning school, focusing on the body, generally measures physiological markers of stress responses like the activation of the sympathetic nervous system and accompanying changes to glucocorticoid hormone levels and heart rate.¹⁵ However, the preferred method for collecting data on hormone levels is taking a blood sample, which can be invasive and itself cause the animal in question to become stressed.¹⁶ Further, these measurements do not always give clear answers, as glucocorticoid concentrations and heart rate can increase in the face of both positive and negative experiences.¹⁷ Most importantly for us, they are difficult to carry out at scale, to get a national picture of animal welfare.

Moreover, physiological stress responses do not always align with an animal's behaviour or wellbeing as otherwise perceived, like through behaviour.¹⁸ As a result, other measures of stress response – evaluating facial expressions, vocalisations or heart rate variability – are being developed, though are not yet in widespread practice.¹⁹

A major problem for the 'feelings' school is the fact that it focuses on evaluating something directly unavailable to us – an animal's internal subjective state, which they cannot verbally communicate. That leads us to try and infer how animals feel from other indicators, drawing on the connection between an animal's affective state and their biology. Animals frequently act in ways that are directed and motivated, likely in order to meet their biological needs, and appear to experience negative emotions like frustration and anger when they are unable to do so.²⁰ More complex feelings, like fear, can also be provoked by the prospect of not being able to meet internal or external needs.²¹ However, some behaviour associated with long-term health benefits, like play, only seem to be performed when an animal's immediate needs are met.²² As a result, play and other behaviours like vocalisations and grooming are increasingly being researched as signs of an animal experiencing positive affect.²³

The upshot is that the practical distinction between the two schools of thought is much narrower than it first appears. The biological functioning school relies on measures that seem to reflect animals' feelings, while the feelings school inevitably falls back on physiological markers. In practice, the frameworks are interlinked, and we can use results from both frameworks to corroborate one another.

We often rely on animal behaviour to judge welfare, using preference and motivation tests: giving animals a choice between different circumstances, observing which one they opt for, and then judging the strength of that preference by seeing if they will pay some kind of 'cost' (like opening a heavy door) in order to achieve it. This comes with the assumption that animals will, in general, choose the situation that is best for them. For example, chickens consistently choose environments which lead to lower glucocorticoid (stress hormone) levels and increased comfort behaviour, which is associated with positive affect.²⁴ Results from these tests can then be used to inform which provisions seem most important to animals' affective states, and can help to alleviate feelings like boredom and frustration. It might be less useful to use these tests to alleviate pain, which is a major cause of animal suffering on farms.²⁵

Animal welfare frameworks like the 'Five Freedoms' have been influential, but are not applied widely enough to offer national data

EU and UK legislation for animal welfare has been highly influenced by the 'Five Freedoms', which were released by the UK Farm Animal Welfare Council in 1979.²⁶ These provide an ethical framework for assessing animal welfare, mostly by looking at the conditions in which animals are kept. They are:

1. Freedom from hunger and thirst by ready access to fresh water and a diet to maintain full health
2. Freedom from discomfort by providing a suitable environment including shelter and a comfortable resting area
3. Freedom from pain, injury and disease by prevention or rapid diagnosis and treatment
4. Freedom to express normal behaviour by providing sufficient space, proper facilities and company of the animal's own kind

5. Freedom from fear and distress by ensuring conditions which avoid mental suffering

Whilst the Five Freedoms may be a useful starting point for assessing and evaluating animal welfare, they are very broad and may in practice be difficult to measure. Taken literally, they promise the unachievable or undesirable (absolute freedom from fear, hunger or thirst would in some cases be unhealthy).²⁷ However, they form a good starting point to formulate basic standards and expectations, such as 'ready access to fresh water,' 'rapid diagnosis and treatment,' and 'sufficient space'.²⁸

As a result, the Five Freedoms have helped shape the UK Animal Welfare Act 2006 in the UK, and are widely utilised by researchers and advocacy organisations.²⁹ They are also explicitly referenced in the RSPCA Assured scheme as being the basis for their guidelines.³⁰

At the same time, the Five Freedoms have been criticised for their focus on negative states. Critics point out that alleviating suffering does not in itself lead to positive welfare.³¹ Instead, it has been suggested that new guidance should discuss the need for provisions that lead to positive emotional states in animals. For example, the Farm Animal Welfare Council formulated a new categorisation system beyond the Five Freedoms – breaking animal welfare down into 'a good life,' 'a life worth living,' and 'a life not worth living'.³² They suggest that 'full compliance with the law should mean that an animal has a life worth living,' and that 'a good life' should be the focus of farm assurance schemes.

Importantly, even a 'life worth living' has been proposed to include:

“...provision of an animal’s needs and certain wants, and care by all involved. Wants are those resources that an animal may not need to survive or to avoid developing abnormal behaviour, but nevertheless improve its quality of life.”³³

This approach goes beyond the Five Freedoms by discussing quality of life in a way that extends further than 'freedom' from suffering. The Five Freedoms were also built on by Mellor and Reid in the context of the welfare of animals in research, to the Five Domains ('Nutrition,' 'Environment,' 'Health' and 'Behaviour,' which are combined to form the fifth domain, 'Mental State').³⁴ These are not intended as a substitute, but instead attempt to provide a framework for quantifying welfare in captive animals.

Whichever framework we opt for, the real challenge is evaluating how the standards have been met. It would be ideal to be able to do this on the basis of validated, specific tests, like taking measurements of glucocorticoid hormone concentrations or heart rate variability under different conditions. We could similarly perform tests of behaviour, like preference, motivation and fear tests, to see if animals on each farm are having their needs catered to. However, this isn't feasible on a wide scale. These tests are time consuming, and can be affected by a lack of standardisation or individual differences.³⁵ Even in humans, self-reported and neurological measures of pain differ between individuals under the same circumstances.³⁶ Further, behaviour can be very difficult to compare, especially across species.³⁷

AssureWel offers scored checklists to assess species-specific welfare outputs, which were specifically designed to be practical for farmers and assessors to use.³⁸ In principle, such checklists could be aggregated to offer us a reliable picture of animal welfare standards across different types of farm. However, the systems were not specifically designed for comparison across species, and some species have more checklist items than others, which could make them difficult to compare. In any case, such data is not publicly available – while they are used to inform farming standards like RSPCA Assured³⁹, or for farmers to improve their welfare practices on a smaller scale – the results are not collated and aggregated. They will not, therefore, do for our purposes.

Similarly, the Welfare Footprint Project seeks to quantify various levels of pain suffered by animals during the making of one product, like an egg. Their framework focuses on the cumulative duration of physical and psychological suffering within a lifetime.⁴⁰ However, the sheer number of potential causes of pain and effort of trying to estimate their durations means that it is not practical to use the footprint to estimate and compare welfare on a wider scale at the moment. Instead, it seems most useful for evaluating specific, limited causes of pain like lameness, heat stress, and chronic hunger – and quantifying the potential impact of associated reforms, like switching to slower-growing breeds.⁴¹ Even then, such data is too limited and specific to be used for our purposes here.

Factory farming is an imperfect but practical proxy for welfare

Given that specific, direct measures are currently unfeasible to use at national scale, we have had to rely on a proxy. The one we have landed on, in the interests of pragmatism, is system of production – the general categories of conditions in which animals are farmed. Even then, we have had to make further compromises. Ideally, the sort of data we would use for analysis like this would draw on a range of metrics – space per head, opportunity for enrichment, disease prevalence.⁴² Instead, for data availability and comparability reasons, we have had to limit ourselves to much cruder distinctions – focusing mainly on the line between ‘factory’ and ‘non-factory’ farmed animals.

A preferable approach would have been to draw on data from farm certification schemes, which use a wider range of indicators to reflect the way that system of production flows through to welfare. RSPCA Assured assesses farms on the basis of RSPCA’s species-specific animal welfare standards.⁴³ Soil Association and other organic certification boards assess farms on a wider range of factors, including things like sustainability as well as welfare.⁴⁴

These certification schemes require animals to have more space per head than the legal minimum, place restrictions on the length of time animals can be confined for transport, and require provisions to be made (like insoluble grit in chickens’ food, and grooved or coated floors for cows) to reduce the occurrence of stereotypies and injuries. Organic certification also requires animals to be ‘free-range,’ i.e. have outdoor access when the weather allows. Both RSPCA Assured and Soil Association also limit the breeds of animals that can be farmed, for example prohibiting certain fast-growing broiler breeds.

Unfortunately, neither RSPCA nor Soil Association publish the data collected as part of these processes in sufficiently granular form to feed into our analysis. In any case, many farms do not participate in such schemes, and so relying too heavily on them could lead to misleading conclusions. For example, less than 1% of cattle are covered by the RSPCA Assured Scheme, compared to 1.25% of broiler chickens. Yet the implication that welfare standards are generally worse for cattle than for chickens contradicts everything we have seen in researching this report.⁴⁵

The major systems of production are intensive indoor farming (often referred to as 'factory farming' or 'concentrated animal farming operations'), extensive indoor farming, free range, and organic. Factory farming is defined by its goal to maximise production of meat and animal products at a low cost. This means that animals are kept in confined spaces under strictly controlled conditions to ensure they grow to the desired size as quickly as possible. Some of the practices which factory farms employ are themselves less positive for animal welfare – the exclusive use of indoor housing (which not only restricts animals' natural behaviours but takes away their agency to choose their environment), the restriction of space to legally permissible limits, and the use of cheaper and less nourishing feed. Factory farms are also more likely to use faster-growing breeds, which are more susceptible to health issues. These practices also have knock-on effects, causing higher levels of aggression, injury, and death. Such things may occur on any farm, but the conditions on factory farms make them more likely.

For these reasons, it seems most useful to make a distinction between factory farms and other systems. The data for extensive indoor and free range farming can be less clear-cut, and certification coverage, depending on species, can be low. Further, factory farms tend to represent a significantly lower standard for welfare than other systems. They generally only follow legal requirements for provisions, which leads to restricting animals' space and exclusively keeping them indoors.

Defining factory farming

While dictionary definitions of factory farming differ slightly,⁴⁶ Oxford's⁴⁷ appears to be the most concise:

“Factory farming is a system of rearing livestock using highly intensive methods, by which poultry, pigs, or cattle are confined indoors under strictly controlled conditions”.

That definition is also closest to those adopted by some animal rights organisations. For example, the Humane League⁴⁸ notes that factory farms are:

“A modern industrial method of raising farmed animals. At its core, factory farming is a form of intensive agriculture designed to maximise profits using as few resources as possible. On factory farms, large numbers of animals are confined in small spaces, which often means keeping animals indoors for the duration of their lives.”

Having assessed these definitions, our simple working definition for factory farming that we will rely upon throughout this report is:

“A system of rearing livestock using highly intensive indoor methods”

However, some of our sources are ambiguous as to what is covered by their definition of ‘factory farming’, so we cannot be certain that the definition is precisely consistent across all animal types – reflecting the broader data challenges of this project.

The realities of factory farming: Poultry

It is worth, at this stage, emphasising why we believe it is reasonable to take factory farming as a proxy for lower welfare, by describing some of the conditions it involves. In the course of this research, some stakeholders have suggested that Britain has high legal welfare standards, and that this means that few if any animal in the UK suffers low welfare. That is the implication, for example, of the industry-led Red Tractor certification scheme, which is content to certify 95% of British pork and chicken.⁴⁹

Laying hens in factory farms tend to be kept in 'enriched' cages, as conventional battery cages were outlawed in the UK in 2012. These cages must have nesting space and perches, but the requirement of 600 cm² of usable floor space per head severely restricts chickens' movement and natural behaviours, like exploring, dustbathing, and comfort and grooming.⁵⁰ It is likely that this inability to move and perform behaviours leads to frustration. Restricted movement also has a negative impact on the strength of birds' bones, which can lead to breakages and fractures.⁵¹ Group-caged chickens' high stocking densities, as well as a lack of enrichment and restricted space to move away from others, can lead to outbreaks of feather-pecking and cannibalism. Beak trimming is performed routinely as an attempt to prevent this aggression, but it is painful and can cause chronic pain if performed improperly or on older birds.⁵²

Broilers (chickens reared for meat) are also kept at very high stocking densities in factory farms. While 33kg per square metre is the stated legal maximum, in practice farms are able to stretch this to 39kg per square metre if they meet certain conditions.⁵³ That is equivalent to around 19 birds per square metre, amounting around an A4 sheet's worth of space for each of them by the time they approach slaughter weight. Being packed so closely together can cause a range of issues, giving the chickens too little space to stretch or spread their wings. It can also produce a build up of faeces in their litter, leading to burns to the chickens' feet, legs and breasts, and increasing their risk of skin infections. Such tight confinement can also lead to respiratory problems, making it hard for the birds to breathe, and heat stress. All these issues occur frequently, even when legal standards are met. Their prevalence increased substantially when minimum stocking density was increased from 30kg per square metre.⁵⁴

The selection of faster-growing breeds of broiler to use in factory farming causes further harms to the chickens. Fast-growing broilers can be slaughtered at five or six weeks, rather than eight or twelve weeks that free range or organically-farmed chickens tend to live.⁵⁵ These strains are more likely to suffer from leg issues, lameness, heat stress, and sudden death; their weight can also make moving so difficult that the broilers are unable to feed and starve.⁵⁶

The problems often found on factory farms can compound each other. For example, growing to an abnormal size, and being stuffed in a confined space with a lot of other birds makes it hard for a chicken to be active. Both lameness and restricted space cause animals difficulty in getting to feeders which can lead to starvation or dehydration. Further, the catching and transport of broiler chickens for slaughter can lead to high levels of stress, injury and mortality.⁵⁷ Another issue is the potential for disease outbreaks – and, in turn, mass culling – exemplified by the recent wave of avian flu that led to the death of millions of UK poultry throughout 2022-23.⁵⁸

The realities of factory farming: Pigs

Factory farmed pigs suffer from lack of space and enrichment as well.⁵⁹ Pigs reared for meat are regularly housed indoors, in concrete or slatted pens, with only one metre squared of space each.⁶⁰ The high densities, boredom, and inability to perform their natural behaviours can lead to aggression and antagonistic behaviour like tail biting, to prevent which tail docking (removal of part of the tail) routinely occurs. Intensive farming systems often use farrowing crates, which restrict gestating sows' movement and prevent them from turning around for a week before they give birth and the four weeks following. This can lead to frustration and stress.⁶¹ Moreover, pigs also become stressed and more aggressive when they are mixed with unfamiliar conspecifics, which can happen several times in their lives. This mixing has a particularly negative effect on subordinate pigs, who may remain fearful after the event.⁶² Pigs' lack of space also prevents them from performing other natural behaviours, such as play and exploration, which could stunt their cognitive development.⁶³

The realities of factory farming: Cattle

Cattle, both reared for dairy and beef, can be kept in densely stocked indoor environments for part of their lives. For dairy cows, this is often for the winter months or in bad weather, though 'zero grazing' systems where cows are permanently housed seem to be becoming more common.⁶⁴ Beef cattle, on the other hand, are often reared outdoors, but are brought indoors for the 'finishing' period (the period before slaughter when they gain weight for a particular specification, up to six months or a quarter of their lives). Indoor housing can be of poor quality, with inadequate ventilation and uncomfortable flooring (including concrete or fully slatted floors, which leads to falls from slipping, foot problems and lameness). Diets for lactating and fattening cattle often consist of nutrient-dense cereals, which are low in fibre and can lead to acidosis or scouring (diarrhoea). Lactating cows kept on concrete floors with insufficient bedding material are also prone to developing mastitis (udder infections). Calves are weaned quickly and separated from their mothers in the dairy industry, which causes distress to both.⁶⁵ Cows also engage in play in their natural environment, which is decreased by pain and early weaning.⁶⁶

The realities of factory farming: Fish

The welfare impacts of fish farming are less researched and clear-cut.⁶⁷ Salmon, trout and shellfish are the main farmed aquatic animals in the UK, though salmon clearly dominates (at 91% of production of tonnage in 2010).⁶⁸ In salmon farms, young stock are first bred and kept in indoor tanks. When they reach the parr stage, they are then kept indoors, outdoors, or in fresh water for 6-12 months. Thereafter, they are adapted to seawater and kept in outdoor cages. There are no detailed legal standards for fish farms, and guidance mostly comes from assurance schemes and the industry itself.

There are several welfare issues on fish farms. Most important is water quality: pH, oxygen levels, and temperature are interlinked and must be closely monitored. Confinement is also an issue. Farmed fish are kept in cages, often in barren conditions where they are unable to perform their natural behaviours. For example, whereas in the wild they migrate thousands of miles, in farms salmon can only swim in circles around the cage. There are sometimes issues of aggression and competition for food, which can lead to stress and injuries such as fin erosion.⁶⁹

Other issues include stocking density, withdrawal of food, predation, disease and parasitism.⁷⁰ Fish are fasted before they are transported or handled in an attempt to reduce metabolism and stress – however, this can happen for longer than is strictly needed, leading to hunger and pain.⁷¹ Parasites and disease, including fungal diseases and sea lice, are major causes of death and suffering. Their spread is made easier by confinement. Treatments to rid salmon of sea lice (e.g. thermolicer) are also a major welfare problem as many cause stress, injury and death (either immediately or in the days or weeks following). Fish are caused extreme stress by being out of water, yet this is necessary for some farming processes. In particular, transportation of fish and moving them to different environments can be very stressful and can lead to physical injuries.

A range of slaughter techniques are used for farmed fish, many of which are likely to cause suffering. Salmon can be killed by having their gill arches cut, either with or without the use of carbon dioxide in water beforehand. Trout are also killed by these methods of suffocation. Any of these methods of slaughter without stunning or immediate killing are likely to be very painful and are considered unacceptable on welfare grounds by the RSPCA and the Farm Animal Welfare Council.⁷²

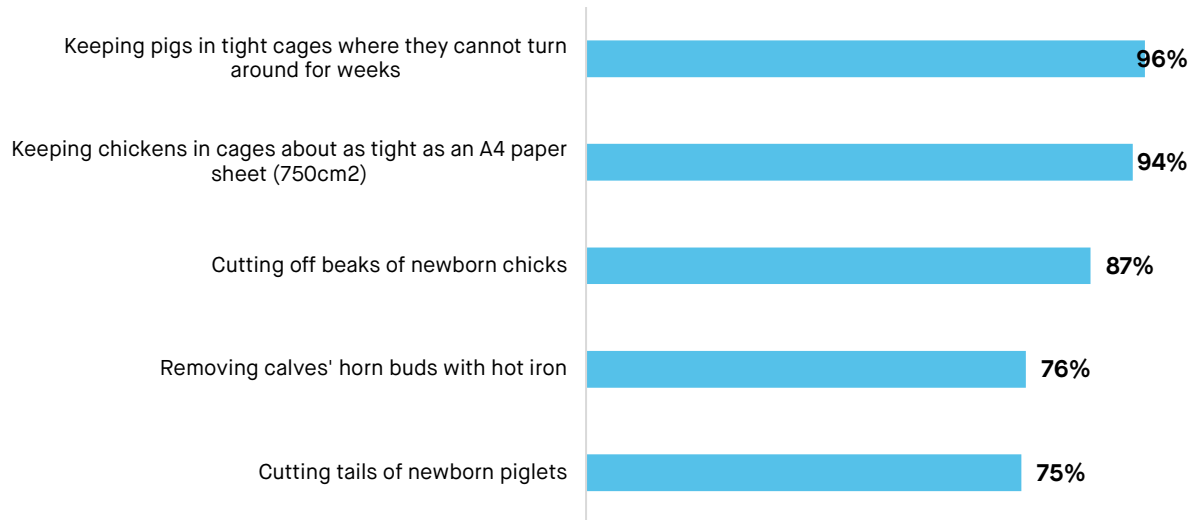
Most reasonable judges would agree factory farming does not provide an acceptable standard of welfare

For all the theory we have examined in this chapter, it should hardly need much argument to say that such outcomes of factory farming are bad for the animals that experience them. Diseases, body parts being pecked at, bitten or amputated without pain relief are evidence that such animals are not experiencing high welfare. That is clearly so on the biological functioning approach, but it is not much of a leap to infer that it creates negative feelings for animals, not least pain.

Moreover, there is evidence of negative psychological impact from the limited space involved in factory farming. For example, studies show broiler chickens prefer lower density environments, and are willing to work in order to get to them.⁷³ Sows confined to smaller spaces tend to show higher levels of aggression and stress.⁷⁴ Social isolation is also associated with high levels of stress, shown by vocalisations, heart rate and plasma cortisol, in heifers.⁷⁵ This is reaffirmed by consistent findings of social buffering and seeking out companions in cows and calves.⁷⁶

It is hard, then, to avoid the conclusion that farm animals reared under intensive conditions experience lower welfare, and many are likely to face what FAWC call a ‘life not worth living’. While such questions should not be subject to referendum, it is striking the vast majority of people find common factory farming practices unacceptable. A survey conducted last year by Bryant Research found that 96% are opposed to the tight confinement of pigs, and 94% to the confinement of chickens. 87% reject debeaking. For most of us, evidently, legal minimum standards are inadequate.

Figure 3: Proportion of British people that believe practice to be “not acceptable”



Source: Bryant Research

These findings suggest that when people are informed about the realities of factory farming, they object. Yet separate polling shows three-quarters of people in the UK (74%) say they know nothing about industrial meat production – 22% know a bit and 3% know a lot – perhaps highlighting a degree of blissful ignorance regarding the suffering involved in our food. It also points to a need for better information, a project to which this report attempts to contribute.

How we have quantified the state of animal welfare in the UK

Although it is an imperfect approach, we have decided the best way of quantifying animal suffering is to use factory farming as a proxy for lower welfare. Conceptually, that is justified by the levels of suffering we have seen involved in factory farming. Pragmatically, we have taken this approach because the necessary data is available.

Our analysis has built on that of the campaigning organisation, Compassion in World Farming (CIWF), which shared its calculations of the number of indoor farmed animals in the UK with us. Those estimates have not been published, but they collate a range of different sources (they cite Free Farrowing to say 53% of breeding pigs were factory farmed, for example) and applied those percentages to population and slaughter numbers to provide a picture of how many animals are farmed indoors. Their focus on indoor farming does not overlap precisely with our definition of factory farming (for example, their estimates include extensive indoor farms that might meet RSPCA standards), but their figures offer a good starting point.

We sought to replicate, update and refine CIWF's numbers. We reviewed the proportion of animals raised under indoor or factory conditions, and replaced them with newer or better estimates where they exist, and then applied those numbers to updated population and slaughter data. The reliability of our sources, as was the case for CIWF's estimates, varies. Some come direct from industry (the British Poultry Council has said that 95% of broiler chickens are reared intensively indoors),⁷⁷ while others came from journalistic reports and 'grey literature'. Where we could not improve upon CIWF's previous estimate of the prevalence of factory farming, we stuck with their original (unpublished) numbers.

Aside from being more up-to-date, the main distinction between CIWF's methodology and ours is that we decided to look at population and slaughter separately. Our view is that population data is preferred because it makes cross-species comparison easier. If we are to compare the number of life years spent in factory farm conditions then we would need to adjust slaughter figures for life span, as some animals reared for meat live less (or, are slaughtered earlier) than others. Population therefore serves as the primary component of our analyses, with factory farmed slaughters carried out as a separate analysis.

Another caveat is warranted for how 'factory farming' is defined. While the concept seems clear enough, not all of the sources we used are explicit as to how *they* define factory farmed. While we can reasonably assume that most organisations will identify factory farming in the same way we have – a system of rearing livestock using highly intensive methods indoors – we cannot say for certain if all literature referenced in this report are working to the same definition.

That is the broad thrust of our approach. Compassion in World Farming set the methodological precedent for our research and it informed the core element of our calculations. But that is not all we did. We also examined trade data, moral values, welfare trends, and created projections for what the future of animal welfare could look like. A brief summary of our methods, including the data we used, is described below. For a more detail, see the appendix.

- **Population:** DEFRA population data tells us how many farm animals there are in the UK at any given point in time. We applied factory farming prevalence estimates to those population figures to give a sense of the scale of suffering caused by lower welfare farming across for each available animal type. DEFRA's data covers terrestrial animals only – cattle, pigs, sheep, and chicken – and excludes fish.

- **Slaughter:** DEFRA also provides slaughter numbers, and the same factory farm prevalence rates were applied to those. For fish, estimates published by fishcount.org were used, showing the average annual capture – both wild-caught and farmed – in the UK.
- **Trade:** We were also interested in trade, i.e. how much meat comes in and out of the country. Data provided by HMRC via the Agriculture and Horticulture Development Board was used to examine how much pork, beef, and sheep meat the UK imports and exports in tonnes. Poultry trade data came from Statista and egg figures were provided by DEFRA via the industry site, egginfo.co.uk. For fish, trade data was sourced from HMRC, by way of the Marine Management Organisation.
- **Moral values:** People disagree as to whether all have the same moral value or capacity for suffering. To account for these differences, we applied ‘moral weights’ to our analysis, based on academic estimates of brain complexity and public perceptions of moral status.
- **Welfare trends:** In an attempt to show whether welfare standards have been getting better or worse, and whether some animals’ have seen more improvement than others, we draw on qualitative literature discussing trends in factory farming and on DEFRA data which looks at organic farming.
- **Projections:** Interested in what the future of animal welfare could like, we use different forecasting scenarios that help us estimate the potential size of the UK’s factory farm population. Those projections rely predominantly on our own factory farm population estimates, with some plausible assumptions added in to show that changes to how we treat animals could have a significant impact on the size of our factory farmed animal population.

CHAPTER THREE – THE STATE OF UK FARMED ANIMAL WELFARE

There are around 236 million – almost a quarter of a billion – farm animals in the UK.⁷⁸ The vast majority are raised with the express purpose of producing meat. Some others are breeding animals to maintain the population and sustain long-term production, with the rest providing other animal products such as eggs and dairy. Ultimately each and every one of those animals is part of a system geared towards producing food for humans.

Within that system, however, there is variation in scale and welfare standards. That is what we try to map out in this chapter.

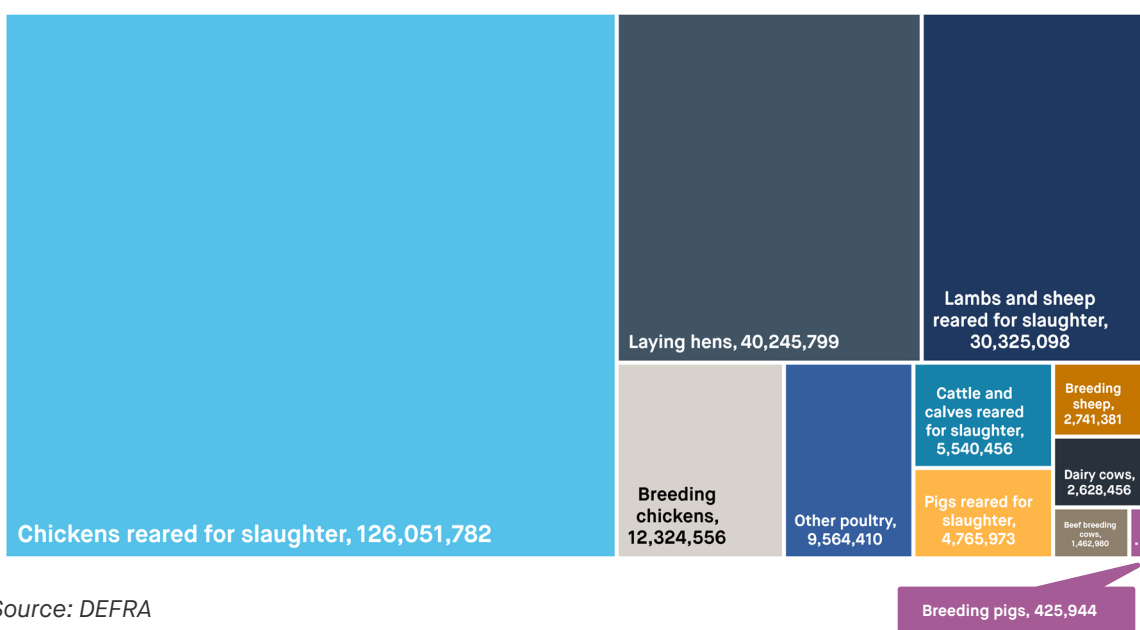
Chicken and fish account for the vast majority of animals kept in lower welfare conditions

Population

The UK government’s Department for Environment, Food and Rural Affairs (DEFRA) collects population data on farm animals, but does so only for terrestrial animals – different types of cattle, sheep, pigs, and poultry – and not fish.⁷⁹ Chickens (broilers reared for slaughter, laying hens, and breeding chickens) are the largest animal group, as they make up the vast majority (178.6 million; 73%) of the total population. Broilers are by far the most populous animal, comprising over half (126.1 million; 53%) of the population. There are almost twice as many broilers as humans in the UK.

In terms of sheer numbers, chickens dominate the farm animal population. But there are many millions of other animals reared in the UK. Though there are considerably fewer of them, comparatively speaking, the population sizes of sheep (33.1 million), cattle (9.6 million) and pigs (5.2 million) are far from trivial. The UK pig population is roughly the same size as Scotland’s human population, for example.

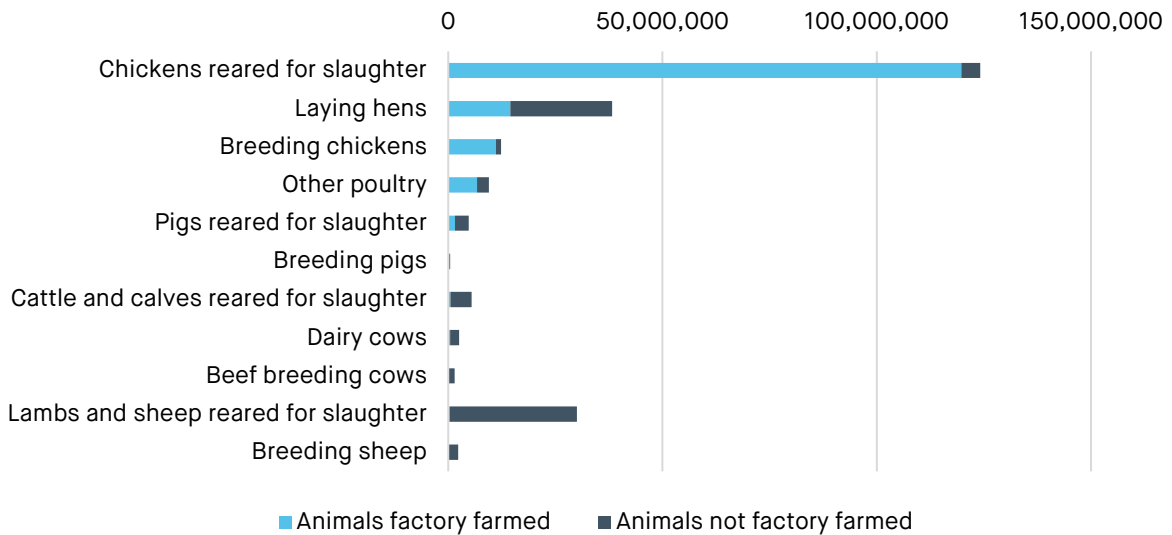
Figure 4: UK animal population, June 2022



Source: DEFRA

Of the total terrestrial population, 66% – approximately 155 million – are factory farmed. That factory farm population is almost entirely (99%) made up of poultry and pigs, with breeding chickens (90%), ‘other poultry’ – ducks, geese, turkey, and all other poultry – (70%), and breeding pigs (60%) more likely to be factory farmed than not.

Figure 5: UK animal population, June 2022



Source: SMF analysis – see appendix for detail

To a large extent that dominance of poultry merely reflects the scale of poultry farming, the fact that there are so many of them. But poultry also tend to experience worse conditions than other types of farming animals. Broiler chickens are not only the most numerous farm animal, they are also the farm animal most likely to be factory farmed.

According to the British Poultry Council, 95% of UK broiler production comes from intensive indoor units, accounting for around 120 million in total.⁸⁰ They told us that some 15% of these could be categorised as indoor, but ‘higher welfare’, being reared to above average standards.⁸¹ However, the RSPCA estimate that only 1.25% of broilers – including some confined indoors – are part of their assurance schemeⁱⁱⁱ, so that number could include significant variation in standards.⁸²

Other animals tend to be reared in better conditions, at least relative to chickens. Dairy cows (16%), cattle reared for slaughter (10%), and beef breeding cows (5%) are significantly less likely to be factory farmed. Less than 1% of sheep are reared in intensive conditions. This stands to reason. While they can still be subjected to harmful practices such as castration and tail docking, those animals are typically found outdoors in open pasture, experiencing higher standards of welfare than the typical chicken or pig. At the same time, livestock and dairy cows face a range of other welfare issues, so our categorisation here should not be taken to imply that all is well outside of factory farms.

ⁱⁱⁱ They may be reared to other standards e.g. to meet retailer requirements.

Table 1: UK factory farm estimates, population

	No. of animals	% factory farmed	No. of animals factory farmed	Share of all factory farmed animals
Chickens reared for slaughter	126.1 million	95%	120.0 million	77%
Laying hens	40.2 million	36%	14.5 million	9%
Breeding chickens	12.3 million	90%	11.1 million	7%
Other poultry	9.6 million	70%	6.7 million	4%
Pigs reared for slaughter	4.8 million	33%	1.6 million	1%
Breeding pigs	0.4 million	60%	0.3 million	0%
Cattle and calves reared for slaughter	5.5 million	10%	0.6 million	0%
Dairy cows	2.6 million	16%	0.4 million	0%
Beef breeding cows	1.5 million	5%	0.1 million	0%
Lambs and sheep reared for slaughter	30.3 million	1%	0.3 million	0%
Breeding sheep	2.7 million	1%	0.0 million	0%
Terrestrial total	236.1 million	66%	155.2 million	

Source: SMF analysis – see appendix for detail

Slaughter

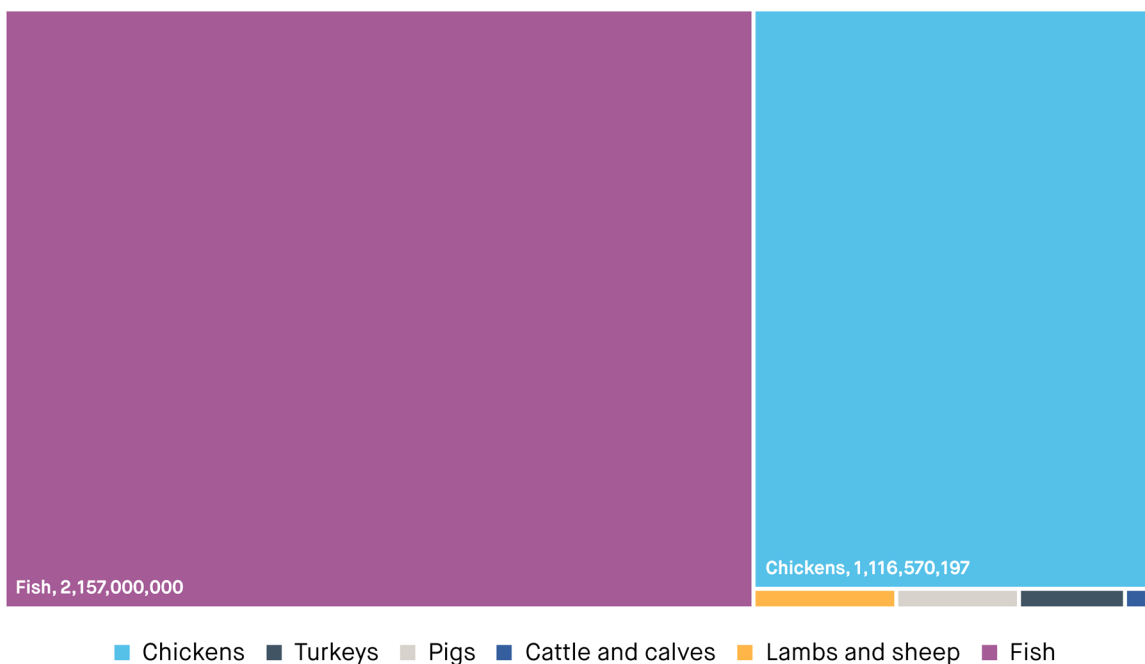
The above estimates provide a picture of how many farm animals are living in the UK at any given point in time. Another perspective is to count the number of animals slaughtered in a year. This number is much higher because many farm animals have life cycles of weeks or months, and so in the course of a year we may pass through multiple generations.

Our preferred measure is population because this makes cross-species comparison of conditions easier. If we are to compare the number of life years spent in factory farm conditions, we would need to adjust slaughter figures for life span – for example, slaughtered beef cattle could account for most of a year individually, whereas eight chickens might live for a year between them. Such adjustment is less necessary with population data. Of course, that assumes that the main harm of farming consists in living conditions, and not the killing of animals. For those that reject that premise, slaughter numbers may offer a better measure of the scale of harm and suffering.

In any case, slaughter numbers are helpful because they cover fish,⁸³ which are not captured by DEFRA populations data.

According to available data, 3.3 billion animals are killed every year in the UK for their meat. As Figure 6 below demonstrates, that tally is almost completely made up of fish (2.2 billion; 65%)^{iv} and broilers (1.1 billion; 34%),^v dwarfing the slaughter of other animals by several orders of magnitude. Even lamb and sheep (13.4 million; <1%), the group with the third highest slaughter count, pale in comparison to these animals.

Figure 6: UK animal slaughters



Source: DEFRA; fishcount.org

^{iv} Refers to finfish only, excluding all other aquatic animals.

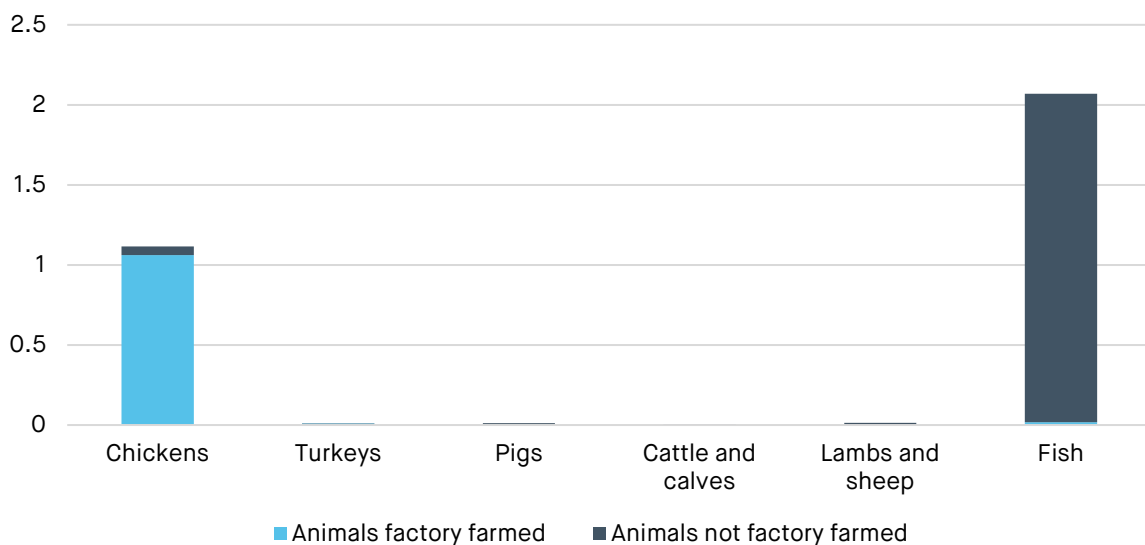
^v Does not include the slaughter of newly hatched unwanted male chickens.

According to Fishcount, the vast majority – 97.6% – of the fish produced by the UK are wild caught, and thus not subject to human farming methods. While wild-catch fishing is not necessarily ethical – suffocation and transportation are common welfare concerns, for example⁸⁴ – most live their lives in their natural habitat and are able to display their innate behaviours. But that means 2.4% of UK fish are farmed, raised to differing welfare standards. That figure may seem small, but it is equivalent to an estimated 52.5 million lives – a huge number that should not be underplayed. Of these farmed fish, around half of farmed trout and over 70% of farmed salmon are RSPCA Assured certified,⁸⁵ so we exclude them from our factory farmed category. That leaves around a third of all farmed fish as factory farmed by our definition – amounting to 17 million a year.

At the same time, the short life cycle of chickens means that they dominate the slaughter numbers for terrestrial animals even more than they do population.⁸⁶ As a result, 93% of slaughtered terrestrial farm animals – just over a billion – are factory farmed.

This figure assumes that factory farmed animals account for the same share of population and slaughter numbers. This assumption is likely to cause us to underestimate the number of factory farmed animals killed every year, since if (as is likely) factory farmed animals have a shorter life span, they will account for a disproportionate share of slaughtered animals.

Figure 7: UK animal slaughters (billion)



Source: SMF analysis – see appendix for detail

What these population and slaughter estimates tell us is that some animals do worse than others. By virtue of the fact that chicken and fish are, in terms of their vast numbers, head and shoulders above every other animal, they immediately stand out as ‘red flags’ indicating significant welfare issues in the UK’s food system. Broiler chickens are a particular concern as they are the animal most likely to be reared intensively, to the sum of over a billion lives. This perhaps supports what campaigners

have been saying for years: that chickens represent the UK's greatest animal welfare concerns, and thus require the most attention.⁸⁷

On a global level, there may be a different story. In February 2023, researchers from CIWF and Fishcount published a peer-reviewed study estimating global numbers of farmed fish killed for food annually. They found 124 billion^{vi} were slaughtered in 2019, meaning farmed fish likely outnumber farmed birds and mammals (80 billion) killed across the world each year.⁸⁸ Though that may be the case, it does not appear to reflect the UK factory farming story – where chickens dominate the narrative.

Table 2: UK factory farm estimates, slaughter

	No. of animals	% factory farmed	No. of animals factory farmed	Share of all factory farmed animals
Chickens reared for slaughter	1,116.6 million	95%	1,060.7 million	97%
Turkeys	9.9 million	90%	8.9 million	1%
Pigs	11.5 million	33%	3.8 million	0%
Cattle and calves	2.8 million	10%	0.3 million	0%
Lambs and sheep	13.4 million	1%	0.1 million	0%
Fish	2,157 million	0.8%	16.9 million	2%
Terrestrial total	1,154.1 million	93%	1,073.9 million	
Overall total	3,311.1 million	33%	1,090.8 million	

Source: SMF analysis – see appendix for detail

Note: The sums of the rows may not match the totals due to rounding

The UK imports welfare standards from other countries

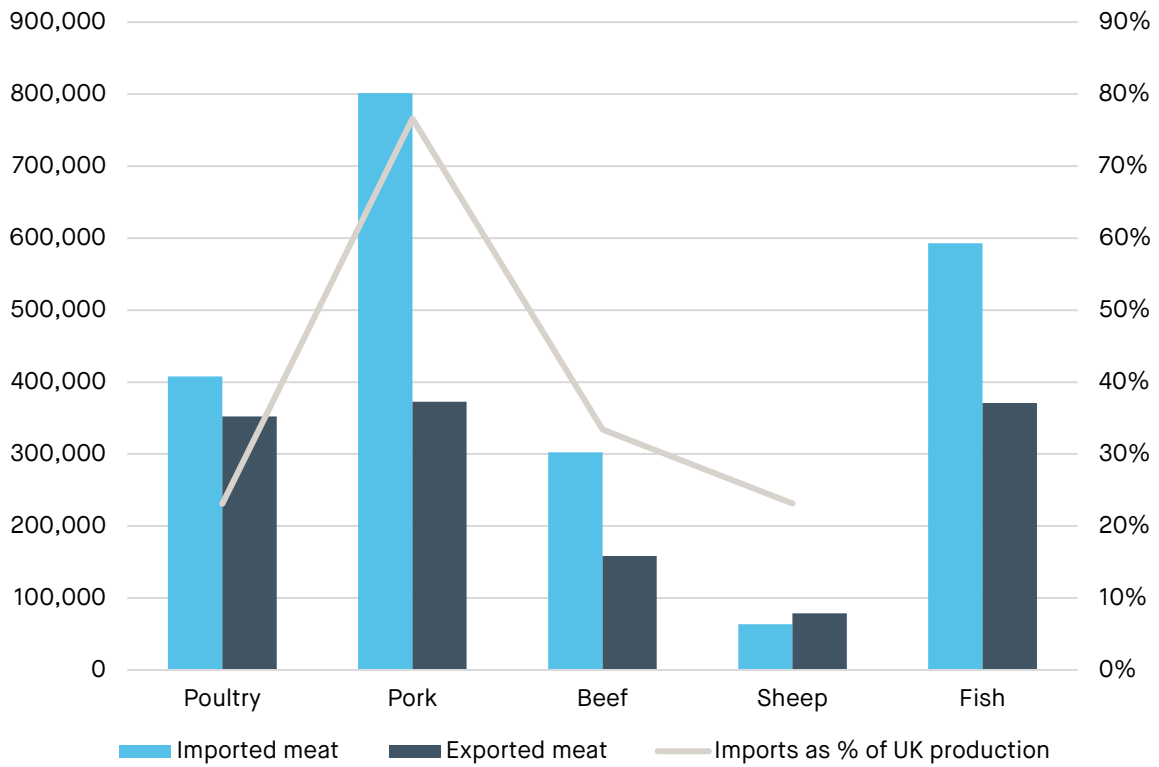
Population and slaughter estimates give a good, if imperfect, impression of the UK's animal welfare problem. But they don't provide the whole picture. Despite the astronomical figures set out above, the UK is not self-sufficient in its meat production – we import more than we export.

The UK imports 2.2 million tonnes of chicken, pork, beef, sheep, and fish meat, while it exports just 1.3 million tonnes.⁸⁹ Meat entering the country from abroad therefore comprises a significant chunk of the total market. In 2021, the UK produced just over

^{vi} Estimate midpoint

3.9 million tonnes of meat (excluding fish)^{vii, 90} meaning imports are equivalent to slightly more than half (52%) of UK production.

Figure 8: UK meat trade (tonnes)



Source: SMF analysis – see appendix for detail

Net imports – i.e. taking account of exports – are equivalent to a smaller share of domestic production, around 20%. For example, the UK imports slightly more poultry meat than it exports. Therefore the poultry that enters the UK is a small percentage (3%) of the British produce consumed in this country and what is exported and consumed elsewhere. Imported pork, on the other hand, accounts for a much greater share of the market. Because we import much more than we export, pork reared in other countries constitutes a larger proportion (41%) of what we produce, and therefore what we consume, in this country. The welfare standards of different countries and their implications for animals’ lives are thus more significant for pork than they are for chickens.

^{vii} Fish meat production data is unavailable. It is therefore not possible to calculate imported fish as a percentage of UK production.

Table 3: UK meat trade (tonnes)

	Imports	Exports	Net
Poultry	408,000	352,000	56,000
Pork	801,742	372,772	428,970
Beef	302,622	158,095	144,527
Sheep	63,768	78,844	-15,076
Fish	592,698	370,775	221,923
Total	2,168,830	1,332,486	836,344

Source: SMF analysis – see appendix for detail

It is not straightforward to account for the welfare standards of imported meat in our analysis here. The most conservative assumption would be to apply the factory farm rates we have calculated for the UK to foreign production. For example, based on UK figures, we could make the assumption that 33% of foreign pork is also factory farmed. But not all countries have the same welfare standards, with some imports coming from animals raised in worse conditions than the UK. If anything, our analysis is likely to understate the scale of the problem.

We saw in Chapter One that despite the common assertion that the UK has particularly high farm welfare standards, it does not stand out in international comparisons like the Animal Protection Index. That said, there is reason to suspect that much of the meat that we import in the UK comes from animals that lived worse lives than those reared in this country.

For instance, a 2010 Guardian investigation found that at least a quarter of meat on sale in the UK comes from farms that do not have to meet national standards for animal welfare.⁹¹ Unless there have been dramatic improvements in animal welfare internationally over the last 13 years, our numbers on the poor welfare of animals consumed for meat in the UK are likely to be underestimates. This issue is likely to be of particular significance to pork.

CHAPTER FOUR – COMPARING WELFARE ACROSS SPECIES

To this point in our analysis, we have judged the state of farmed animal welfare simply by counting up the number of animals in factory farm conditions. We have not made much effort so far to account for the possibility that such conditions may be experienced as worse by some animals rather than others, or that some animals may not have such capacity for welfare at all.

The previous chapter highlighted the vast number of chickens (and to a lesser extent, fish) that exist in lower welfare conditions as the key welfare issue in the food system. While chickens are more likely to be factory farmed, the main driver of their dominance is the sheer scale of the chicken industry. Yet the implicit assumption is that the badness of a chicken being intensively farmed is the same as the badness of a cow or sheep.

That is the view taken by the RSPCA, which considers all animals to be individuals of equal value, and believes that every animal's life is of intrinsic value.⁹² Moreover, the RSPCA favours a precautionary principle under which we should assume all animals are sentient, and potential harmful actions are bad until there is strong contrary evidence.

However, this 'one animal, one vote' approach would strike many as counterintuitive. Mammals seem more complex and intelligent than birds or fish. Does that not mean they have greater capacity for suffering, making them vulnerable to a richer and more intense set of emotions, like fear and loneliness? Or does that assumption reflect parochialism and a lack of imagination, presuming that creatures that are like us humans are inevitably more sophisticated and worthy of moral concern?

This chapter explores such questions, and how far different answers to them affect the conclusions we should draw on the state of animal welfare in the UK.

There is little doubt mammals and chickens are sentient – and strong evidence that fish can experience pain too

There is generally little debate over whether mammals are sentient – capable of feeling and perceiving things.⁹³ Humans are self-evidently sentient, and our sentience is believed to be the result of having a neocortex (a six-layered structure in the cerebral cortex of mammals, responsible for processing a great deal of information). By analogy, the fact that other mammals also have a neocortex is a clear argument for their sentience.⁹⁴

By contrast, the picture is more complicated for animals lacking a neocortex, including birds and fish. Birds have a layered avian cortex, which seems functionally analogous to the layered mammalian cortex.⁹⁵ The argument for birds' sentience is further strengthened by behavioural evidence. For example, chickens consistently show fear responses like tonic immobility when restrained, and lame broilers can self-administer analgesic drugs.⁹⁶

On the other hand, the absence of a neocortex or analogous structure in fish makes their sentience more controversial. Fish do have nociceptors (pain receptors)⁹⁷, though this does not in itself show that they are sentient. It has instead been argued – though such theories are disputed – that fish could react to pain based on non-conscious survival mechanisms like a human reflex without feeling the pain.⁹⁸

It is generally believed that for evolutionary reasons information about pain should be combined with sensory information in integrative pathways and regions of the brain. This will allow the pain response to vary dependent on context.⁹⁹ Fish do have these pathways and regions, and it appears like they can use information about pain flexibly.¹⁰⁰ For example, Dunlop et al. find that trout and goldfish had different responses to pain from shocks, dependent on context.¹⁰¹ Another indicator that a creature is feeling pain is disruption to other actions, and taking priority. Such phenomena have been demonstrated in rainbow trout, which exhibit disrupted anti-predator responses when they are in pain.¹⁰² Rainbow trout also show behavioural responses to pain, which are reduced when they receive morphine, indicating that the behaviours are not just reflexive.¹⁰³

Besides evidence about pain, which is still the subject of some debate¹⁰⁴, fish also show intelligent behaviour which indicates that they are good candidates for sentience. For example, they have generally good spatial learning capacities – some species of fish can develop cognitive maps of their habitats, and in experimental learning conditions, rainbow fish were able to remember the escape route from a net for up to a year after they were first exposed to it.¹⁰⁵ They also have social learning capacities, with larger groups helping rainbow fish learn in the net trial.¹⁰⁶ Some can ascertain their own or a potential partner's position in a social hierarchy by observing the behaviour of others, and can cooperate with members of the same species or occasionally different species.¹⁰⁷ Kohda et al. even proposed that cleaner wrasse showed markers of being able to recognise themselves in a mirror.¹⁰⁸

Whilst this evidence doesn't definitively prove that fish are sentient, it certainly gives the argument strength and calls into question the consequences of our use of fish as protein sources. One concern is that most research has only been performed in a small number of species, all in the teleost infraclass; given that some fish classes are phylogenetically distant, this might mean that results aren't more widely replicable.¹⁰⁹ However, given that the vast majority of relevant fish are teleosts, including salmon and trout, this limitation of the research does not have much bearing on discussions about fish we consume as food in the UK.

Without robust measures to compare animals' capacity for welfare, we rely on human surveys and neuron counts

Of course, sentience is merely a baseline, reflecting *some* capacity to experience welfare and suffering. Is that capacity comparable to mammals for chicken and fish? More broadly, there is ongoing debate about the 'moral weight' we should grant to different animals – an issue currently being explored by the research organisation Rethink Priorities.¹¹⁰

The most obvious reason for giving greater consideration to some animals over others is that they have greater capacity of welfare – the depth of their pleasure or pain, how good or bad their life can be, may differ. Being enclosed is worse for a being with some psychological conception of the freedom they are being denied. Being separate from offspring is worse if a creature has a stronger emotional bond with them.

However, that is not the only reason why we may give greater moral weight to some animals over others. On some moral theories, it may be legitimate to show partiality towards animals that we feel greater affinity or closeness to – essentially analogous to the way some people believe it is morally acceptable or even required to favour one’s family or compatriots over outsiders. In a similar way, perhaps moral considerations lead us to prioritise fellow mammals over other animals.

How can we measure capacity for welfare and moral status? An ‘all-things-considered’ approach tries to combine the various issues into a single measure – for example, using surveys of experts or the general public. Such a method might use hypothetical questions like asking people whether they would be willing to give up a year of human life for a lifetime of being a particular animal, or eliciting trade-offs between species (e.g. how many cows’ lives are worth one human life).

Such an approach carries many flaws. We should be sceptical of uninformed, reflexive intuitions. Responses may be driven by idiosyncratic personal preferences – for example, curiosity over what it would be like to live as a particular animal. They may be influenced by invalid biases – for instance, assuming that ‘less human’ animals like chicken or fish are unintelligent because we do not understand their behaviour, or that larger and ‘cuter’ animals are more morally worthy.¹¹¹

An alternative approach is to break moral value down into “discrete constituents (atoms) that are answered independently and then aggregated”.¹¹² Rethink Priorities have attempted to pursue such an approach, trying to identify, weight and measure features like “intensity of valenced experiences, self-awareness, general intelligence, autonomy, long-term planning, communicative ability, affective complexity, self-governance, abstract thought, creativity, sociability, and normative evaluation”. These could be measured by accumulating evidence from behaviour, cognitive bias trials, physiological measures and more – though often they will rely on proxies.

This approach is more robust and theoretically defensible, but time consuming. Rethink Priorities estimate that it would take 5-7,000 person hours.¹¹³ Until this herculean task is completed, we have to make do (once again) with crude proxies. The information we have that offers most help with the task of comparing animals in their capacity for welfare is neuroanatomical data.

In particular, neuron count, or cortical neuron count, can be used as a proxy for intelligence. The reasoning is as follows – more neurons mean higher cognitive sophistication or intelligence, implying that animals with higher neuron counts can have more or richer experiences, which means a higher capacity for welfare. These links can be questioned, and generally rely on common sense and intuition rather than evidence.¹¹⁴ However, neuron counts and in particular cortical neuron counts generally track our existing assumptions about animal intelligence, which suggests they might be useful, particularly when we lack other proxies.

In the future, as well as integrating other evidence of markers of consciousness, it might be valuable to investigate other neuronal measures. For example, Dicke and Roth suggest that a combination of traits, including “the number of cortical neurons, neuron packing density, interneuronal distance and axonal conduction velocity”, may contribute to intelligence and other sentience markers.¹¹⁵ Rethink Priorities suggest these and other cytoarchitectural traits, like degree of myelination and synaptic transmission speed, may be useful indicators.¹¹⁶

However, greater intelligence does not necessarily mean that animals will have a higher capacity for welfare – their experiences might not automatically be more intense, or their experiences might differ in ways other than intensity. For example, though humans’ cognitive sophistication opens us up to a wide range of emotions, including those that require mental time travel (like hope or worry about the future), we can also use reasoning to lessen the intensity of pain by telling ourselves it has a limited duration or is for a reason (like receiving medical help). We might also be more sensitive to pain than other animals, and require less pain to change our actions and fulfil pain’s adaptive role – this could make our experiences less intense overall.¹¹⁷ In summary, it could be that there are different types of pain and affect, which would widen our definition of capacity for welfare. Although intelligence might track these, it’s also plausible that we can only get a true picture of capacity for welfare with the inclusion of other traits, and how much they are affected by animals’ circumstances in practice.

However we weight animals, the overall picture remains the same – chickens are the most pressing welfare issue in the food system

Making inter-species comparisons is difficult and complicated. It requires tricky and contentious moral judgement, and judgements on uncertain questions regarding what different animals can and do experience. The most straightforward and conservative assumption is that all animals matter equally and have equal capacity for welfare and suffering. That was the implicit assumption of the analysis in the previous chapter. Now we test the sensitivity of our findings to that assumption. Does the suffering of chickens still dominate the picture if we account for the possibility that chickens count for less than other animals?^{viii}

^{viii} As noted at the beginning of the chapter, this is an assumption which the RSPCA, as sponsors of this report, do not endorse.

We have seen that there are two plausible, albeit far from perfect, ways to morally weight different animals. The first is to weight them according to the number of neurons they have. The second is to weight them according to public perceptions of their moral value. We tried to apply both types of weight to our numbers so far.

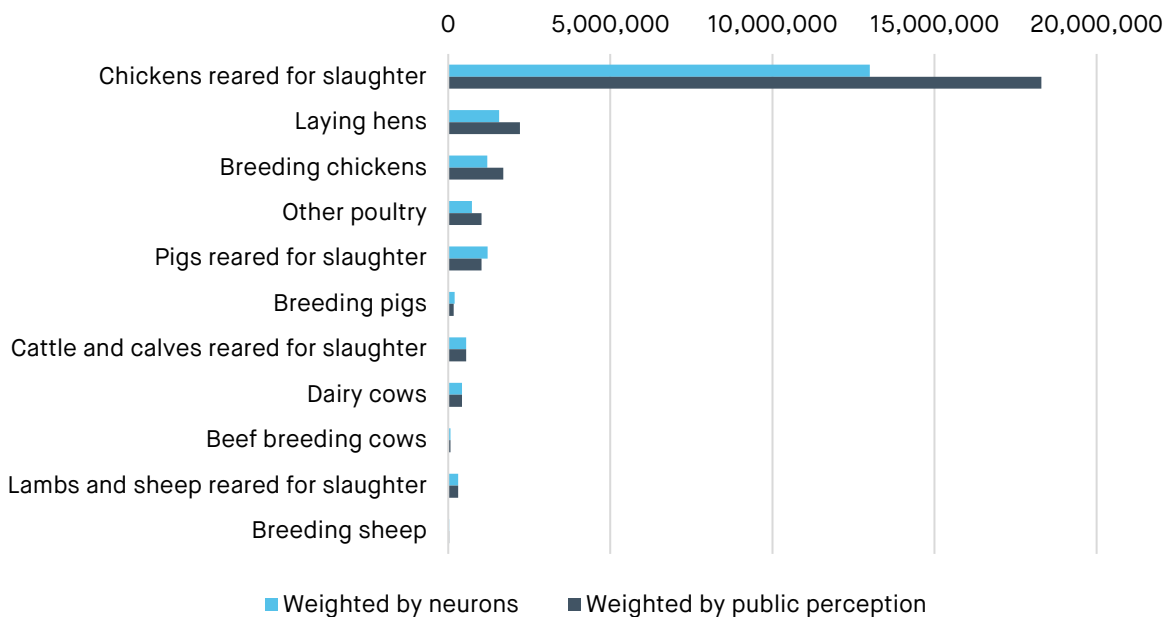
Once again, we found data challenging to come by. We were not able to find a single consistent source for neuron counts, but used data for comparable animals where needed. Depending on the available data, we weighted animals according to the total number of neurons they have, or the number of cortical neurons they have. See the appendix for more details.

In terms of public perceptions of the moral value of animals, we drew on a relatively small survey of 490 participants on Amazon Mechanical Turk conducted by Rethink Priorities.¹¹⁸ This found, for example, that people think the life of one cow is worth as much as 6.5 chickens. Again, see the appendix for more details.

In these discussions it is common practice to express moral weights in terms of human lives. Given that many people may find such comparisons distasteful and confusing, we thought it better to normalise relative to cows (generally believed to be the most morally valuable farm animal).

Figure 9 shows the number of factory farmed animals in the UK, with different moral weights applied. It shows that if we adjust for the fact that chickens’ brains are relatively less complex, then the 120 million factory farmed chickens falls to 13 million ‘cow equivalents’. Using public perceptions of moral value, the weight given to chickens is somewhat higher, coming out at 18 million ‘cow equivalents’. The story does not change dramatically though. The prominence of chickens recedes somewhat, but they still account for the overwhelming majority of lower welfare animals.

Figure 9: Number of factory farmed animals, weighted by neurons and public perception (cow equivalents)

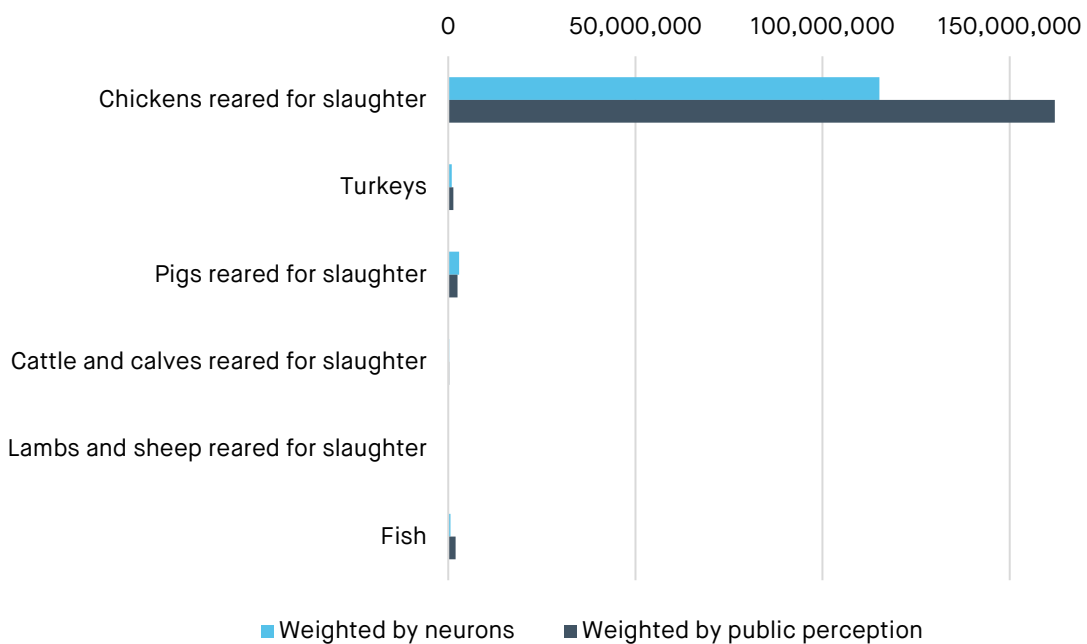


Source: SMF analysis - see appendix for detail

As we explained in the previous chapter, we have not been able to produce population estimates for fish, so to include them in the analysis we have had to apply moral weights to slaughter statistics. Figure 10 presents the results. As it is functionally the same analysis as Figure 9, it should be no surprise that chicken numbers are again greatly diminished by adjusting for neuron count or public perception of value, but that they continue to account for the vast majority of lower welfare animals.

More interesting is the relative status of pigs and fish. Weighting according to both brain size and public assessment, pigs overtake fish and move into second place. However, the gap is far greater on the neural weighting, under which even turkeys overtake fish.

Figure 10: Number of factory farmed animals slaughtered, weighted by neurons and public perception (cow equivalents)



Source: SMF analysis - see appendix for detail

CHAPTER FIVE – ARE THINGS GETTING BETTER?

To this point, we have shown that huge billions of animals raised for meat – the majority – are reared in lower welfare conditions that generate substantial suffering. We have seen that the overwhelming majority of these animals are factory farmed chickens, though there are also issues with farmed fish and pigs. If alternative proteins can displace some of this meat production, they could make a substantial positive contribution to animal welfare. But are they necessary?

This chapter explores the ‘do nothing’ scenario on alternative proteins. How are more traditional efforts to promote animal welfare faring? Is the market moving in the right direction? And where are we likely to end up on current trends? It begins by exploring what we can say about how welfare standards have developed over time. It then sets out a number of projections to show the stakes of action and inaction on this issue.

There is little clear evidence that farmed animal welfare is improving

As has been the case throughout this project, in trying to plot trends we have been frustrated by the absence of robust, reliable and comparable data. We have found it difficult enough to build a static point-in-time picture of the British farming industry, as we did in Chapter Two. Trying to track all of the data points beneath those estimates over time has proved incredibly challenging, and for many key variables – notably, the proportion of animals that are factory farmed – we have had to assume no change.

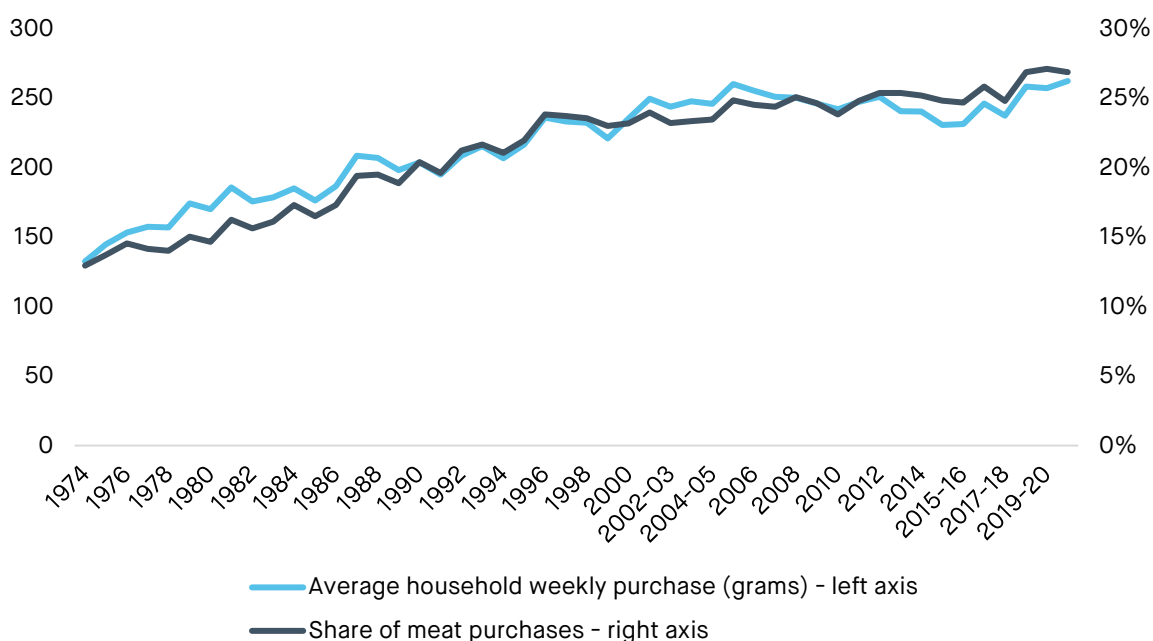
That makes it hard to assess industry claims that things are getting better. However, what we can say is that there is little clear evidence to show that standards have been improving. In fact, there are some signs that animal welfare may be getting worse over time.

Rising chicken consumption

We have seen that chicken is generally the most intensively farmed source of meat, and thus lowest welfare. All else equal, that makes the fact that chicken consumption has risen substantially a cause for alarm. While some data sources suggest overall meat consumption may be flatlining or in decline¹¹⁹, that is partly because consumers have switched towards chicken and away from red meat. A range of data sources agree that British people are eating more chicken, though they disagree on the growth rate.

Looking first at farm population numbers, we see that the number of broiler and breeding chickens grew by almost a quarter between 2012 and 2022, an increase of almost 26 million birds.¹²⁰ That is reflected in dietary surveys. A 2021 study, based on the National Diet and Nutrition Survey reported that average daily poultry consumption in the UK rose from 32.0g in 2008/09 to 35.3g in 2018/19 – an increase of 10% over the decade.¹²¹ In that dataset, poultry was the only type of meat to increase, gaining share at the expense of pork, beef and lamb.

The trend is a long-term one. According to the Family Food Survey, the average household purchased 133g of poultry a week in 1974. By 2021, that had almost doubled to 262g.¹²²

Figure 11: UK household poultry purchases, 1974-2021

Source: DEFRA Family Food Survey; SMF analysis

More intensive farming

Another negative trend is the growth of highly intensive forms of farming. In a 2017 investigation, The Guardian and Bureau for Investigative Journalism (BIJ) discovered there were 800 ‘megafarms’ – “US-style” farms that can house more than a million poultry, 20,000 pigs, or 2,000 dairy cows in indoor factory units – throughout the UK.¹²³ Five years later, in 2022, The Guardian found there were more than 1,000 megafarms in Great Britain alone – a significant increase that potentially represents millions of farm animals.¹²⁴

It has been noted that the rise in this form of intensive farming has been fuelled by Britain’s demand for cheap meat – particularly chicken. The Guardian and the BIJ revealed that by March 2017 the Environment Agency had issued 1,418 permits for intensive poultry farms, having issued zero in December 2002. At that time, 86% of all permit-holding intensive farms in the UK were poultry farms. Between 2011 and 2017, the number of large intensive pig and poultry farms with permits rose by 26%.¹²⁵

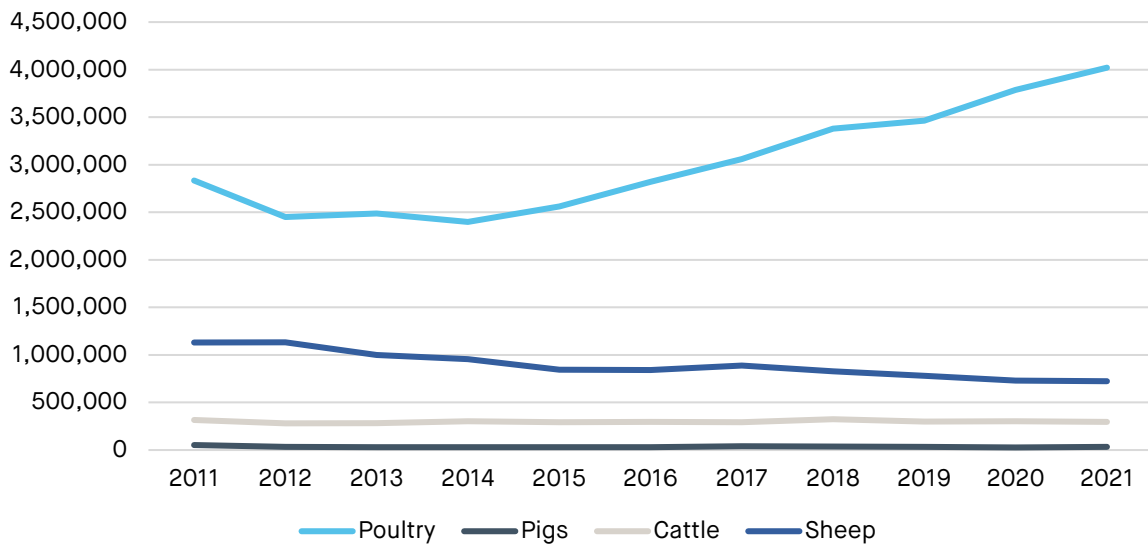
More intensive farming suggests a downward pressure on animal welfare standards, particularly among poultry. Industrial farming maximises production while reducing costs in order to produce cheaper products, often at the expense of animals’ wellbeing. If there are more of those kind of units, it stands to reason that more animals will be suffering.

Some increase in higher welfare farming

If there are grounds for concern about the rate of expansion at the ‘bottom end’ of the market – cheap, highly intensive pig and poultry farming – the picture is less clear towards the ‘top’. Organic farming is generally understood as being the ‘gold standard’ with the most stringent requirements for protecting animal welfare.¹²⁶

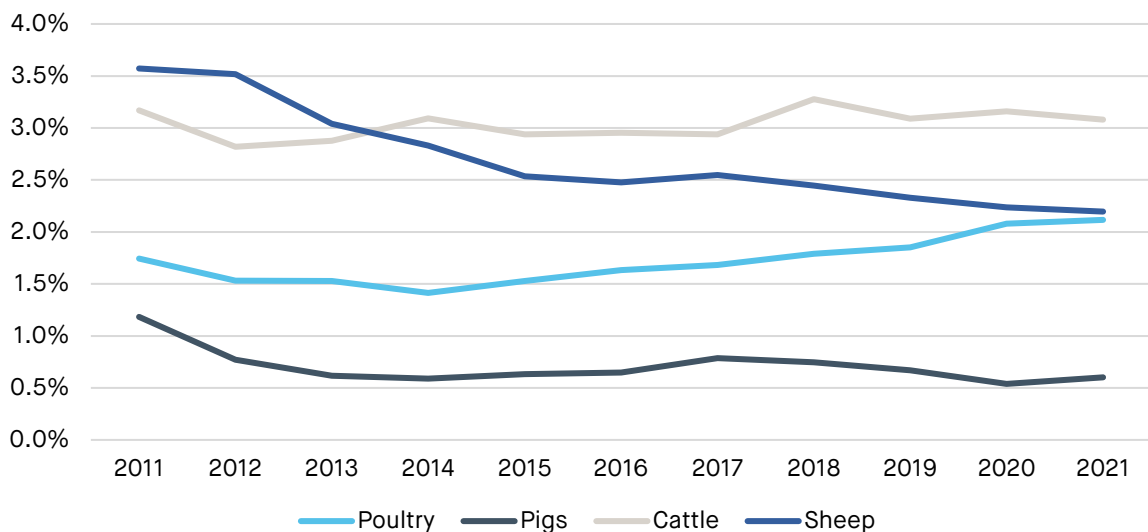
Figure 12 shows how the number of animals reared organically in the UK has evolved over recent years. Interestingly, for pigs, cattle and poultry, the number of animals organically farmed has fallen over the past decade. The main story as ever, though, is poultry, where the number of organically reared animals has risen by 42%.¹²⁷

Figure 12: Number of animals reared organically in the UK



Source: DEFRA

Figure 13: Proportion of farm animals reared organically in the UK



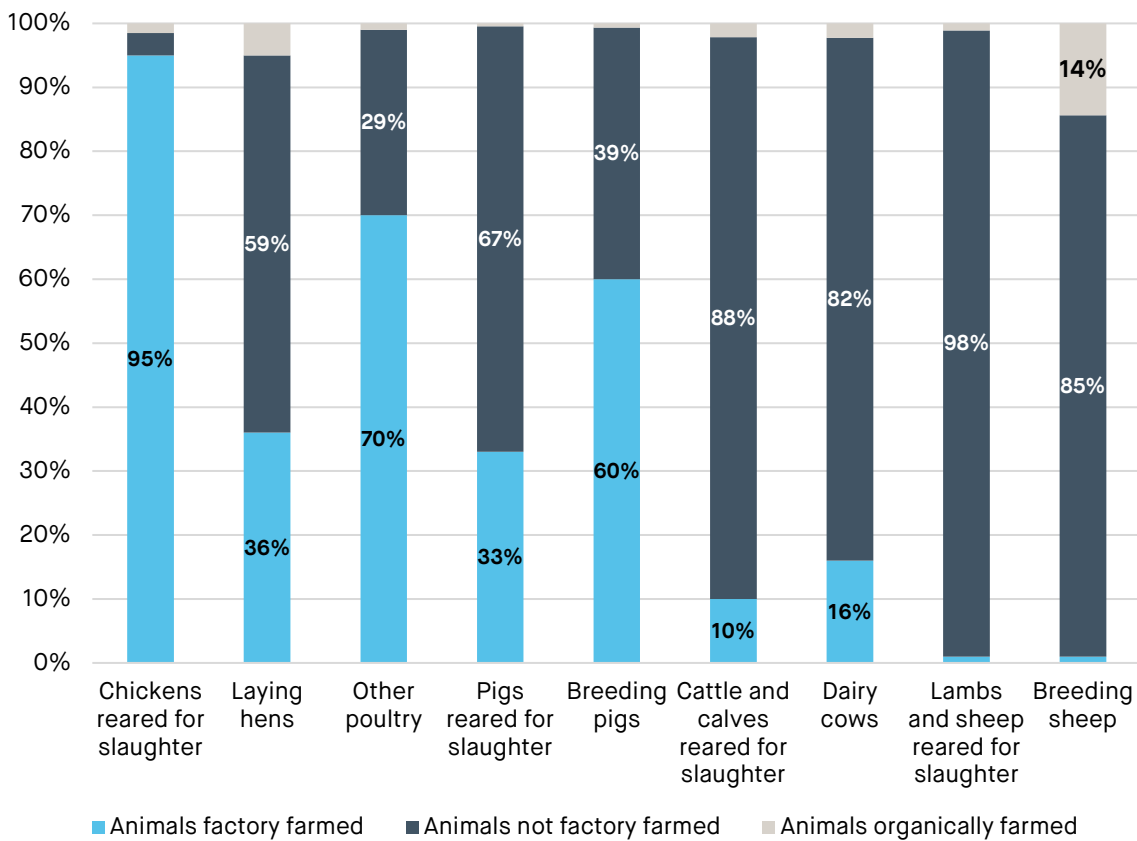
Source: DEFRA

This suggests a degree of polarisation in the UK poultry market, with increases in both relatively higher and lower welfare and the share in the middle declining. Our estimates suggest that broiler chickens constitute the majority of a growing factory-farm driven lower welfare population. But there are also 21% more broilers reared organically in 2021 than there were in 2016. Moreover, it may be that this trend is going into reverse: sales of organic meat, fish and poultry declined in 2022.¹²⁸

Laying hens are much more likely to be raised on organic farms. There were 78% more hens living in organic conditions in 2021 than there were in 2016. DEFRA data also shows that the proportion of free-range products doubled from 2004 (32%) to 2011, representing 70% of all egg sales, while free-range egg production also doubled (27% to 60%).¹²⁹

Overall, though, those positive trends are relatively small compared to the size of the overall meat system. Organic poultry may have grown, but it has grown from a relatively low base. In total, just 2% of farm animals are organically farmed. That leaves plenty to be desired, particularly among animals most likely to suffer in intensive conditions. Organic broilers (1.9 million) represent 2% of all broilers (126.1 million), for example, and are vastly outnumbered by how many factory farmed broilers (119.7 million; 95%) there are. While positive, organic farming is barely a drop in the ocean.

Figure 14: UK animal population by welfare standard

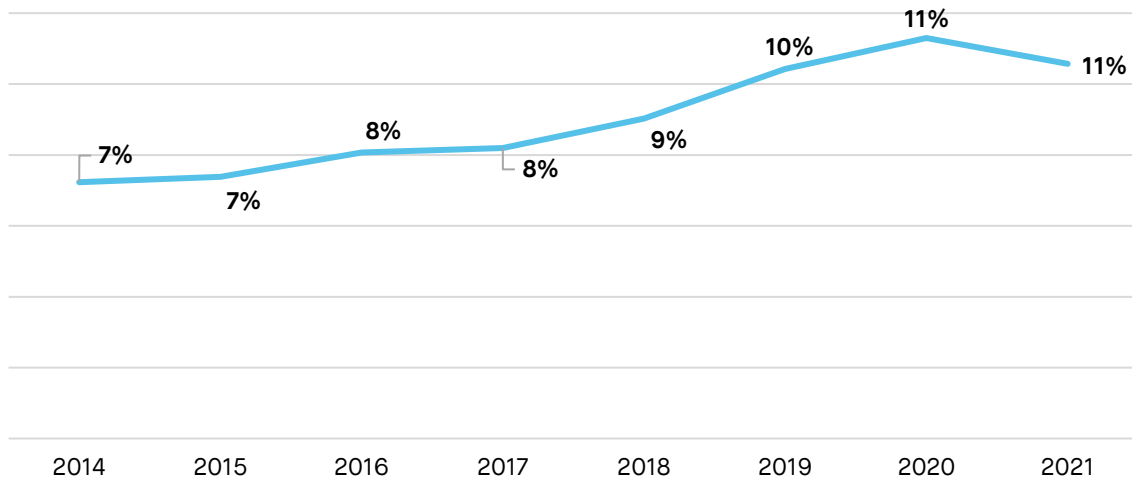


Source: SMF analysis

Note: Organic data not available for breeding chickens and breeding cows

RSPCA Assured is another set of standards that guarantee higher animal welfare “beyond ‘standard’ or typical production”.¹³⁰ According to data provided in its Annual Review reports,¹³¹ the number of animals covered by the Assured scheme grew by 60% between 2014 and 2021, representing 11% – 25.2 million – of the total population. But as we discuss in the following chapter that trend, while positive, will need significant acceleration to compare to the scale of factory farming. RSPCA Assured chickens make up just 1.25% of the total population, for example. The challenge ahead is recognised in RSPCA Assured’s transformation plan.

Figure 15: RSPCA Assured animal numbers as a share of the total animal population



Source: RSPCA; DEFRA

We acknowledge this does not provide the full overview of UK farming practices. Without a complete set of welfare data, there is an entire ‘middle ground’ of animals that sit between factory farming and organic which are absent from our analyses. We have not been able to properly discuss free range estimates, for example, not to mention animals that will inevitably fall between the cracks of different welfare schemes. It’s likely there are many higher-welfare farms that provide ‘good’ conditions but will not have certification, leading us to underestimate the number of animals reared under high welfare conditions.

Without the necessary data, it is not possible to say for certain. What we can say based on the available evidence, though, is that – apart from maybe laying hens – conditions do not seem to be improving for farm animals.

Table 4: UK animal population across different standards

	No. of animals factory farmed	No. of animals not factory farmed	No. of animals organically farmed
Chickens reared for slaughter	119.7 million	4.4 million	1.9 million
Laying hens	14.5 million	23.7 million	2.0 million
Other poultry	6.7 million	2.8 million	0.1 million
Pigs reared for slaughter	1.6 million	3.2 million	0.0 million
Breeding pigs	0.3 million	0.2 million	0.0 million
Cattle and calves reared for slaughter	0.6 million	4.9 million	0.1 million
Dairy cows	0.4 million	2.1 million	0.1 million
Lambs and sheep reared for slaughter	0.3 million	29.7 million	0.3 million
Breeding sheep	0.0 million	2.3 million	0.4 million
Terrestrial total	144.1 million	73.3 million	4.9 million

Source: SMF analysis

Note: Organic data not available for breeding chickens and breeding cows

Things could get worse under current trends

A primary aim of this report is to diagnose the scale and nature of animal suffering. Our estimates show that the majority of the total population is raised in lower welfare environments, with some animals – namely, chickens – faring worse than others. There is little to suggest that conditions have improved in recent years.

We also sought to answer another question: what animal welfare *could* look like.

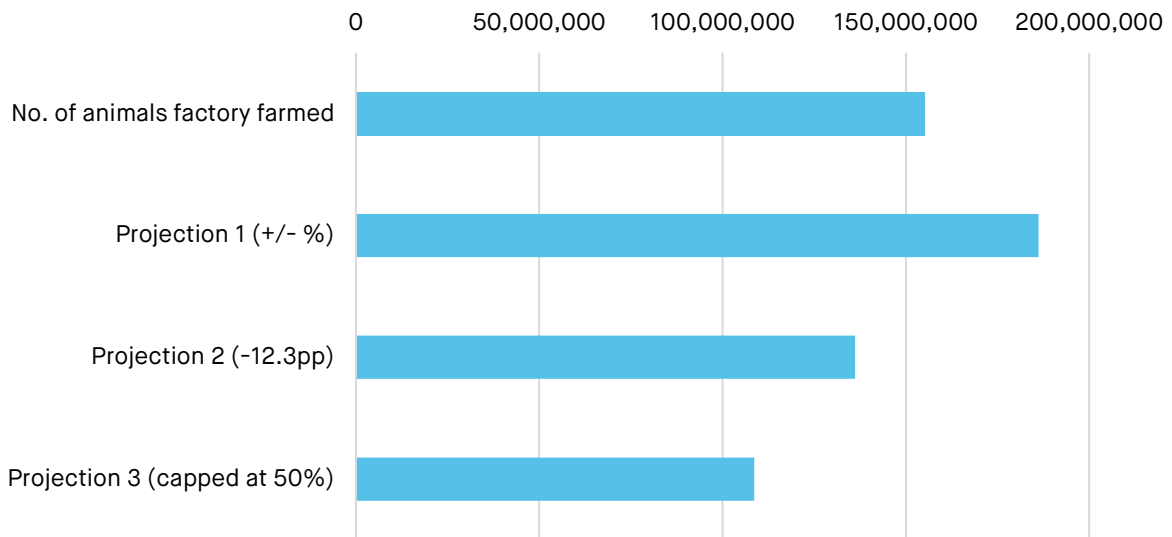
Under current trends, animal welfare standards are set to get worse, with a greater number of animals suffering from factory farming. There is some room for optimism, though. Other avenues are possible, and changes to either our consumption habits or farming practices (or both), could have a significant impact on the size of our farmed animal population.

We relied upon three forecasting scenarios that help us estimate the potential size of the UK's future factory farm population:

- **Projection 1:** The 'do nothing' scenario, which assumes that the past decade's population growth (+14%) will continue over the next decade.
- **Projection 2:** A more optimistic course of events, whereby the UK emulates Germany's recent meat consumption reduction of 12.3%.

- **Projection 3:** The most ambitious goal, meeting the RSPCA’s target of rearing 50% of all animals to its Assured welfare standards.

Figure 16: The UK factory farm population under different projection scenarios



Source: SMF analysis

Projection 1 (+/-%)

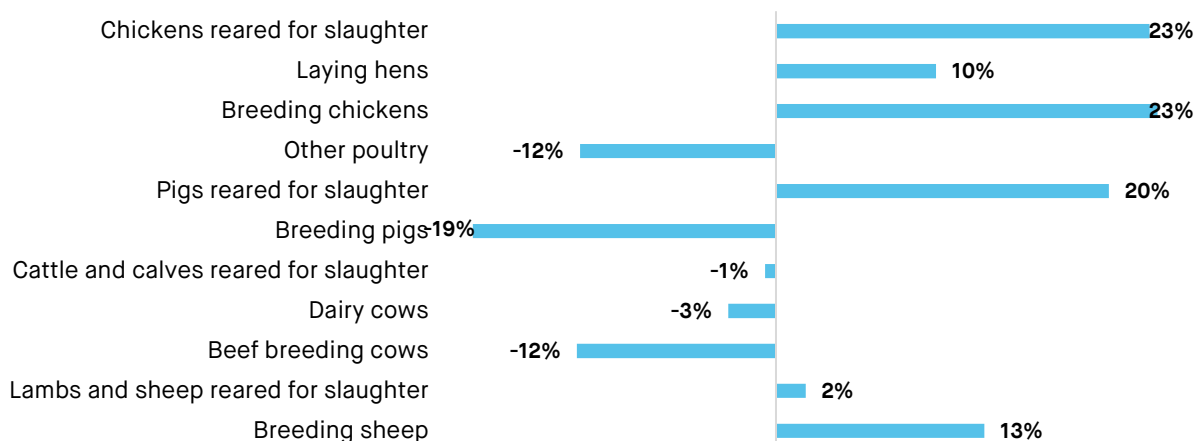
Lower welfare farming is currently on a growth trajectory. Extrapolating population trends from the previous decade (2012-2022), the farm animal population is set to increase by 14%. Such a scale of change is consistent with market research forecasts. Euromonitor expects meat consumption to rise by 1.7% a year between 2022 and 2027 in the UK – over a decade, that amounts to 18% growth overall.¹³²

If we assume no change in the proportion that are factory farmed, a 14% increase would imply that the factory farm population is set to grow from 155.2 million to 186.2 million over the next decade (2022-2032).

Unless the UK changes how it treats its farmed animals, welfare is set to get significantly worse. Inevitably, though, some animal populations are set to grow more than others. Breeding pig (-19%), other poultry (-12%), and beef-breeding cow (-12%) populations have declined in recent years, for example, meaning there will be relatively fewer of them suffering in factory farms if those trends are to continue.

Those that have experienced the largest population growth are broiler chickens (+23%), breeding chickens (+23%), and pigs reared for slaughter (+20%) – animals we most expect to be reared in lower welfare conditions. The factory farm population for broilers – the animal we have identified as representing the biggest welfare concern – is set to increase from 119.7 million to 147.3 million. That is an additional 27.6 million lives likely spent suffering in highly intensive conditions.

Figure 17: UK animal population growth, 2012-22



Source: DEFRA

Projection 2 (-12.3%)

Between 2011 and 2021, German people reduced their meat consumption by 12.3%. For this reason, Germany is said to be a country that has embraced plant-based food and the politics of meat reduction, and has thus “made itself an outlier in global meat consumption”.¹³³ When thinking about reducing our own meat consumption, whether that be with the aim of limiting animal harm or for any other kind of objective, Germany stands out as an exemplar country the UK could emulate.

If the British public were to follow in the footsteps of the Germans, there would be 136.1 million animals raised in lower welfare conditions. That is 19.1 million less than the current factory farm population, and 50.1 million less than what is projected in our ‘do-nothing’ scenario for a decade’s time. Needless to say, a reduction in meat consumption of the scale of the Germans would have the biggest impact on the lives of broiler chickens, as it would result in 42.3 million fewer kept in factory farms – around a third (35%) of the current broiler factory farm population. However, this would require the British to do better than the Germans themselves – in Germany, poultry consumption has increased over the past decade.¹³⁴

Projection 3 (capped at 50%)

Our third projection is based on the RSPCA’s ambition of rearing at least half of all UK farm animals to higher welfare standards by 2030.¹³⁵ Effectively capping all future factory populations (as per the 2032 growth trends set out above) at 50%, such an achievement would be genuinely transformational, resulting in 77.6 million fewer animals living in lower welfare environments than what is forecasted.

As ever, it is broiler chickens that drive the numbers, accounting for 69.8 million of the animals that would be spared under such a scenario. Since 95% are currently factory farmed, getting the number to half would have a huge effect, liberating more chickens than the entire human population of the UK.

However, it is worth emphasising that achieving this target would require a massive acceleration in progress. Though the number of members in the scheme has increased over time, rising from 3,422 in 2014 to 4,020 in 2022, the share of animals covered by it has barely budged (presumably because of the faster growth rate of lower welfare farming).¹³⁶ In 2016, RSPCA estimated that that 1.21% of British chickens were raised to its standards. By 2021, that was 1.25% - a long, long way from 50%.

Table 5: UK factory farm populations projections

	No. of animals factory farmed	Projection 1 (+/-%)	Projection 2 (-12.3%)	Projection 3 (capped at 50%)
Chickens reared for slaughter	119.7 million	147.3 million	105.0 million	77.5 million
Laying hens	14.5 million	15.9 million	12.7 million	15.9 million
Breeding chickens	11.1 million	13.6 million	9.7 million	7.6 million
Other poultry	6.7 million	5.9 million	5.9 million	4.2 million
Pigs reared for slaughter	1.6 million	1.9 million	1.4 million	1.9 million
Breeding pigs	0.3 million	0.2 million	0.2 million	0.2 million
Cattle and calves reared for slaughter	0.6 million	0.5 million	0.5 million	0.5 million
Dairy cows	0.4 million	0.4 million	0.4 million	0.4 million
Beef breeding cows	0.1 million	0.1 million	0.1 million	0.1 million
Lambs and sheep reared for slaughter	0.3 million	0.3 million	0.3 million	0.3 million
Breeding sheep	0.0 million	0.0 million	0.0 million	0.0 million
Terrestrial total	155.2 million	186.2 million	136.1 million	108.7 million

Source: SMF analysis

CHAPTER SIX – CONCLUSIONS AND RECOMMENDATIONS

If we care about animal welfare, we should collect better data

By this point of the report, we expect readers to be sick of our complaints about the limitations of UK animal welfare data. This has been a frustrating project to carry out. We are fully aware that our methods are crude, and our inferences broad-brush. That is because we can only work with what we have, and what we have is inevitably limited. We understand that using a farming method (intensive factory farming) as a proxy for animal welfare outcomes conflates two conceptually different things. Again, we can only do our best.

A lack of data is a nuisance for researchers, but that is the least of the problems. Fundamentally, it is an obstacle to good policy if we do not know how bad issues are, whether they are getting better or worse, and how far particular interventions improve things. Otherwise, it is impossible to hold government and industry to account. Polling suggests the British public don't know enough about the realities of meat production – better information and greater transparency would help them make informed decisions about what, exactly, they choose to eat.¹³⁷ The absence of good data raises questions about our values and priorities as a society.

We opened our introduction with a cliché. Here is another one for the conclusion: what gets measured matters. Our failure as a society to maintain robust, comprehensive and trustworthy data on the condition of the animals we farm fits with a more general unwillingness to look closely at the suffering that goes into the food we eat. If we really care about animal welfare, as so many of us claim to do, we would put more effort into understanding where our treatment of animals falls short, so that we can do better.

The government and industry bodies already collect all manner of data on farm animals – population, weight, disease – but generally they do so because it is economically useful. DEFRA should give similar consideration to animal welfare statistics. It already carries some data on the number of organically-reared animals, and the number of free range egg-laying hens. Yet as we have seen, this tells us relatively little about the bulk of animals not in those categories. Organisations like the RSPCA and Soil Association, who maintain assurance schemes could perhaps do more with their data, but run into the difficulty that most farms do not participate.

DEFRA should aim to produce, based on a representative sample of farms, estimates of the welfare status of each farmed animal in the UK. Ideally, it would be good to have a consolidated checklist, based on approaches like RSPCA Assured or AssureWel's, giving each farm a rating. These could classify each animal as having a 'good life', 'life worth living' or a 'life not worth living', following the FAWC's categorisation.¹³⁸ Alternatively, it could be a more fine grained, but less evaluative set of categories like 'very high', 'high', 'average', 'below average' and 'low'. Such a scheme would allow us to know how many animals exist in low welfare conditions, just as we know how many children are in schools rated inadequate by inspectors. It could also form the basis of a trusted and reliable labelling system to inform consumers of what they are buying and eating.

Beyond this, it would be good, at an aggregated level, to have data on the indicators beneath the checklist. To illustrate the point using AssureWel's broiler checklist, it would be useful to understand, at a national level, how densely packed birds are, how many experience decent air quality, how many have their beaks trimmed, how many get enriched cages, the distribution of scores in walking ability, the proportion showing burns and other signs of physical harm, and differences in slaughter conditions.¹³⁹

Animal welfare improvement is about chickens first and foremost – and that may be in tension with other meat reduction goals

For all the limitations in our method and imprecision in our data, the headline message is hard to miss: farm animal welfare is overwhelmingly about chickens (and more specifically, intensive broiler chickens). We have seen that 98% of factory farmed animals in the UK are poultry, and that over a billion are slaughtered every year, dwarfing all other animals. It would be an exaggeration to say that the welfare issues facing other animals are a footnote by comparison, but only a slight exaggeration. Next on the priority list are fish, around 17 million of whom are factory farmed and slaughtered every year, and pigs who are more likely to be intensively farmed in lower welfare conditions. By contrast, sheep and cows are both less numerous and tend to have better conditions, so have a less material impact on the overall state of animal welfare in the British farming system. That is not to say that there are no welfare issues with livestock – and we have documented some of them here – just that they should be lower priority for animal welfare advocates.

Reducing the consumption of any form of lower welfare meat would be good for animals, but these findings suggest that the crucial imperative is to resist and to reverse the dramatic growth of the intensive chicken industry. That is a priority that may not necessarily be shared by others that seek to reduce meat consumption.

To begin with, it seems to highlight trade-offs around meat consumption and climate change. It is increasingly recognised that eating less meat is one of the most effective things people can do to address climate change. The UN estimates that animal agriculture accounts for 14.5% of total greenhouse gas emissions, and some have argued this is an underestimate.¹⁴⁰ But the sorts of meat that produce most emissions tend to be those that have higher welfare standards. Climate researcher Hannah Ritchie estimates that 49.9kg of CO₂-equivalents are produced per 100g of protein in beef.¹⁴¹ That is far higher than the equivalent figure of 7.6kg for pork and 5.7kg for chicken. In fact, the emissions impact of chicken is lower than cultivated meat has achieved so far, although plant-based and fermentation-made meat substitutes are better still.¹⁴²

The comparatively low carbon footprint is, to some extent, a consequence of the lower welfare standards involved in producing chicken. Practices like packing chickens more closely together may be bad for the animals, but they make farming more efficient from an economic and energy perspective.

These tensions are reflected, for example, in the position and messaging of the UK Government's Climate Change Committee. The committee has called for a 20% reduction in UK meat and dairy consumption by 2030, and a 35% reduction by 2050.¹⁴³ However, it is at best ambivalent over whether chicken should be included in this. On its website, it recommends that people should eat "less beef, lamb and dairy", but not less chicken.¹⁴⁴ Indeed, some of its modelling assumes that lower consumption of beef and lamb is achieved by switching to pork and chicken (most likely lower welfare meat).¹⁴⁵

That said, some analyses suggest that this apparent trade-off between animal welfare and environment considerations does not in fact exist. A study by IDDRI, on behalf of the Food Farming and Countryside Commission, modelled an ambitious scenario for UK farming, outlining a path to 'agroecology', reducing emissions by over half, increasing biodiversity and reducing synthetic fertilisers, pesticides and nutrient loss.¹⁴⁶ In the model, cows play an important role because of their ability to feed on grass and fertilise crops – however, they are farmed in a more extensive manner that reduces the amount of meat and dairy they produce. Conversely, pigs, broilers and laying hens are seen as competing with humans for cereals and bring fewer ecological benefits, and so production is required to go down in order to achieve balance. Moreover, intensively farmed poultry and pigs generate substantial pollution.

The upshot of the modelling is that the poultry numbers fall by 34% in the modelled scenario – more than any other farmed animal. Pig numbers also fall by 30%. By contrast, the number of dairy cows falls 14% and cattle 23%. In other words, production of lower welfare meat falls by more.

As well as tensions with environmental goals, attempts to encourage people to cut down on chicken consumption in the interests of animal welfare may conflict with advice on healthy eating. White meat like chicken generally has less fat and is seen as carrying less cancer risk than red meat like beef, pork and lamb.¹⁴⁷

We have not at this stage assessed how far beef, chicken, pork and fish substitutes are in competition for investment, attention and resources. Certainly, there are a good number of companies that are attempting to address each of those categories, and many firms try to produce multiple different types of products (for example, mince, sausages and chicken pieces).¹⁴⁸ Anecdotally, in our experience, the moral rhetoric around alternative protein products seems to emphasise environmental benefits over animal welfare concerns, and often the 'flagship' products so far have been beef and dairy substitutes. However, that may be a misperception and is a theory to test in the rest of this project. There may still be a role for animal welfare advocates to ensure their priorities are reflected in the direction of the alternative protein market.

APPENDIX

This appendix describes the methods we used to estimate the level of farmed animal welfare in the UK, setting out the key sources used and our rationale for using them, as well as the limitations of our approach.

Population

The primary element of our analysis was estimating the number of factory farmed animals in the UK. We did this by taking the total farmed population of each animal and applying an estimated proportion that is factory farmed.

Our main source of population statistics is DEFRA livestock populations data,¹⁴⁹ which provides estimates for the numbers of different types of cattle, sheep, pigs, and poultry, as of 1 June 2022. Though they exclude fish, DEFRA's population estimates are fairly comprehensive and capture everything we could reasonably hope for. The data also breaks down species by different animal types ('cattle and calves' includes beef cows, dairy herds, and breeding cattle, for example). For the sake of communicating that range plainly, we created some easy-to-understand composite categories (see below) or renamed groups. Other than that, our population estimates mirror those presented by DEFRA – no additional analysis has been carried out. One small caveat to add is that, due to issues around DEFRA data collection, 'breeding chickens' covers Great Britain only (i.e. it excludes Northern Ireland).

SMF animal category	DEFRA animal types
Chickens reared for slaughter	Table chickens (broilers)
Laying hens	Hens and pullets laying eggs for eating (birds in the laying flock, pullets)
Breeding chickens	Breeding flock (layer breeders, broiler breeders, cocks and cockerels)
Other poultry	Other poultry (ducks, geese, turkeys, all other poultry)
Pigs reared for slaughter	Fattening pigs
Breeding pigs	Female breeding pigs (sows in pig, gilts in pigs, other sows), other breeding pigs (boars being used for service, gilts intended for first time breeding)
Cattle and calves reared for slaughter	Aged 2 years or more; other female cattle (of which beef), female cattle aged between 1 and 2 years (of which beef), female cattle less than 1 year, all male cattle (aged 2 years or more, aged between 1 and 2 years, less than 1 year)
Dairy cows	Breeding herd (of which dairy heard), other female cattle (of which dairy), female cattle aged between 1 and 2 years (of which dairy)
Beef breeding cows	Total breeding herd (of which beef)

Lambs and sheep reared for slaughter	Other sheep and lambs (lambs under 1 years old, rams, other sheep 1 year and over) and ewes intended for further breeding and for slaughter
Breeding sheep	Ewes intended for first time breeding

Slaughter

As well as point in time population, we also produced numbers for factory farmed animals slaughtered each year. That data was also provided by DEFRA,¹⁵⁰ capturing how many chickens, turkeys, pigs, cows, and sheep were killed for meat in 2022. Again, we decided to recategorise or rename some animal types, in the name of simplicity. The table below shows what each animal type, as we have categorised it, refers to in terms of DEFRA terminology.

There are two caveats to note regarding how we used DEFRA slaughter data. First, 'boiler fowl' is likely to include some poultry other than chickens. However, given the vast scale of chicken farming, it is reasonable to assume that most boiling fowl will in fact be chickens. Boiler fowl has therefore been placed into the 'chickens reared for meat' category.

Second, while DEFRA's populations data for 'other poultry' includes turkeys, slaughter estimates are only available for turkeys. For that reason, turkeys are the only type of poultry, other than chickens, that we have been able to provide in this analysis. While we could have added the culling of newly hatched unwanted male chicks to our estimates, a figure approximated to be around 29 million lives per year¹⁵¹, due to complexities around age (and therefore consciousness) of chicks – often just hours old at the time of slaughter – we decided to exclude them.

SMF animal category	DEFRA animal types
Chickens reared for slaughter	Broilers and boiling fowl
Turkeys	Turkeys
Pigs reared for slaughter	Clean pigs, sows and boars
Cattle and calves reared for slaughter	Calves, steers, heifers, young bulls, cows, adult bulls
Lambs and sheep reared for slaughter	Sheep and lambs, ewes and rams

As we note in the report, DEFRA slaughter data excludes fish. To fill that gap, we called upon numbers provided by Fishcount¹⁵² – a website that seeks to provide estimates of number of individual fish from production and capture tonnages, and increase awareness of welfare issues caused by commercial fisheries and fish farming. Fishcount provides data on average annual capture of fish caught in the UK between 2007 and 2016. Its estimates are based on data from the Food and Agriculture Organization of the United Nations and are presented as ranges – 1,526-2,683 million for wild fish and 28-77 million for farmed fish. To provide a single figure for all fish caught (2,157 million) the midpoint of each range was added together.

It is important to note that, while it was possible to also provide numbers for other kinds of seafood, due to difficulties comparing different species under a single ‘fish’ category, we decided it was more straightforward to focus solely on finfish, excluding all other aquatic animals.

Factory farming

We drew on a range of sources to estimate the proportion of animals raised under ‘factory’ or ‘intensive’ farming conditions. We started with a previous estimate produced by Compassion in World Farming, itself drawing on a range of sources. In most cases, we were able to update or improve upon the data sources used by CIWF.

As we have already mentioned, the reliability of those sources vary – some come directly from industry, for example, while others come from what might be considered ‘grey literature’. Some numbers provided by CIWF were unpublished expert estimates, shared internally with the SMF. The table below lists the sources used for calculating the UK factory farm population:

SMF animal category	% factory farmed	Source
Chickens reared for slaughter	95%	British Poultry Council ¹⁵³
Laying hens	36%	Egg Info ¹⁵⁴
Breeding chickens	90%	Expert estimate
Other poultry	70%	RSPCA, ¹⁵⁵ Vegan Food and Living ¹⁵⁶
Turkeys	90%	Surge Activism ¹⁵⁷
Pigs reared for slaughter	33%	Farm Animal Welfare Council (via CIWF) ¹⁵⁸
Breeding pigs	60%	The Guardian ¹⁵⁹
Cattle and calves reared for slaughter	10%	DEFRA, Scottish Government, European Commission ¹⁶⁰
Dairy cows	16%	Viva! ¹⁶¹
Beef breeding cows	5%	Expert estimate
Lambs and sheep reared for slaughter	<1%	Compassion in World Farming ¹⁶²
Breeding sheep	<1%	Compassion in World Farming ¹⁶³
Fish	0.8%	Fishcount ¹⁶⁴

Again, there are a few caveats to bear in mind here. For example, as no other data was available, we decided to use duck estimates as a proxy for ‘other poultry’ factory farmed. The RSPCA and Vegan Food and Living claim the “majority” or “vast majority” of these animals are factory farmed. To turn that assessment into a single, quantifiable figure, we reasoned that ‘majority’ must mean more than 50% while likely to be less than 90%, the figure provided by Surge Activism for the amount of turkeys (an animal categorised by DEFRA population data as ‘other poultry’) reared factory farmed. We decided that 70% was the most appropriate percentage to use for our analysis – the midpoint of those two figures.

Three sources – DEFRA,¹⁶⁵ Scottish Government,¹⁶⁶ and the European Commission¹⁶⁷ – were used to estimate the percentage of beef cows housed in barren slatted systems, a form of modern industrial production that is considered to make meat more efficiently and be suboptimal for animal welfare.¹⁶⁸ A DEFRA Farm Practices Survey indicates that 2-3% of beef cows spend at least part of their life in a slatted system in England, mostly in loose slatted systems. Slatted systems with cubicles may have bedding in the cubicles, but loose slatted systems are likely to be barren. This percentage is expected to be higher in Northern Ireland and Scotland, where there is less straw available. Though a Survey of Agricultural Practices in Scotland does not break down the figures by cattle type or type of slurry-based system, it says 40% of all cattle are in some kind of slurry-based system or are tethered.¹⁶⁹ A report by the Scientific Committee on Animal Health and Welfare suggests that slatted and tethered systems are relatively less prevalent compared to systems with litter in the UK.¹⁷⁰ The 10% estimate is based on combining this available data, taking into account the variations in slatted system usage across regions and the relative importance of different housing systems. There is considerable uncertainty surrounding this figure due to the limited data.

As mentioned above, Fishcount estimates that 28-77 million of fish produced in the UK are farmed. The midpoint of that range is 52,500,000 – 2.4% of the total fish capture (wild caught and farmed). In addition, Fishcount estimate that 70-80% of farmed salmon are reared to RSPCA standards and around half of all trout.¹⁷¹ This is consistent with industry reports.¹⁷² Between them, salmon and trout account for almost all farmed fish in the UK, so we took the weighted average non-RSPCA figure for those two fish (32%) and applied it to the 2.4% to get to our figure of 0.8% of all fish farmed in the UK as being factory farmed.

In an article published by Compassion in World Farming, it is estimated that “less than 1%” of sheep are kept in intensive systems.¹⁷³ While that could mean anything between 0% and 1%, and CIWF do not make a distinction between sheep reared for slaughter and sheep reared for breeding, we decided to assume the figure is 1% to give us a single parameter for our analysis. We should also note that the article also references global proportions. But as no such figure appears to exist for the UK, it is all we have to go by.

Trade

Population and slaughter estimates don't provide the entire picture welfare picture. We were also interested in trade, how much meat comes in and out of the country, and what the implications are for the domestic market. This part of the analysis also helped us to understand whether the UK is more likely to be importing or exporting welfare standards from, or to, other parts of the world.

The majority of imports and exports data originated from HMRC. For pork, beef, and sheep, that data came via the Agriculture and Horticulture Development Board, and therefore data is standardised and includes the same kinds of meat: fresh, frozen, offal, and processed. Poultry meat trade data was obtained by way of Statista, including fresh, chilled or frozen carcass meat, cuts and offal.

According to the Marine Management Organisation (MMO), fish trade is measured in terms of 'fish, fish preparations, meals, flours, and oils'. Though data is available, our estimates exclude shellfish so to be conceptually consistent with slaughter numbers. It is worth noting that data on fish imports and exports is also provided by the European Market Observatory for Fisheries and Aquaculture, producing slightly lower numbers than the MMO. Because it is official domestic data, we decided to lead with government estimates.

SMF category	Source
Poultry	Statista, 2021 ¹⁷⁴ ¹⁷⁵
Pork	HMRC via Agriculture and Horticulture Development Board, 2022 ¹⁷⁶
Beef	HMRC via Agriculture and Horticulture Development Board, 2022 ¹⁷⁷
Sheep	HMRC via Agriculture and Horticulture Development Board, 2022 ¹⁷⁸
Fish	HMRC via Marine Management Organisation, 2019 ¹⁷⁹

Moral weights

As discussed in the report, we explored two ways of weighting the value of animal life to account for the possibility that some animals may have greater capacity for welfare/suffering than others, or that some animals may be considered more morally important.

The first is to weight animals by the complexity of their brain structures. The main data source for our weights was Scherer et al, who in turn draw on different sources for cortical neurons and neurons.¹⁸⁰ Moral weights in that paper were expressed as a proportion of human cortical neurons and neurons, although we have rebased them to be expressed relative to cows, as discussed above. That paper did not provide weighting for sheep, so we have treated sheep as equivalent to cows without finding compelling alternative numbers in a quick literature search. In the absence of specific data on turkeys, we have treated them as equivalent to chickens.

Animal	Proxy animal	Cortial neurons	Neurons	Brain mass	Moral weight
Human	-	16 billion	86 billion	1,508g	28.57
Chicken	Red junglefowl	61 million			0.11
Turkey	Red junglefowl	61 million			0.11
Pig	-	432 million			0.77
Cattle	-		3 billion		1.00
Sheep	-		3 billion		1.00
Fish	Shark			2g	0.04

The second analysis we did was to weight animals according to their moral value as perceived by survey respondents. There have been a few small surveys exploring people's attitudes to animals' moral value, but we believe the most reliable is the one conducted by David Moss of Rethink Priorities. In a 2019 survey conducted on Amazon Mechanical Turk, he asked people how many lives of particular animals are equivalent to one adult human life.¹⁸¹ Such surveys have been skewed by people who believe such comparisons are impossible, or that human life always trumps animal life (i.e. that the answer should be infinity). We think the most useful data (especially since we are not seeking to compare animal with human life) comes from dropping those respondents. The result is the table below, which we have normalised to cows. Again, we have treated sheep as equivalent to cows, and chickens equivalent to turkeys.

Animal	Value per human life	Moral weight
Chicken	42.5	0.15
Turkey	42.5	0.15
Pig	10	0.65
Cattle	6.5	1
Sheep	6.5	1
Fish (lobster)	55	0.12

Welfare trends and projections

The section of the report where we discuss welfare trends and projections – Chapter Five – was, methodologically speaking, relatively straightforward. Beyond what is discussed in the main body of the report, the analysis (and what goes on behind it) presented no methodological challenges to note.

Organic farming data was provided by DEFRA,¹⁸² while some figures on RSPCA Assured¹⁸³ trends were also cited. As all our projections were based on SMF population estimates, as discussed above, there is no need to unpack them either – no additional data sources were used for that analysis.

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