CIWF Response to the Coalition for Sustainable Egg Supply Study
April 2015

The Coalition for Sustainable Egg Supply study seeks to understand the sustainability impacts of three laying hen housing systems – conventional cage (CC), enriched cage (EC), and cage-free aviary (AV). This response to the study is focused primarily on the findings specific to Animal Health and Well-Being, which is one of the five areas of sustainability assessed by the study.

Unfortunately, the study is inherently flawed mainly due to issues with inexperienced and inconsistent management, particularly with the AV housing system. The predetermined measures set forth to gauge animal welfare, and the potential for good animal welfare, were also insufficient.

Welfare Potential:

The study does not address the welfare potential of each of the housing systems. A cage-free system inherently has a much higher welfare potential than a caged system.[1] Even under optimal and experienced management, a caged system has severely limited welfare potential. Contrary to this, with proper management, the AV system has the potential to allow birds to exhibit more natural behaviors such as foraging, scratching, dust-bathing, perching and laying eggs in a secluded nest site. It can also allow for greater freedom of movement for exercise, wing-stretching, flapping, and flying.[2] Such movements can contribute to greater bone strength.

Achievement of welfare potential depends on good management which is referred to later. For more information on the welfare potential of each of the housing systems, please see the final section of this response, titled 'Additional science on hen housing systems'.

Space Allowance:

Failure to provide sufficient space per bird in the AV system could be a serious confounder for all Animal Health and Well-Being related results of the study.. The amount of space allowed according to the Coalition study results in the AV system was 144 square inches per bird, which is the minimum space allowance according to the United Egg Producer (UEP) guidelines for this type of housing.

The UEP acknowledges, however, that a minimum of 216 sq. in. per hen must be allocated to allow for normal behavior. In the EU, the legally required minimum space allowance for AV systems is 172 sq. in. of space per bird. Offering only 144 sq. in. likely set up the study for being unable to show the true potential of an AV system, and could have contributed to the higher mortality, pecking, failed landings, and other problems observed in the aviary flocks.

Mortality:

[1] http://www.compassioninfoodbusiness.com/media/5789266/laying-hen-welfare-in-alternative-systems.pdf
[2] http://www.ciwf.org.uk/media/5235027/Welfare-sheet-Laying-hens.pdf

AV hen mortality was twice as high as CC and EC, with more hens excessively pecked or caught in the structure. This is evidence of inexperienced management and high stocking density, not an inherently bad system.

The study reports that "AV hens that died were more likely to have been caught in the system, cannibalized, or pecked extensively than CC or EC hens." These issues could be mitigated with lower stocking densities, increased enrichment, rearing the chicks in similar conditions to those they will encounter in the laying environment including access to litter, and more experienced management.[3] Because AV and free-range systems are widely used in the EU, considerable experience has been built up in how to manage them successfully. See, for example, "Improving Feather Cover: a guide to reducing the risk of injurious pecking occurring in non-cage laying hens."[4] This report is based on a project run by the University of Bristol, a leading institution in the field of practical animal welfare, bringing together scientific research and the practical experience of farmers and stock people to reduce the risk of injurious pecking.

Feather pecking:

The study notes that birds in the caged systems had poorer feather cover, but there was a greater incidence of injurious pecking in the AV system. The study also reports that the birds in the AV system were confined to the colony part of the system from arrival at 17-19 weeks old until they were 25 weeks old to accustom them to the system.

According to the LayWel report *Improving Feather Cover*, "Feather pecking is primarily a redirected foraging behaviour. Birds can start to forage or even feed on each other's feathers when they do not have a balanced diet or sufficient opportunities in their surroundings for normal feeding and foraging behaviour. Factors such as stress, disease and overcrowding can reduce normal foraging behaviour and trigger injurious forms of pecking."[5]

The point at which birds are transferred to the laying house is a high-risk point for feather pecking since, in addition to adjusting to a new environment, it is also separately a time of high stress, as birds are approaching puberty and undergoing hormonal changes.At this point it is particularly important for birds to have access to foraging and dust-bathing areas to keep them occupied, reduce the stress, and give them more appropriate foraging opportunities than the feathers of their companions.

Laywel goes on to state "Allowing access to good quality, friable litter from day one and throughout the whole laying period is the single most important strategy to encourage foraging behaviour and reduce feather pecking, particularly the severe forms." Not only does giving access to litter encourage proper foraging, it also reduces the average stocking density, another key risk factor for injurious pecking.

Hens are commonly deprived of access to foraging areas at placement to prevent eggs being laid on the floor. However, LayWel states, "Giving your pullets immediate access to the litter doesn't necessarily

[3] http://www.compassioninfoodbusiness.com/media/6207569/welfare-issues-table-laying-hens.pdf
[4] http://www.featherwel.org/Portals/3/Documents/Advice_guide_%20V1.2%20%20May%202013.pdf
[5] LayWel, 2006. Welfare implications of changes in production systems for laying hens http://www.laywel.eu/web/pdf/deliverable%2071%20welfare%20assessment.pdf

mean that floor eggs will be a problem. Lifting the birds up onto the slats after lights out for the first week will train them to sleep on the slats and encourage them to use the nestboxes."

Recent scientific studies[6] have also shown that dark brooders, covered enclosures for rearing chicks, can dramatically reduce feather pecking in later life by separating active from inactive birds and preventing the early onset of injurious pecking.[7]

Following best practice for reducing the risk of injurious pecking, including early access to litter, reducing the stocking densities, and preparing pullets during rear for the environment they will expect later, would significantly reduce the risk of higher mortalities in alternative systems.

Failed flights:

Analysis of flights in the open litter area in the AV showed that 9-21 percent ended in failed landings, usually due to collisions with other hens. This is likely attributable to there being too many hens attempting to take flight in too small of a space. The *Featherwel* report *Improving Feather Cover* mentioned earlier also refers to the need to design housing to reduce the risk of collisions and injury. It argues, "To reduce the risk of keel fractures, access between levels needs to be easy with nothing in the way of landing. … Wider ramps give easy access between levels, reducing the risk of injury."[8]

Keel issues:

The study reports that "[t]hose reared in the AV system had more keel abnormalities (15 percent of pullets) and dirtier feathers (21 percent of pullets) than CC-reared pullets (0 percent with keel abnormalities and 10 percent with dirty feathers), but also better foot condition as shown by less toe damage (2 percent of pullets from AV compared to 10 percent from CC) and shorter claws."

Many of the welfare problems relating to keel-bone fractures are due to how the birds were reared in early life. If as pullets they don't experience a 3d environment with adequate enrichment and litter they are not equipped to deal with the environment they find themselves in during the laying period. This could be addressed in future flocks and we would expect to see the number of keel abnormalities decrease. Keel bone damage can also be reduced by changes in genetics, nutrition and the house environment (including equipment design, lighting, and bird movement around the house).

Environment:

The study reports that "[t]he highest environmental microbial levels were found in the AV litter area and on the EC scratch pad. AV floor eggs also had significantly higher levels of microorganisms than AV nest box and wire, EC nest box and wire, and CC wire-laid eggs".This can be addressed through an improved hygiene of litter and feeding areas. Particle matter and ammonia levels were highest in the aviary system, likely due to less dry manure. Farm management, ventilation, and lower stocking density would improve both issues.

---

[6] http://www.appliedanimalbehaviour.com/article/S0168-1591(12)00271-7/abstract?cc=y

[7] http://www.compassioninfoodbusiness.com/media/7004214/info-4-summary-reducing-the-need-for-beak-trimming-in-laying-hens.pdf

[8] http://www.featherwel.org/Portals/3/Documents/Advice_guide_%20V1.2%20%20May%202013.pdf

Lack of experience with aviary and enriched housing:

The farm in the study had an established CC system in place with multiple barns, but the EC and AV systems were new and there was only one of each. Therefore farm operators had a deeper knowledge of managing battery cage housing, with less experience managing alternative systems. Conducting a study that seeks to compare established CC systems with new EC and AV systems creates confounders caused by learning to manage a new system. This could yield more favorable results for CC systems. Authors of the third paper in the series (Karcher et al., *Impact of commercial housing systems and nutrient and energy intake on laying hen performance and egg quality parameters*) acknowledge this: "The increase [in mortality] might be due to the learning curve of managing a new housing system and larger hen groups within the pen resulting in pecking and crowding." Furthermore, "[o]bserved differences between housing systems might be more management related, with adjustments needed by a commercial entity adopting new housing systems, than differences due to the actual housing system."

The authors acknowledge worker inexperience with alternative housing in multiple instances. The Executive Summary states, "During Flock 1, more pullets died from wing and leg fractures soon after placement in the EC (Table 7) than in the other houses. This was most likely due to the workers being inexperienced in placing pullets in this system, since this finding was not repeated in Flock 2." While the coalition's FAQ webpage agrees, "Both management and the workers learned more about how to successfully manage each of these new systems, and study design adjustments were made where appropriate."

There is evidence that management improved due to experience gained in just the short time between the first and second flocks in the study. EC mortality decreased between flock 1 and 2, suggesting improvements in management due to experience and/or education yield better results for alternative housing.

The study reports that "[i]n the AV, 77 percent of manure was deposited on the belts and the remaining 23 percent on the litter floor when the hens had free access to that area. In comparison, 86 percent of total manure was deposited on the belts and 14 percent on the litter floor when the hens were kept inside the system (away from the litter) between 5-11 a.m." This demonstrates a variation in management practices, and an attempt to improve practices, in the AV system.

Ammonia levels and dust concentrations were highest in AV. Authors acknowledge proper management through frequent manure removal helps achieve lower ammonia levels and, "Future mitigation of ammonia emissions should focus on manure storage."

Production improved from AV flock 1 to AV flock 2, further supporting the notion that the management of the alternative housing systems was not experienced, but rather in a trial and error period. With more experience, and improved management, the results from the study would very likely yield more favorable results for the alternative housing systems.

Presentation of not statistically significant information:

Physiological measures did not indicate that hens in any housing system were experiencing short-term or long-term stress in any of the housing systems. These findings, however, should not be used to demonstrate a presence, of lack thereof, of stress in the birds, chiefly due to the very small number of birds that were sampled (25 per housing type at each time point).

The study alleged workers were exposed to more pollutants and declining pulmonary function in the AV system, but notes that the results were not statistically significant. It is troubling, then, that this information was included in the executive summary. The summary reasons "[t]he small number of workers studied may have contributed to a lack of statistical power to observe significant results."

Conclusion:

It's clear that the majority of welfare problems found to be associated with EC and AV systems could be corrected with better management and more experience with these alternative types of houses. Welfare could also be bettered by improving systems for pullet rearing and selecting for birds with stronger bones and lower tendencies for keel bone damage and injurious pecking. The results of the study do not represent an accurate comparison between caged, enriched, and aviary housing systems for two primary reasons:

1. Insufficient space allotment per hen in the AV system affected many of the measures of health and well-being such as mortality, pecking, nesting, natural behaviors, and flight collisions.

2. Less management experience in AV and EC systems compared to an established CC system skewed findings in favor of caged housing in many cases, but could have been avoided by comparing an established and well managed AV and EC system to an established and well managed CC system.

Additional science on hen housing systems:

The use of CC systems was banned in the EU following a report by the EU Scientific Veterinary Committee that reviewed the scientific literature and concluded that "It is clear that because of its small size and its barrenness, the battery cage as used at present has *inherent* severe disadvantages for the welfare of hens".[9]

A *LayWel* report, prepared for the European Commission, concluded that "the welfare of laying hens is severely compromised in conventional cages" and that these cages do not have the potential to provide satisfactory welfare.[10]

The scientific evidence shows that ECs do not have the potential to meet many of the welfare requirements of hens, notably:

- enriched cages provide inadequate facilities for dust-bathing and foraging. The 2005 report by the European Food Safety Authority (EFSA) concluded that in enriched cages "some high priority behaviors (e.g. foraging, dust-bathing) cannot be performed or are limited…".[11]
- exercise is seriously restricted, especially in a vertical direction.

---

[9] European Commission: Scientific Veterinary Committee, Animal Welfare Section. Report on the welfare of laying hens. 30 October 1996. Brussels, Belgium. Conclusion 9 (emphasis added).
http://ec.europa.eu/food/fs/sc/oldcomm4/out33_en.pdf

[10] LayWel, 2006. Welfare implications of changes in production systems for laying hens
http://www.laywel.eu/web/pdf/deliverable%2071%20welfare%20assessment.pdf

[11] *The EFSA Journal* (2005) 197, 1-23, The welfare aspects of various systems of keeping laying hens

- individual space allowance is much more restricted than in AV or free-range systems. The EFSA report stressed that in enriched cages “the behavioral repertoire is still restricted compared with birds in non-cage systems”.
- the lack of a high perch so that birds feel secure at night is a major drawback.

The small space provided in enriched cages and the lack of a complex and interesting environment are indicative of a system that cannot fulfill the birds’ welfare needs. Our overall conclusion is that the space and facilities provided in enriched cages are so inadequate that the system deprives hens of the ability to meaningfully fulfill natural behaviors.

Unlike all systems that involve cages, AV has the potential, if well-designed and well-managed, to provide a good standard of welfare.