Banning Cages For Laying Hens

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Final Report:
Banning Cages for Laying Hens

Executive summary

With the UK transitioning out of the EU, we can take back full control over animal welfare standards in the UK. This gives us the opportunity to demonstrate best practices based on the most up-to-date animal welfare science. Equally, it could see us undermine Britain's identity as a world leader in animal welfare.

Several potential improvements to existing farming practices benefit from widespread public and scientific support. This report explores one such policy – banning cages for laying hen welfare. We present recent evidence for the effect of this policy change on animal and human welfare, as well as the logistical feasibility of such a change and potential externalities.

We find that banning caged eggs has strong public support: 76% of consumers want banning cages to be a priority [1]. Based on the price of caged versus free range eggs and annual consumption in Britain, we calculate that consumers must be willing to pay at least £3.74 per year to cover the additional costs for cage free systems. We found that consumers in similar studies were willing to pay $200.84 for all laying hens to be raised without cages. These figures suggest strong support for a ban on cages for laying hens in the UK and imply that British consumers could benefit as much as the equivalent of an additional £197.1 per year from such a ban.

We expect such a ban to be inconvenient for producers in the short term and that investment will be required to support the shift. However, the cost of the capital invested will be offset by an additional premium on cage free eggs.

Evidence for the welfare impact of a ban on cages for laying hens is mixed, but overall more positive than negative. A ban on cages would allow laying hens to express more of their natural behaviours, including nesting and dustbathing (where stocking densities are sufficiently low). Cage free hens also suffer from lower rates of metabolic disorders including caged layer fatigue, which can lead to paralysis and

death from starvation. However, important welfare concerns are associated with cage free systems. Mortality rates have higher variation, due in part to higher rates of cannibalism and bacterial infections that can occur due to mismanagement. Beak trimming is commonly used to reduce cannibalism, but causes chronic pain.

We must go beyond the symbolic value of ending cages and ensure that free-range systems involve meaningfully higher welfare. Lower stocking densities and good management practices can somewhat mitigate the welfare concerns surrounding cage free systems. For this policy to fulfill its goal, it will be important to support farmers changing from caged to cage free systems and ensure they are educated in the best management strategies.

Overall, we find a ban on cages to be an economically viable policy that benefits from widespread public support. Assuming that the welfare of hens can be adequately protected in the transition to cage free systems, this policy could represent an important step forward for laying hen welfare.

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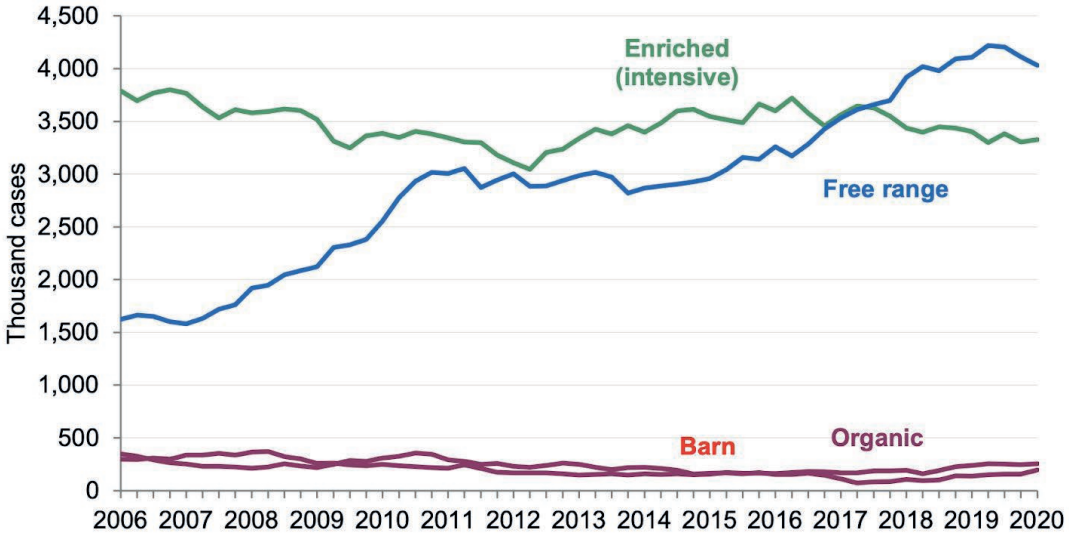
1 Introduction & background

Although progress has been made on the issue, with the ban on barren battery cages in Europe taking force on January 1st 2012, 'enriched' battery cages are still permitted. Battery cages now have to provide 600cm squared of usable space per bird – less than the size of an A4 piece of paper each – and limited facilities for perching, nesting and scratching. In the UK, eggs produced from hens in these enriched cage systems accounted for 42% of the total throughput in Q2 2020 [2]. This means that approximately 16 million of the 38 million laying hens in the UK are currently in battery cages. A ban on such practices would fully shift production to barn, organic, or free range systems.

In this report, we discuss the ways in which a ban on caged systems for laying hens would impact three major groups affected by such a policy: the British public, the laying hens themselves, and producers.



2 The British public

A ban on cages for laying hens would benefit the British public in two ways. Firstly, the value that the British people place on animal welfare means that this ban would better live up to their expectations for animal protection. Secondly, caged systems may present a food safety issue, so a ban is arguably in the interests of consumer protection.

2.1 Consumer utility

Consumers and voters are ultimately the drivers for market based or legislative change. Without the support of the public, any proposed ban on cages would not be feasible. Fortunately, the British public place high value on the welfare of the animals who produce their food. A staggering 98% of the public think it is important to protect the welfare of farmed animals, with 78% rating it "very important" [3]. Of these, 76% believe that the welfare of farmed animals in the UK should be better protected than it is now. There seems to be widespread consumer support for a ban on cages: 76% of consumers want banning cages to be a priority [1]. Major retailers in the UK have felt the weight of public opinion, with the result that all major retailers have committed to going cage free by at least 2025 [4] – many have already done so.

The support from consumers and retailers is evidence of two things: the efficacy of proposing a policy to ban cages in the political sphere, and human altruism for animals. The latter point highlights a market failure caused by the inability for individuals to coordinate in the market.

A consumer's utility function is a sum of the direct utility they get from consuming eggs and the altruistic utility they get from the knowledge that egg laying hens are treated humanely, minus the cost. The cost and consumption utility only affect individual consumers; however, the altruistic utility is a public good from which all consumers benefit.

In a simplified market, each consumer is thus presented with the choice between a slightly cheaper caged egg and a cage free egg. The caged egg minimises the cost, maximising the private benefits for the consumer. However, purchasing the caged egg contributes to the creation of more caged eggs, which reduces the public altruistic utility. Without regulation, each consumer is incentivised not to coordinate and to opt for cheaper cage free eggs even though doing so decreases overall utility and in aggregate ultimately results in lower utility for all consumers with sufficient altruistic drive.

The existing market for cage free eggs is largely dependent on united action by consumers, retailers, and animal advocacy organisations to agree to ban caged eggs and what Andreoni (1989) [5] refers to as a "warm glow" from giving. Andreoni's observation is that we often gain utility from the act of giving regardless of the

consequences. Lusk (2011) [6] explains that in the market for cage free eggs this implies that individuals purchase cage free eggs because it makes the individual feel good, even if it may have little effect on the chicken. This "warm glow" is the most likely cause of the current premium consumers are willing to pay for cage free and free range eggs. If we assume that consumers' current willingness to pay is connected to this "warm glow" then we can determine:

1. (Average price of cage free eggs - average price for caged eggs) - (consumer WTP for cage free/ free range) = average additional utility per egg if all consumers purchase cage free
    a. (0.803 - 0.522) - (1.57/6) = 0.281 - 0.262 = -0.019
2. Average additional utility per egg if all consumers purchase cage free * average number of eggs consumed per person per year = average amount British consumers have to be WTP for the knowledge that no hens are raised in cages
    a. -0.019 * 197 = £3.743 / year

The final figure can be seen as the minimum tax consumers must be willing to pay to prevent the use of cages. The actual WTP in this regard has not been studied in the UK or for caged eggs but similar studies exist. Ward (2014) [7] examined consumers' willingness to pay for all U.S. laying hens to be raised cage free and found that the mean value was $200.84 per year. Lusk (2011) [6] notes that these hypothetical estimates tend to be inflated so these findings should be taken as an upper bound for consumers' true WTP.

The public has demonstrated widespread public support for cage free eggs through large donations to animal advocacy organisations campaigning on this issue and through polls. If cage free eggs were banned we expect that the british public would receive an upper bound, equivalent benefit of an additional £197.1 per year.

2.2 Food safety

A ban on cages for laying hens is in the interests of British consumers not only because of their concern for animal welfare, but also because of the potential public health risk of caged systems. For instance, caged systems may pose an increased risk of salmonella food poisoning compared to cage free systems (including not only

free range but also indoor barn systems). A HSUS report examined the available literature and concluded that "the best available science suggests that confining hens in cages means increased salmonella infection risk in the birds, their eggs, and the consumers of caged eggs" [8]. This was largely based on the European Food Safety Authority (EFSA)'s analysis, which found 43% lower odds of salmonella enteritidis contamination in cage free barn systems than in cage production. In organic egg production the odds of salmonella contamination were 95% lower and in free range production the odds were 98% lower. However, there is some disagreement about this analysis. Five of the studies used by EFSA showed higher incidents in free range housing [9]. Despite this dispute, we can weakly conclude that salmonella contamination is more frequent in caged systems.

3 Laying hens

The welfare benefit of banning cages for hens depends on the system that replaces them. The three main alternatives to cage free rearing systems are barn, free range, and organic. In barn systems, hens are reared indoors either on a flat deck system on one level or on a multi-tier system (also known as an aviary), with up to three additional floors hens can move freely between. Free range hens have access to outdoor areas for foraging, pecking and scratching. These can be multi-tiered or flat deck as above, and sheds can be fixed or mobile. Organic systems are similar to free range systems but stipulate additional requirements for stocking density and environmental enrichment.

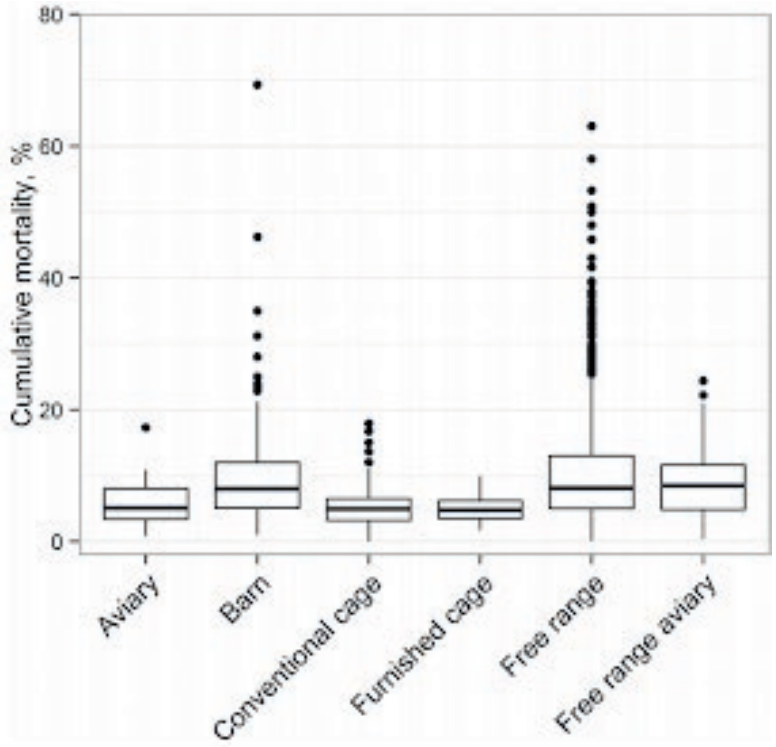
Barn and free range are the most likely replacement systems for caged eggs. In the UK, the average cost for a dozen eggs is 53.6p for caged eggs and 80.3p for free range eggs [2], or 4.46p and 6.69p per egg respectively. The cost of barn eggs falls somewhere in the middle: a free range egg costs just 2.6 eurocents (cents) more to produce than a battery egg, and a barn egg costs only 1.3 cents more to produce than a battery egg [10]. If past trends continue, free range eggs will likely gain the majority of the market share and barn eggs will be the 'value' offer. This is how major retailers in the UK have been transitioning their supply chains over the past few years. For example, Sainsbury's, a retailer who has pledged to stop sourcing caged eggs by 2025, first changed their supply to 83% free range and 13% barn [11], and then pledged to go fully to free range after April 2020 [12] (a goal they have achieved).

To provide a better sense of how a ban on caged eggs would impact laying hens, the next few pages discuss the welfare stakes of caged versus cage free production

systems. We examine how the different systems compare on five outcomes: mortality, disease, injury, stress, and behavioural restriction. Overall, it seems that banning cages would raise the upper bound for welfare, but also causes greater variation.

3.1 Mortality

Weeks et al (2016) conducted a meta-analysis of the cumulative mortality of 3,851 UK based flocks between 2005 and 2012 in conventional or furnished cages, aviary, barn, free range, and free range aviary systems [13]. They found that overall mean cumulative mortality was 7.89% and ranged between 0-69%. Mean cumulative mortality was higher in all cage free systems. However, there was more variability in cumulative mortality in free range systems. For the 579 free range flocks that Weeks examined at 72 weeks of age, the lower quartile of cumulative mortality ranged from 0.6% to 5.0% while the upper quartile ranged from 11.6% to 53.3%. Weeks suggests that this variance shows that with good management, there is considerable scope for most free range flocks to achieve lower levels of mortality, more comparable to those found in cage systems.



A systematic review conducted by Aerni et al (2005) for the World's Poultry Science Journal also investigated mortality in cage and aviary systems [14]. Unlike previous studies and Weeks et al.'s analysis, Aerni et al only included studies that used the

same hen strain, age, and beak trim status in both systems. Aerni et al found that when controlling for these factors the mortality rate did not differ significantly between caged and aviary systems.

The main causes of mortality vary between systems. In caged systems, the most common causes of mortality in order of prevalence are egg yolk peritonitis, hypocalcaemia, gout, self induced moult, and salpingitis (Fossum et al, 2009) [15]. Bacterial diseases are a common form of mortality in all systems but Fulton (2017) found that cannibalism is more likely in some free range and barn systems in Sweden [16]. However, we expect this to be less of a concern on UK farms as beak trimming helps to mitigate the effect of feather pecking and lower rates of cannibalism (although this practice can itself cause welfare issues, such as chronic pain [1]7[1]).

3.2 Disease

Generally, incidence of bacterial infections, viral diseases, coccidiosis, and red mites is higher in cage free than in caged systems (Rodenburg et al, 2008; Fossum et al, 2009 [16]; Widowski et al, 2013 [18]). Interaction with a larger number of hens increases the risk of transmission, and red mites that reside in cracks and crevices in the bird's environment are more common in cage free systems (Fraser et al., 2013). This concern can be significantly reduced through proper management of biosecurity and through vaccinations. The exception to this are respiratory diseases, as the high levels of ammonia and faecal dust in door systems increase the risk of infection (Shields et al, 2009 [19].

While more resistant to infectious diseases, hens in cage systems are more prone to metabolic disorders due to lack of exercise (Hartcher et al, 2017) [15]. The most prominent examples of these are caged layer fatigue and fatty liver haemorrhagic syndrome (FLHS). Caged layer fatigue occurs because of skeletal calcium depletion for egg shell formation (Shields et al, 2009) [19]. This can cause the hen to become so weak that they are paralyzed, leading to death from dehydration and starvation. Birds with FLHS have excessive fat deposits in their liver and abdomen. This softens and enlarges the liver, which can then easily be damaged. Caged layers on high energy diets are the most affected by this disease (Shields et al, 2009).

3.3 Injury

Hens in cage free systems are at greater risk from injury during the laying period than caged hens. Hens in cage free systems have been found to have a higher incidence of bone breaks (Rodenburg et al, 2008) [20]. This greater injury rate is most likely explained by the bird's ability to move and perform its natural behaviours. For example, activities such as roosting require birds to fly between multiple levels which can lead to bone fractures due to collisions or falls.

Injury rates are highest in caged systems during depopulation (i.e., the removal for slaughter of spent hens who can no longer produce as many eggs), at the end of a production cycle, compared to other systems. Hens in cage free systems have greater musculoskeletal strength because of their increased ability to exercise and display natural behaviours. This means that cage free hens have stronger wing and keel bones than hens in cages, leading to fewer bone fractures during depopulation (Rodenburg et al, 2008) [20].

3.4 Stress

Stress can be measured through various biological indicators and through behaviour change. Biological stress indicators include corticosterone in plasma and faeces and heterophil-lymphocyte ratio (H/L). Blokhuis et al (2007) [21] evaluated data from 230 different flocks using these indicators. Reaching firm conclusions was difficult, as the data used were from experiments with different objectives and the systems varied on several factors such as stocking density and breed. Overall, they found that the system that produced the worst stress response varied depending on the measure used. The inconsistent relationship between welfare and indicators of stress was also noted by Bulmer et al (2008) [22]. They found that there was a significant positive trend between corticosterone levels in eggs and welfare quality. They suggest that this may be because of a drop in hens' hormonal output due to chronic stress. Overall, biological indicators of stress provide inconclusive answers at best and misleading answers at worst.

3.5. Behavioural restriction

Hens are strongly motivated to exhibit various natural behaviours that originate from their primary ancestor, the red jungle fowl. Many of their instincts have been unaffected by domestication and are therefore commonly at odds with the environments they now find themselves in. Some of these behaviours include

nesting, perching, foraging, dust bathing, and comfort behaviours such as preening. Good welfare requires that conditions for hens go beyond freedom from disease, and that they are also able to perform these natural behaviours. This is probably the greatest difference between caged and cage free systems: the degree of behavioural restriction. Cage free systems generally allow hens a greater opportunity for basic movement and to express their natural behaviours.

Nesting

Prior to laying an egg, hens have a strong drive to perform nesting behaviour. This occurs roughly 90 minutes before oviposition when rising hormones trigger the behaviour. Hens will search for a private nesting site and then build a nest by scraping out a hollow in the ground. Nesting behaviour is considered an important priority for hen welfare (Weeks and Nicol, 2006) [23]: they are willing to pay high costs, such as squeezing through narrow gaps or opening doors. Caged hens prior to oviposition are restless and show stereotypic pacing and escape behaviour. They have been observed performing "vacuum" nesting behaviour, making the motions of building a nest in the absence of appropriate nesting materials (Shields et al, 2009) [19].

Perching

Hens' instinct to perch is thought to have developed to keep them safe from predators at night, and this strong instinct is maintained even in protected domesticated environments. When the lights go off at night, 90% of hens begin to perch within 10 minutes (Olsson and Keeling, 2000) [24] and hens are less likely to jump between perches if light levels are low (Weeks and Nicol, 2006) [23]. In the daytime, perches allow hens to escape from more aggressive hens (Appleby and Huges, 1991) [25]. Although enriched cages do provide some opportunity for hens to perch, the position of the perch may make it difficult for birds to access it [28]. Perches in furnished cages have also been associated with an increased risk of cloacal cannibalism (Hartcher et al, 2017) [15].

Scratching and foraging

When free to perform all of their natural behaviours studies have reported that domestic fowl spend 50% of their active time foraging (Shields et al, 2009) [19]. In more constrained environments such as perchery systems they spend as little as 6% of their time foraging and about 45% standing idle (Weeks and Nicol, 2006) [23]. This urge seems to go beyond the need to acquire food. Hens demonstrate a phenomenon termed 'contrafreeloading', where they will choose to forage rather

than eating more easily accessible food. Foraging behaviour is only partially accommodated in furnished cages as substrate is easily depleted and environmental complexity is low.

Dustbathing

During a dust bath, birds roll around in dirt and sand and then preen themselves. This helps to maintain the optimal level of oil in their feathers and combat parasites. Dustbathing is an essential behaviour for birds to clean and maintain feather condition but is restricted in caged conditions. Furnished cages have already made improvements over conventional cages by providing some provisions for dustbathing. However, there is still evidence that cage free aviary systems better satisfy the dustbathing needs of hens (Colson and Micheal, 2007) [26].

Comfort behaviour

Hens also engage in other comfort behaviours, such as extending their limbs, changing posture, and preening. In conventional cages this is not possible but is less restricted in furnished cages. The extent to which furnished cages are an improvement in this regard has been questioned (Weeks and Nicol, 2006) [23]. Even cage free systems are not always immune to such problems, as stocking densities have to be low enough to allow for this natural behaviour.

3.6 Summary of welfare benefits

We expect switching to a cage free system to improve the welfare of laying hens. Evidence concerning mortality and disease rates is mixed, but we weakly consider the two to be comparable in both caged and cage free systems. Injury rates are slightly higher in cage free systems, but stress and behavioural restriction are higher in caged systems. Furthermore, research into hen preferences between systems has shown that they prefer cage free systems [2]. This is likely due to the main benefit of cage free systems – the increased ability to express natural behaviors. Some concerns arise in cage free systems due to welfare issues that can result from poor management by farmers inexperienced with cage free systems. However, we expect that this will reduce over time and could be mitigated through supporting farmers in the transition.

4 Producers

In addition to consumers and hens, the final party that will be affected by a ban on caged eggs is the producers themselves. The majority of egg producers will be unaffected by such a ban, but the 42% who continue to use furnished battery cages will have to replace equipment and adopt new practices. The previous ban on conventional battery cages in 2012 was estimated to have cost producers approximately £400 million at the time [27]. To offer some context, this is 40% of the sales value for the retail egg market in 2019. However, as with the existing system the cost of capital incurred by the change will ultimately result in increased prices for free range eggs for the consumer, who are willing to pay this increased cost.

5 Conclusion

We have examined the banning of cages for egg laying hens from multiple perspectives. Overall, we expect that the banning of cages in the UK would be beneficial for both animals and the public. Although there are some risks to hen health in cage free systems if mismanaged, the freedom provided means hens have a greater potential for welfare. The British public place a high value on animal welfare, are strongly in favor of a ban on cages, and have demonstrated their willingness to pay in the open market. Any concerns producers have with the capital required to transition will be mitigated by a small increase in the price for consumers who are ultimately more than willing to pay this increase.

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