

BUILDING A BETTER HEN HOUSE



A comprehensive guide to higher welfare systems for laying hens



HIGHER WELFARE SYSTEMS FOR LAYING HENS: PRACTICAL OPTIONS



Cage-free systems allow birds to express more of their natural behaviors, and have the potential to deliver a higher level of welfare for laying hens. Caged systems for hens, whether conventional/barren/battery or enriched, do not provide for the full physiological and behavioral needs of laying hens. As companies pledge to end the use of cages for laying hens in their supply chains, producers must invest in systems that deliver good welfare standards for hens throughout their lives. Good management is also crucial to welfare outcomes. These guidelines offer basic recommendations for housing and management of laying hens in indoor cage-free systems.

Higher welfare cage-free systems for laying hens should provide:



- Appropriate pullet rearing.
- Good design of shed with well laid out functional areas, ensuring hens' access to elevated perching, dustbathing, and foraging.
- Adequate functional space.
- Ample enrichment.
- A nutritionally adequate mash diet.
- Nipple drinkers.
- Monitoring of welfare outcome measures including feather cover, keel bone fractures and flock behavior.

This document shares practical guidelines for food companies and producers moving to cage-free laying hen systems, including:

- A summary of current legislation in the US.
- A summary of certification schemes for laying hen operations in the US.
- Description of acceptable types of cage-free housing – including multi-tier/aviary systems, single-tier/flat-deck systems, as well as unacceptable options [such as combination systems].
- Key design features of housing, requirements for lighting, ventilation and climate control, drinkers and feeders, litter, space, nesting, perching provision, shed enrichments, and verandas.
- Key welfare issues in laying hens, including feather pecking, keel bone fractures, beak trimming, and foot health.
- Key points for management of welfare issues.
- Pullet rearing: considerations for rearing chicks to ensure better welfare during the laying stage.
- Recommendations for the assessment of hen welfare using animal-based welfare outcome measures.

INVESTING IN THE FUTURE

Compassion highly recommends that all producers and companies invest in cage-free systems. Over 200 of the leading companies in the United States have committed to going cage-free no later than 2025. Consumer demand for better animal welfare continues to build year on year, and investing in cage-free systems with the highest welfare potential represents the most future-proofed investment.

U.S. legislation regulating hen housing and welfare

The following states have passed ballot initiatives or legislation phasing out the in-state use of battery cages for egg production—some of which have also prohibited the sale of eggs from battery cage facilities:



- **Massachusetts:** In 2016, passed a ballot measure to phase out all cage usage for egg production, as well as the sale of any shell eggs produced in cages, by 2022. The measure defines caged systems as those that prevent the animal from lying down, standing up, fully extending her limbs, or turning around freely. It also requires a minimum space allowance of 1.5 sq ft per bird.



- **California:** In 2018, California passed Proposition 12, which replaced Proposition 2 and established new minimum space requirements for housing egg-laying hens. Under Prop 12, laying hens cannot be confined with less than one square foot of usable floorspace* per hen after December 2019. By the start of 2022, all hens must be housed in cage-free systems must allow the minimum usable floor space of 1.0-1.5 sq ft for each hen in line with the 2017 United Egg Producers' guidelines for cage-free housing. Whether indoor or outdoor, all cage-free systems must allow the hens to roam with restriction and provide enrichments for normal behavioral expression, including the provision of scratch areas, perches, nest boxes, and dustbathing areas. In these cage-free systems, farm employees must also be able to access the hens to provide adequate care while standing in their usable floorspace. In addition, businesses in California are banned from selling shell or liquid eggs that do not comply with these new minimum housing standards.



- **Washington:** In 2019, Washington passed Substitute House Bill 2049, meaning all eggs and egg products sold or produced in the state must comply with the cage-free housing standards outlined in United Egg Producers' 2017 guidelines by the start of 2024. These guidelines provide a minimum of 1.0-1.5 sq ft of usable floorspace* per hen. As with California's Proposition 12, cage-free housing covers indoor or outdoor systems where the movement of hens is unrestricted (except by external walls) and then hens are provided at minimum perches, nest boxes, and areas for scratching and dustbathing that allow them to exhibit their normal behavioral repertoire. Farm staff must also be able to access the hens from within their usable floorspace to provide appropriate care.



INVESTING IN THE FUTURE

U.S. legislation regulating hen housing and welfare



- **Colorado:** In 2020, passed legislation that prohibits the production and sale of eggs and egg products from caged hens, as well as establishing minimum space and enrichment requirements. The legislation is set to take effect in phases starting January 1, 2023.



- **Oregon:** In 2011, passed legislation to phase out the use of battery cages, which also requires a minimum space allowance and enrichments [defined as: nests, scratching areas, and perches]. The legislation also prohibits the construction of new battery cage facilities.



- **Ohio:** In 2010, passed regulation setting minimum standards for existing cage systems, and prohibits the construction of new battery cage facilities across the state.



- **Michigan:** In 2009, passed legislation to phase out the use of cages that prevent a hen “from fully extending her limbs” by 2019.

** In both California’s Proposition 12 and Washington’s Substitute House Bill 2049, usable floorspace is defined as total square footage made up of the available ground floor space and elevated flat platform areas [level or nearly level] where hens can roost, but does not include the area provided by perches or ramps. The mandated minimum usable floor space is dependent on the availability of vertical space in the cage-free system.*

U.S. THIRD PARTY ANIMAL WELFARE STANDARDS

In response to a growing public concern for the welfare of laying hens, an increasing number of food businesses are voluntarily choosing to source their eggs from producers who adhere to standards set by animal welfare certifiers. The organizations listed below offer standards-based certifications for cage-free egg production. Links to the full standards for each certification can be found in the references section.

Animal Welfare Approved

Animal Welfare Approved only certifies pasture-based systems. Use of any cage systems, including combination, convertible, or select access aviaries, is prohibited. Birds must have access to the outdoors, starting as early as two days of age.



- Indoor space allowance: Laying hens 1.8 sq ft/bird, pullets 0.67 sq ft/bird. No separate density limit provided for indoor floor space. However, continuous access to a minimum of 4 sq ft/bird of outdoor range and foraging area after 4 weeks of age.
- Perches/nestboxes: Aerial perches required, 7 in per bird. Nestboxes must provide 20 sq in per bird.
- Enrichment: all birds must have access to dustbaths.
- Pullet rearing: pullets must be reared in systems similar to those to be used in lay. Preferably, pullets are hatched in AWA certified facilities, and must have access to forage by seven days of age at the latest [at 24 hours post-hatch preferred].
- Beak trimming: no form of beak trimming or conditioning allowed.

Global Animal Partnership (GAP)

GAP standards allow certification at six different levels or steps [1,2,3,4,5,5+], where each level requires incremental welfare improvements. The requirements described below apply to GAP Steps 1-3 for laying hens. Hens in Steps 1 and 2 systems are housed indoors, while hens in Step 3 systems must have seasonal access to pasture. For Step 4-5+ requirements, please refer to the GAP website. Use of any cage systems, including combination, convertible, or select access aviaries, is prohibited from Step 1.



- Space allowance: Laying hens 1.5 sq ft per bird, pullets 0.45 sq ft per bird during brooding, 0.65 sq ft per bird post-brooding. Usable space includes floor and slatted areas (min 18 in high and 12 in wide) excluding nest boxes. A separate minimum space allowance for the floor level is not specified.
- Perches/nestboxes: Aerial perches required, 5 in/bird.
- If using communal nestboxes 1 sq ft of nesting space per every 10 birds, or one individual nestbox per every 6 birds
- Enrichment: Step 1 requires dustbaths*. Step 2 requires one type of enrichment for a group of up to 1,000 hens;
- Step 3 requires two types of enrichments for a group of up to 750 hens. Enrichment is defined by GAP as: "something that hens can peck at, manipulate, and destroy. Examples of suitable enrichments include, but are not limited to: bales of straw or hay, provision of forages or brassicas, and scattered grains."
- Pullet rearing: pullets must be reared in systems similar to those to be used in lay. Pullets must be transferred to the laying house at least 4 weeks before start of lay.
- Beak trimming: only infra-red beak conditioning for day-old chicks is allowed.

* Note that GAP does not include dustbaths in their definition of enrichment; however, as other certifiers listed here include them as enrichments, they are included for Step 1.

U.S. THIRD PARTY ANIMAL WELFARE STANDARDS



Certified Humane (Humane Farm Animal Care)

Humane Farm Animal Care certifies cage-free, free-range, and pasture-based systems. This summary refers only to the cage-free standards.



- Space allowance: Laying hens in all-litter floor systems or single-tier systems: 1.5 sq ft per bird; hens in multi-tier aviaries: 1 sq ft per bird. Space allowances do not include nests or elevated perches. No separate stocking density limits are provided for access to the littered ground space.
 - The use of multi-tier systems with doors (i.e., combination, convertible, or select access aviaries) is prohibited.
 - Perches/nestboxes: Aerial perches required, 6 in per bird. Slatted platforms can count as perching space if suitable perching surfaces are included. If using communal nestboxes, 9 sq ft of nesting space per every 100 birds, or one individual nestbox per every five birds.
 - Enrichment: Not required.
- Pullet rearing: pullets must have access to perches and litter at or before 4 weeks of age. Pullets must be transferred to the laying house between 16-18 weeks of age.
 - Beak trimming: allowed infra-red before 24 hours post-hatch, or hot-blade if performed before 10 days of age, and if flock is considered at risk of feather pecking or cannibalism.

American Humane Certified

American Humane Certified certifies enriched colony, cage-free, free-range and pasture-based systems. This summary refers only to the cage-free standards.



- Housing requirements: no cages allowed (cage-free standard only).
 - Use of multi-tier systems with doors is allowed. Young laying hens can be enclosed in the system using cage doors overnight after transfer to the laying hen house for no longer than the first four weeks or when they reach 50% egg production, whichever comes first.
 - Space allowance: Laying hens in all-litter floor systems: 1.5 sq ft per bird; brown egg layers and other medium weight breeds in systems with raised areas: 1.2 sq ft per bird; white layers and other light weight breeds in single or multi-tier systems: 1 sq ft per bird. Usable space includes the floor area and tiers of min. 17.7 in height but excludes nest boxes and outdoor space. A min space allowance at the floor level is not specified.
- Perches/nestboxes: Aerial perches required, 6 in per bird. Slatted platforms can count as perching space if the edge of the tier is considered suitable for perching. If using communal nestboxes, 9 sq ft of nesting space per every 100 birds, or one individual nestbox per every 5-7 birds.
 - Enrichment: Not required.
 - Pullet rearing: pullets must be raised on litter, with access to perches and scratching areas. Watering and feeding systems must be similar to those of the laying house. Stocking density must be no greater than that allowed for the laying flock.
 - Beak trimming: allowed infra-red before 24 hours post-hatch, or hot-blade if performed before 10 days of age, and if flock is considered at risk of feather pecking or cannibalism.

U.S. THIRD PARTY ANIMAL WELFARE STANDARDS



United Egg Producers

United Egg Producers certifies conventional battery cage and cage-free systems. This summary refers only to the cage-free standards.

- Space allowance: Laying hens in all-litter floor systems or single-tier systems, 1.5 sq ft per bird; hens in multi-tier aviaries, 1 sq ft per bird. Usable space does not include kick-out nest boxes, but includes the floor, elevated tiers, and covered areas over manure belts. No separate space allowance is specified for access to the littered floor level.
- Use of multi-tier systems with doors is allowed. Hens can be enclosed in the system using cage doors overnight.
- Perches/nestboxes: Perches required, 6 in per bird, at least 20% of perch space should be aerial or elevated above 16 in. Communal nestboxes must provide 9 sq ft of nesting space per every 100 birds, nesting substrate is recommended, and wire only or plastic slat flooring should be avoided in nest area.
- Enrichment: Not required.
- Pullet rearing: pullets must have access to perches and raised areas by 4 weeks. Watering system must be similar to that of the laying house. Pullets should be transferred to the laying house before start of lay.
- Beak trimming: Allowed infra-red before 24 hours post-hatch, or hot blade if performed before 10 days of age. A second hot blade trimming is allowed if performed between 5-8 weeks of age.



The image above depicts a hen with a trimmed beak.

DIFFERENT TYPES OF CAGE-FREE HOUSING

Avoid systems that allow full or partial restriction of movement. Not all cage free systems fully offer a higher welfare potential for laying hens: Systems designed to allow the closing-off of sections of the aviary to some or all of the birds at given times are not considered acceptable from a welfare perspective, since restricting movement has a direct effect on the birds' ability to fulfill their needs at will.

Examples of unacceptable cage-free systems include:

- Combination/convertible systems that can be used as either enriched colony or open aviary systems.
- Select/limited access systems that allow the closing of one or more tiers, or restrict access to the scratching area or other functional spaces.

Restricting access to sections of the housing system is only considered acceptable in some cases; for example, during the initial stages of pullet rearing, when partial and temporary space restrictions may be required to ensure the welfare of the birds as they learn to navigate a multi-tier system; or in the adult layer system, when hens are prevented from accessing the nestboxes at night to reduce fecal contamination. Cage-free housing systems with unrestricted access to functional spaces allow laying hens to fulfill their behavioral and physiological needs to a greater extent. Examples are described below.



Example of a multi-tier aviary using a ramp.

Multi-tier/aviary housing

These systems offer more three-dimensional space for movement. Producers often find that this setup reduces the number of floor eggs, improves food conversion rate, and results in calmer flocks. Multi-tier systems also provide more opportunities for hens to avoid feather-pecking individuals. In terms of husbandry, it is easier to remove manure, and therefore easier to keep the litter clean and ammonia and dust levels down. Well-designed multi-tier aviaries include carefully-positioned perches, with ramps linking the tiers to ensure birds can navigate the shed without injury. The layout of the tiers and ramps must allow for easy inspection of the birds at all levels.

Single-tier/flat-deck housing

These systems require more floor area to provide enough space per hen. It is a much simpler layout than the multi-tier system, but does not provide the birds with the height they desire for or enable hens to easily escape aggressors. Keel bone fracture risk is frequently reduced in this system due to the lack of furnishings, but birds may have less variation in functional space. Producers often comment that birds are more flighty in these systems.



Example of a flat-deck system with unrestricted access to space.

KEY DESIGN FEATURES OF GOOD HOUSING

Lighting

It is important for hens to be able to find what they need in the shed. Light intensity should be even throughout the house, using either natural or artificial light, and areas of extreme bright light or darkness should be avoided. Placing the birds in dim light to control injurious feather pecking should be a last resort. There should be no sudden changes to lighting; transitions between light and dark periods should be gradual, simulating twilight and dawn. Birds need an uninterrupted period of darkness of at least 6 hours to allow for resting (except during the first 48 hours after pullet placement, when it is acceptable to provide light continuously).

Ventilation and climate control

Laying hens are very sensitive to adverse changes in temperature, drastic changes in humidity and air quality in the house should be kept to a minimum. Furthermore, climate can have a big impact on the evenness (uniformity of weight) of the flock. Extreme changes can also lead to stress in the birds.

Ammonia in the air can depress feed intake. It also causes inflammation in the trachea, making the birds more susceptible to respiratory disease. If levels get very high, it can lead to blindness. Levels should not exceed 25 ppm for atmospheric ammonia, and producers should aim for a maximum of 15 ppm. Hens should be separated from their feces through the use of slatted floors and/or manure belts under drinkers, nestboxes and perches. Finding the right balance between keeping the litter dry to avoid ammonia production, but not so dry that it leads to high dust levels, is important.



Properly working fans adjusted as needed according to external weather conditions will help remove stale gases and moisture, and their use is recommended even in cold weather. When using automatic ventilation, take into account moisture as well as temperature levels, to ensure that even on cooler days ammonia levels are kept low. All draughts should be minimized.

KEY DESIGN FEATURES OF GOOD HOUSING

Drinkers and feed

The drinkers and food provided in a shed can significantly impact birds' behavior.



Nipple drinkers are associated with a reduced risk of feather pecking.

- Nipple drinkers are associated with a reduced risk of feather pecking and improved feather cover.
- There is a strong association between feather pecking and pellet food. To better occupy the hens, a mash diet should be given rather than pellets. Studies suggest that pullets fed pellets have more plumage damage than pullets fed mashed feed.
- The feeding interval should be long enough to ensure adequate food consumption. However, it should never be so long that the birds go hungry.
- Changes to diet should be avoided where possible. If a change of diet is needed, placing extra enrichments and minimizing the number of changes that happen in quick succession can help reduce stress levels.

Litter

The quality and accessibility of the litter can impact the welfare of the birds. Poor litter quality caused by dampness increases the risk of feather pecking and can lead to foot health problems, such as bumblefoot.

- At least one-third of the floor area must be covered with enough high quality, stimulating litter to ensure that birds can dustbathe and forage.
- Frequent monitoring of litter is needed; forking the litter over or rotating it and adding fresh clean litter to the top can help maintain litter quality. However, if litter gets wet or capped (dirt layer formed over the litter) it must be replaced, and the cause of the problem should be determined and solved.
- Hyper-absorbent pellets can be used in known problem areas, e.g., pop-holes providing outdoor access, in addition to the usual litter. Keeping the external area dry and well-drained and preventing rain from getting into the shed are important for managing litter quality.
- Using small bales of treated and dust-extracted hay in the shed will allow the litter to build up naturally and encourage foraging behavior.



High quality litter is important for dustbathing.

KEY DESIGN FEATURES OF GOOD HOUSING



Space

Systems must provide sufficient space for hens to perform comfort and maintenance behaviors (including preening, stretching, wing-flapping, and dust-bathing) and locomotion (including running, walking, flying).

- Stocking density for pullets: recommended total usable area in open housing systems at the end of the rearing period is 0.78 sq ft per pullet for light strains, or 1 sq ft per pullet for medium and heavy strains.
- Stocking density for laying hens: Minimum space allowance of 1.2 sq ft of usable total area per bird is recommended, with 0.6 sq ft per bird at floor level to ensure all hens have access the littered floor surface.
- Total usable area is defined as at least 12 in wide, with floor slope not exceeding 14% and 18 in of headroom.
- Whenever possible, large flocks should be separated into smaller colonies (maximum of 4,000 hens) to keep the birds in manageable groups and to ensure they are well spaced throughout the house. This also means they can easily get to the resources they need, such as water, feed, and nest boxes. Smaller flocks also minimize problems of stress and reduce the risks of smothering (birds crowding and suffocating each other) and feather pecking.

Nest boxes

Nest box design must encourage nesting behavior, which includes nest site investigation and selection, pre-laying behavior (gathering, scraping, crouching, sitting, circling, and raising the keel bone), followed by egg laying and post-lay sitting. The sequence of behaviors takes up to three hours or more and occurs largely in the morning. The design of the nest boxes and fittings are important for the birds but also for the control of red mites (a common ectoparasite) so nests should be sealed properly to prevent the mites from nesting in cracks and crevices.



- Hens prefer to lay in a discrete enclosed nest with loose material, such as straw or a flexible artificial nest liner on the floor.
- There should be at least 1 nest box per 5 hens, or 9 sq ft of nest box space per every 100 birds.
- If group nests are used they need to be enclosed on three sides with front curtains and a plastic grid or perch in front; the floor sloped 12% to 18% (12% is recommended as it leads to more sitting events) and should be covered with a texturized, manipulable surface that allows for good grip.
- Front curtains are an important component of group nests; sliced or partitioned curtains allow for hen investigation along the length of the nest.
- Integration of nests into a multi-tier structure at the center of the shed as opposed to against a wall can lead to more even use of nests. If platforms are placed in front of nests, they should be at least 12 in wide.
- Nest box lighting is associated with vent pecking. Lights should gradually be dimmed over time once the birds are trained, until the nest boxes are completely dark.

KEY DESIGN FEATURES OF GOOD HOUSING

Perching provisions

Birds are highly motivated to perch at night. Perch design, height, and space can influence perch use and welfare outcomes.

- Providing high perches (28 in from the floor) can reduce feather pecking and improve plumage cover. Providing a separate resting area protects birds from being pecked while inactive.
- To control vent pecking, avoid perches which present the vent at bird eye-level. Ensure fittings that birds may perch on, such as the nipple line, are at least 16 in above the next level below.
- Aerial perches have the highest level of keel bone fractures compared to static low perches, however, they offer many benefits in terms of behavioral needs and reduction of feather pecking.
- A ramp up to the different tiers is key to allowing birds easy access to high perches so they don't have to fly up or down and risk damaging their keel bone.
- The minimum recommended linear perch space per hen is 6 in.
- Perch angles and distance between horizontal perches must be designed to minimize instances of failed landings and injuries, including keel-bone fractures. A slope of less than 45 degrees between horizontal perches at different heights, as well as reduction of the distance between perches have been shown to result in fewer injuries.



Enrichments

For the purposes of these recommendations, an enrichment is defined as an environmental modification that results in improved biological functioning (physical health and mental wellbeing), and should increase the range and expression of beneficial natural behaviors, like activity and foraging, while minimizing negative and harmful behaviors, such as feather pecking and flightiness. To increase the variety within the shed and occupy the birds long-term, we recommend manipulable enrichments such as straw bales, sawdust bales, and alfalfa blocks.



Example of using straw bales as enrichments.

COMMON WELFARE ISSUES FOR LAYING HENS



Hen with severe feather loss.

Feather pecking

Feather pecking (or injurious pecking) is a serious welfare issue – birds redirect their pecking behavior towards others, leading to feather loss and skin injuries, and in extreme cases, vent pecking and cannibalism. Feather pecking is an abnormal behavior in laying hens which can occur in all types of housing systems. It is caused by multiple factors including breed, poor environment, health and management, but is mainly caused by the frustration of restricted foraging and dustbathing behavior. Designing and managing systems that let hens fulfill their foraging and dustbathing needs reduce the risk of feather pecking. Strategies to reduce feather pecking include:

- Selection of breeds known to be less prone to feather pecking.
- Raising pullets in environments similar to the laying house, and ensuring early access to litter and perches.
- Providing ample enrichment, as well as opportunities to forage, for example by scattering feed or grit evenly in the litter area.
- Visit www.featherwel.org for more details and practical solutions.

Beak trimming

Beak trimming (also called beak treatment or conditioning) is the main method currently used to control feather pecking. This involves removing a portion of the beak with a red-hot blade or infra-red beam. The beak is a complex sensory organ which contains extensive nerves and receptors. Both beak trimming methods cause pain, reduce growth due to lack of feeding ability and cause changes to behavior. Beak trimming can have long-term effects on welfare, such as chronic pain, and inhibit the normal expression of behavior.



The beak is a complex organ and highly sensitive. Beak trimming should be avoided through design and management of a system.

Systems need to be designed to ensure birds can live with intact beaks and minimal feather pecking. Features known to minimize feather pecking include access to litter and dustbathing substrates, perches, pecking enrichments, and multiple tiers, which help birds escape and find shelter from others if needed. Where beak trimming is currently performed, infra-red beam should be used, in order to minimize pain and distress to the birds.

Because of its serious effects on hen welfare, beak trimming should be replaced by breeding, housing, and husbandry methods that eliminate the need for this practice.

COMMON WELFARE ISSUES FOR LAYING HENS

Keel bone fractures

Osteoporosis is prevalent in caged birds due to lack of exercise and calcium deficiencies, and it is a significant risk factor for fractures. Despite wing and keel bones being stronger in hens from non-caged systems, keel bone fractures are more prevalent in alternative systems, as birds have more freedom of movement, and this can increase the risk of collisions with hard surfaces. Birds can break the anatomically exposed keel bone in collisions with perches or other obstacles, as they jump and fly between structures at different heights. Failures of landing and collisions with walls or other hard surfaces can also result in fractures. Keel bone breakages and subsequent deformities are painful, reduce movement in the birds and affect egg quality and production. However, keel bone fractures can be minimized through good management and design, especially early in the hens' lives. Strategies for preventing keel bone fractures include:

- Genetic selection for bone strength.
- Matching pullet-rearing systems, in which pullets learn to navigate tiers, ramps, and platforms from a young age.
- Improvements to house and perch design such as: The use of plastic slatted flooring instead of wire mesh; placing perches, rather than platforms, in front of nest boxes; and ensuring correct distance and angles between tiers.
- Feeding a diet specially formulated for cage-free layers.

Foot health

Foot pad dermatitis (inflammation of the foot pad – a severe, painful type called ‘bumblefoot’ occurs when the foot becomes infected) and hyperkeratosis (excessive hardening of the skin) are the most common foot problems in cage free systems. Infection with the bacteria *Staphylococcus aureus* which may be found in the litter can lead to bumblefoot (right), a localized bulbous lesion in the ball of the foot, causing severe lameness. Litter maintenance is therefore of paramount importance in all systems, and particularly deep litter systems. The following recommendations can result in better foot health:

- Litter should be kept dry and friable; avoiding wet litter with a high ammonia content. Feed and genetic factors can predispose hens to foot pad dermatitis.
- Perch design is important for reducing hyperkeratosis due to compression loading while perching. Standard oval or round perches reduce the force on the foot in comparison to square perches.
- Hens are much less likely to suffer hyperkeratosis in an alternative cage-free system than in a caged one.



Example of bumblefoot.

KEY CONSIDERATIONS FOR PULLET REARING

The experiences of pullets (juvenile hens) are crucial not only in ensuring their welfare at a young age, but also enabling them to navigate and benefit from cage-free systems during the laying period.

Preparing pullets for the laying hen shed

It is crucial that pullets are reared in similar systems to those they will lay in (birds must not be reared in cages). Matching the rearing environment to the adult environment eases the transition to the layer house and may help reduce problems such as feather pecking and cannibalism.

- Give pullets access to raised slatted areas, including perches, ramps, and raised tiers, matching the laying house design. This provides time for the pullets to learn to navigate while they are young and light and their bones are stronger and more flexible.
- Perches should be gradually introduced by 7-10 days of age, with access starting at 2.4 in/bird. Depending on perch height, chicks will begin perching between 7 and 10 days of age. Benefits of early access to perches include higher use of perches in adult birds, increased bone strength with lower prevalence of fractures, and reduced prevalence of floor eggs and cloacal cannibalism during the laying period. Access to perches during rearing may also reduce feather pecking during this period. The configuration of perches in the rearing shed should ideally be aligned with the laying hen shed.
- The sensitive period for learning about foraging and dustbathing material is during the first 10 days of life. Introducing pullets to litter, dustbathing substrate, and other enrichment materials during this period is crucial, as this may help reduce feather pecking in the future.
- Introduce nestboxes during the latter stages of pullet rearing to train the young hens to use a nestbox. This can help reduce the number of eggs laid on the floor, a source of economic loss.

Brooders

Dark brooders are panels equipped with heating elements, surrounded with black, plastic fringes blocking out the light from day one. They are highly recommended in order to create a warm, safe place for young pullets to rest without being disturbed.

The area underneath the dark brooder is warmed by underfloor heating, hot pipes, or thermal heaters. The chicks use brooders as a place to rest and be away from other investigating chicks that might peck them. The use of dark brooders during the rearing phase has been shown to reduce feather pecking during lay. Dark brooders may also improve behavioral synchrony, and result in calmer birds. Additionally, the use of brooders saves energy and therefore money as sheds can be kept cooler while the brooders are warmer.



This is a dark brooder with the fringes removed (as birds are 8 weeks of age). The dark brooder is hung on chains that allow for the height to be adjusted as the birds grow. The fringe is removed once they no longer need a dark heated area beneath and instead the birds prefer jumping on it.

KEY CONSIDERATIONS FOR PULLET REARING

Placement of pullets

It is important to follow breeders' advice on the timing of the onset of lay in relation to the breed and body weight of the birds. A careful balance is needed: late onset of lay (and large eggs) is associated with vent pecking and problems with prolapse. In contrast, early onset of lay (before 19 – 20 weeks) may increase the risk of feather pecking. The following are additional recommendations for pullet placement.

- Weigh a sample of birds regularly from the day of arrival on the laying farm. Flocks should be even (i.e. with all birds at a similar weight) before coming into lay.
- Avoid mixing birds from different rearing groups when putting pullets into the laying shed.
- Do not restrict access to the littered floor surface, as this increases the hens' stocking density and prevents them from foraging in the litter, which they will be accustomed to from the rearing phase. Immediate access to litter is the most critical strategy to reduce risk of feather pecking; without this, birds can become highly frustrated.

Breed/strain of bird

Different commercial hybrids cope differently with fear and stress. The genetics of the bird can therefore predispose them towards injurious pecking and other unwanted behaviors that are detrimental to their welfare. Strains that are calm, with improved bone strength are well suited for aviary systems. Some strains have been genetically selected to reduce cannibalism and feather pecking. Traits that can be improved through genetic selection include bone strength and reduced fearfulness.



ASSESSING WELFARE IN LAYING HENS

Welfare outcomes are an animal-based method of assessing an animal's physical wellbeing, and increasingly their behavioral expression and mental wellbeing. While provision of certain resources (inputs) in the hens' environment is necessary to increase the welfare potential of a system, measuring animal-based outcomes indicates whether that potential has been met. Regularly scoring appropriate outcome measures can identify welfare problems and help set targets or benchmark improvements through an active program.

Recommended indicators

Disease incidence

- **WHAT:** Record the incidence of sick or injured birds in the flock and the type of illness.
- **WHY:** Sick and injured birds need additional attention; early recognition, treatment or culling is key to reducing suffering and suboptimal performance.
- **HOW:** AssureWel protocol for birds needing further care: www.assurewel.org/layinghens/birdsneedingfurthercare.html. Laying hens can become ill from viral diseases, bacterial infections, and parasites. Foot pad dermatitis, bumble foot, hyperkeratosis, and excessive claw growth are the most common foot problems. Osteoporosis is also a major cause of mortality.
- **TARGET:** Mortality <3% at the end of lay.

Keel bone fractures

- **WHAT:** Record the prevalence of keel (breast) bone fractures.
- **WHY:** Keel bone fractures, particularly when moderate to severe, are painful and restrict bird movement. Prevalence can be high in cage-free flocks indicating poor housing design, particularly perches, and lack of aerial experience at an early age, which can lead to hens falling and colliding when moving around the system.
- **HOW:** LayWel keel protocol (p.16): www.laywel.eu/web/pdf/deliverable%2072%20manual-2.pdf. Photo guide available at (p.66): <http://edepot.wur.nl/233471>
- Feel along the hen's keel for distortion/ lumpiness indicating old breaks and assign a score of 4 (normal), 3 (slightly damaged), 2 (moderately damaged) to 1 (severely lumpy/ distorted).
- **TARGET:** Average incidence of <5% old fractures [score 3 and under].

Feather cover

- **WHAT:** Assess the prevalence and severity of feather loss caused by feather or aggressive pecking behavior, at various stages of production.
- **WHY:** Injurious feather pecking is a major welfare issue largely resulting from redirected foraging behavior; it can lead to suboptimal thermal control, reduced productivity, injury, cannibalism and even death. Managing this behavior is essential to operating successfully with non beak-trimmed flocks.
- **HOW:** AssureWel feather loss protocol (www.assurewel.org/layinghens/featherloss.html):
- Assign score of 0 (none/minimal) to 2 (moderate/severe) – record region of body affected. See also: A guide to preventing feather pecking: www.featherwel.org/Portals/3/Documents/advice_guide_V1.2_May-2013.pdf
- **TARGET:** In the green zone (top 25% of farms - see link below for more details) using the AssureWel industry benchmarking tool: www.assurewel.org/layinghens/howisyourfeatherlossmeasuringup.html

ASSESSING WELFARE IN LAYING HENS



Recommended indicators

Flock behavior

- **WHAT:** Record the flock's reaction to people.
- **WHY:** Flighty birds have a high fear level, indicating poor stockmanship, suboptimal environments or predator activity. Fearful flocks can become easily alarmed and smother each other.
- **HOW:** AssureWel flightiness protocol: www.assurewel.org/layinghens/flightiness.html
- Observe birds' behavior as you approach and assign a score of calm, cautious or flighty.
- **TARGET:** A calm flock, with birds that can be approached by the stockperson.

Mortality

- **WHAT:** Record the number of birds found dead or culled, and the causes.
- **WHY:** Mortality may be due to chronic injury, disease, suboptimal management or environmental conditions, and indicates pain, suffering, suboptimal performance, and loss to the business.
- **HOW:** AssureWel mortality protocol: www.assurewel.org/layinghens/mortality.html
- **TARGET:** <3% of the flock at end of lay.

Other measures

- Feather cleanliness: www.assurewel.org/layinghens/birddirtyiness.html
- Foot pad dermatitis: <https://edepot.wur.nl/233471> [p.67-68]
- Beak trimming: www.assurewel.org/layinghens/beaktrimming.html

Hen signals

Positive behavior

- Dustbathing
- Ranging outdoors
- Approaching the stockperson and allowing the stockperson to approach
- Perching
- Foraging: walking, pecking, and scratching at the ground, food items, and enrichments
- Positive social interaction, such as foraging or using enrichment with other birds

Negative behavior

- Aggressive pecking*, aimed at the head or neck
- Ranging outdoors
- Injurious feather pecking*, aimed at the feathers and skin, wounds, or vent
- Aggression towards other birds: chasing and fighting
- Smothering behavior

*www.featherwel.org/Portals/3/Documents/advice_guide_V1.2-May-2013.pdf [pg 2]





PEER- REVIEWED ARTICLES

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7. Featherwel website: <http://www.featherwel.org>
8. RSPCA Assured laying hen standards <http://science.rspca.org.uk/sciencegroup/farmanimals/standards/layinghens>

Links to full standards documents or third party certifiers listed in this booklet:

1. Animal Welfare Approved: <https://animalwelfareapproved.us/standards/layinghens-2017>
2. Global Animal Partnership (GAP): <http://gapstaging.blob.core.windows.net/standards/5%E2%80%90Step%C2%AE%20Animal%20Welfare%20Rating%20Pilot%20Standards%20for%20Laying%20Hens%20v1.0.pdf>
3. Certified Humane (Humane Farm Animal Care): <http://certifiedhumane.org/wp-content/uploads/2014/01/Std14.Layers.6A.pdf>
4. American Humane Certified: http://www.humaneheartland.org/index.php?option=com_content&view=article&id=3&Itemid=106&jsmallfib=1&dir=JSROOT/Animal+Welfare+Full+Standards+%2B+Supplements
5. United Egg Producers: <http://uepcertified.com/wp-content/uploads/2015/08/2016-UEP-Animal-Welfare-Guidelines-2016-Cage-Free-Edit-002.pdf>



About Compassion

Compassion in World Farming is recognized as the leading international farm animal welfare charity. It was founded in 1967 by Peter Roberts, a British dairy farmer who became concerned about the development of intensive factory farming.

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