

**Submission
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**INQUIRY INTO USE OF BATTERY CAGES FOR HENS IN
THE EGG PRODUCTION INDUSTRY**

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Summary

The Animal Welfare Standards and Guidelines for Poultry (**'the Standards'**) have been released. The New South Wales Parliament is considering how to introduce part or all of the Standards into legislation. A key part of the Standards is that they expressly permit the continued use of battery cages for egg-laying chickens. Part of the Standards drafting process considered the animal welfare science relating to the comparison between housing in cages versus free range. Much of the science relied on by industry uses a measure of the so-called stress hormone, corticosterone, to support its position that hens in cages suffer no more stress than hens in non-cage systems. This is coupled with a de-emphasis of the undeniable detriment to hens of keeping them in cages for the entirety of their lives.

It is clear that the science based on corticosterone measures is deeply flawed in many respects, and should therefore be disregarded. The international scientific consensus is that lifetime caging of hens results in severe and unavoidable welfare detriment, while the problems associated with free range systems can be overcome by good design and management.

The New South Wales parliament should therefore mandate the phasing out of battery cages and institute a programme to identify improvements in free range systems which address the problems which may be associated with particular configurations of that housing system.

Introduction

In recent years there has been increasing public concern about the housing of layer hens in cages which are too small to allow the birds to express normal behaviours. Those normal behaviours include perching, stretching wings, dust-bathing, ground scratching and nesting.

Those concerns have been reflected by the abolition of battery cages in several jurisdictions, including the European Union, Canada, New Zealand and several states in the USA (California, Michigan, Oregon). Many major retailers, such as Coles and Woolworths, have taken steps towards ceasing stocking eggs from hens kept in battery cages, and major buyers of eggs (such as several large restaurant chains, including McDonald's, and food manufacturers, including Nestlé) have stopped using these eggs. A recent development has been the announcement by

Kraft Heinz, the world's fifth-largest food and beverage company, that it will stop using eggs from caged hens.¹

The most evident indicator of public concern about battery cages is the phenomenal increase in the number of consumers buying free range eggs. In 2016, the value of grocery sales of free range eggs was just over 51%, compared to 37% for cage eggs and 9% for barn laid eggs.² This increase in demand for free range eggs has occurred despite their commanding a price premium of about 67% compared to cage eggs.³ This clearly shows that a majority of consumers are willing to pay more for free range eggs, which they associate with better hen welfare.

Housing egg producing chickens

Background

The animal welfare code for domestic poultry (**the Code**), published in 2002, specifically allows laying hens to be kept in cages.

The Code states that when it is reviewed, it will *'take account of advances...in the understanding of animal physiology and behaviour and in regard to the expectations of the industry and the general community.'* This has not happened. The Standards have not taken account of advances in relevant science, and have disregarded the expectations of the general community. The continued use of battery cages contemplated by the Standards is instead entirely consistent with one of those factors - the expectations of the industry.

Science – battery cages versus free range housing

The situation with animal welfare science is that there are several interdependent approaches which can be taken to measure the welfare status of an animal. These can include, for example, measures of physiological state (such as using biochemical techniques to assay so-called stress hormone), observations of behaviour including assessment of whether an animal's natural behaviours are frustrated, and observations of an animal's health status. These frameworks are not mutually exclusive; indeed animal welfare scientists agree that multiple approaches must be taken in measuring animal welfare.

Since the 1990s, Australian animal welfare science has been dominated by the view that measures of corticosterone in chickens provide a valid indicator of their welfare status. This position has been criticised by prominent international scientists for many years. As early as 1991, Rushen said: *'the outstanding problem is the failure of different research groups to achieve agreement about how housing methods affect plasma corticosteroids. Corticosteroid levels of laying hens kept in battery cages, compared with those of hens in pens, have been reported to be elevated, depressed, the same, or either depressed or the same, depending on how the birds were handled. Two studies comparing cages, pens and outdoor runs for hens produced*

¹ www.medianet.com.au/releases/151368.

² Australian Eggs Annual Report 2017: <https://www.australianeggs.org.au/who-we-are/annual-reports/#item-818>

³ Poultry Standards Consultation Regulatory Impact Statement.

*completely opposite rankings. Plasma levels of corticosteroids have proven to be poor predictors of welfare problems, contrary to Barnett and Hemsworth's claims.'*⁴

Despite this and subsequent international scientific criticism of relying on corticosterone, the egg industry has pressed ahead with further studies of corticosterone in chickens, using the data to support the argument in favour of keeping hens in cages. The most recent industry-sponsored work from the Hemsworth group makes repeated statements relying on a failure to record increased corticosterone levels as indicating good welfare:⁵

- *There were no effects of space allowance during rearing, space allowance during adulthood or access to a nest during adulthood on corticosterone...*
- *There is evidence of animals adapting over time to spatial restriction...*
- *There is little evidence in the literature that a lack of a nest box results in either an acute or a chronic stress response*
- *There was no evidence based on corticosterone concentration that hens that were not provided with a nest box experienced stress*
- *If there was sustained frustration without a suitable nest site...elevated glucocorticoids may occur*
- *The space allowances in these studies may have been above the threshold for causing a chronic stress response*

Note particularly that the absence of an increase in corticosterone is also used as support for the claim that hens kept throughout their lives in cages eventually get used to this extreme confinement. This view is not subscribed to by the international animal welfare science community.

However, the problems for the corticosterone approach are insurmountable. In a submission to this Committee, Dr Matthew Padula and I have summarized the significant technical problems associated with the indirect measure using antibodies to assess corticosterone levels in egg white. Our results using state of the art high performance liquid chromatography coupled with mass chromatography demonstrate that levels of corticosterone vary over an enormous range so cannot be used as a welfare indicator. Industry-sponsored research carried out by the Hemsworth group at Melbourne likewise found approximately 100 fold variation in egg white corticosterone measures. However, when these data were published in a scientific journal,⁶ the very high numbers were not reported.

There are further serious problems questioning the applicability of corticosterone measures to indicate chicken welfare in the different housing systems. These are set out in the most recent review of the physiology of the so-called stress hormones.⁷ Firstly and most importantly, the corticosterone response system declines in the face of maintained stress, as would be the case if the housing system imposed stress on the birds. This adaptation occurs in the brain systems

⁴ Rushen H (1991) Problems associated with the interpretation of physiological data in the assessment of animal welfare. *Applied Animal Behaviour Science* 28, 381.

⁵ Engel JM et al (2019) The effects of floor space and nest box access on the physiology and behavior of caged laying hens. *Poultry Science* 98,533.

⁶ Footnote 5.

⁷ Spencer RL and Deak T (2016) A user's guide to HPA axis research. *Physiology and Behavior* 178, 43.

that integrate the stimulus inputs and ultimately stimulate corticosterone secretion from the adrenal glands. This prevention of sustained elevation of corticosteroids is necessary to avoid the pathological consequences of high maintained levels, which include liver damage, disruption of fluid homeostasis, high insulin levels and muscle wastage. Secondly, corticosterone levels vary naturally during the day in complex patterns, such that measuring corticosterone at a single time point will not give a complete picture of the variability of levels. There is a basic daily rhythm, on top of which are pulse like increases. Finally, corticosterone levels do not reflect stress, but instead are indicative of general arousal. They increase in response to non stressful stimuli such as exercise, feeding and sexual activity

The conclusion and the international scientific consensus is that corticosterone levels cannot be used to assess chicken welfare in different housing systems.

During the Standards review process the Victorian government, alarmed by the absence of an independent review of the relevant poultry welfare science, commissioned a review by world expert Professor Christine Nicol. This review represents a complete and objective analysis of key science.

The Nicol Review emphasises the importance of mortality levels in the different housing systems as indicative of welfare problems. It refers to three recent review papers (each of which review many experimental studies) which found that non-cage systems, including free range, had higher mortality levels than cage systems. It also analysed further more recent data from over 20 studies which indicated that, while mortality was often higher in free range systems, this was not necessarily always the case. In other words, some free range systems were found to have mortality levels as low as conventional cages. The Nicol Review reported that causes of mortality in free range systems (where this was analysed) included bacterial and viral infection, parasitic infections (such as coccidiosis) and cannibalism. Significant numbers of deaths can also result from smothering; predation can also contribute to mortality. In a very important conclusion, the Nicol Review went on to say that *'despite these average figures, well-managed and designed free-range systems can produce low-mortality outcomes'*. This is a crucial conclusion, as it strongly suggests that proper investigation of the factors that contribute to high mortality in free range systems may identify steps which can be taken on-farm to reduce chicken deaths.

The Nicol Review considered the issue of bone fractures (particularly of the keel bone) in layer hens, and noted this was an important issue. There were said to be higher levels of keel damage and fractures in non-cage systems. The predominant cause was collisions, either with other birds, falling on the ground, or with aviary structures.

It is not entirely clear whether severe (injurious) feather pecking is more predominant in cage than non-cage systems, but the Nicol Review does refer to several recent studies which indicate that there is likely to be less serious damage to birds from feather pecking in free range than in cage systems. However, they note the problem is caused by many factors, and control requires a multi-factorial response.

Restriction of movement in conventional cages is associated with reduced bone strength, which results in increased incidence of leg and wing fractures, particularly when facilities are

depopulated. Most reported studies found the greatest bone strength in wing and leg bones in free range systems. Another condition which can be seen frequently in cage systems is 'fatty liver'. It probably results from an inability to exercise, and can occur in around 50% of caged birds.

The Nicol Review deals in detail with the behavioural needs of chickens, most of which are frustrated by housing in battery cages. Key behaviours are the need to nest, perch, forage, dust-bathe and have social interactions. The Nicol Review is clear that 'there are negative welfare impacts if these behaviours cannot be performed'. The Nicol Review says 'the spatial restriction of the conventional cage prevents or constrains the performance of most comfort movements and there are no resources to meet the birds' roosting and nesting needs. A limited amount of foraging can take place in the feed trough.' The Nicol Review says about free range systems that 'range access has benefits in reducing overall stocking density and greatly increased opportunities for birds to perform foraging, exploratory and dust-bathing behaviours. This reduces the risks of injurious pecking. The benefits of outdoor access have to be weighed against risks of disease and predation'. The Review notes that 'use of the range by individual birds is highly variable'; some studies report as few as half of birds do not use the range, while other studies indicate that use can be higher than 90%. Concerning measures of so-called stress hormones (ie corticosterone), the Nicol Review notes that these measures can often reflect arousal (rather than stress), which may explain the many contradictory levels obtained using this measure. Behavioural measurements of fear (such as 'tonic immobility') indicate 'there is no clear relationship between housing system and fearfulness', and it may be that 'the nature and type of human contact have a greater effect than housing type'.

The Nicol Review concludes:

The conventional cage system prevents birds from performing basic movements essential for good health...and denies birds the possibility of expressing their behavioural needs to roost, nest and forage, or their motivation to dust-bathe... Lack of exercise weakens bones which are likely to fracture during depopulation, and leads to metabolic conditions such as haemorrhagic fatty liver syndrome. Claw breakage, plumage abrasion and poor foot health are also features of [the] system...Non-cage systems tend to have highly variable outcomes for flock mortality, health, prevalence of keel fractures and injurious pecking...These same considerations apply to free range systems...'

This conclusion represents a balanced and objective view of the current science concerning layer hen housing. It does not indicate a preference for either cage or free range systems, indicating instead that the benefits of any system must be weighed against negative aspects. Given the weight of evidence that chickens kept in cages suffer poor welfare for the entirety of their lives, this, taken with the public opposition to battery cages, is arguably sufficient justification to ban them.

Conclusion

The Standards review process concerning the issue of layer hen housing has been a complete failure. There is evidence the process, including the references to science, have been managed and dictated by industry interests intent on maintaining the *status quo*. It is arguably the case

that the science shows that hens confined to cages suffer severe behavioural deprivation and thereby poor welfare for the entirety of their lives. This, coupled with the increasing public concern about battery cages, is sufficient justification for phasing out battery cages.