

# CAGE-FREE SYSTEMS FOR LAYING HENS

## Additional Guidance for Multi-tier Systems

Cage-free multi-tier or aviary systems were developed in Europe, around two decades ago, to enable commercial farmers to maximise the use of available space in a cage free system, without compromising the minimum welfare needs of the hens. They can be used in both barn and free range systems, and are available in an ever increasing variety of designs and specifications, able to be tailored to suit existing building dimensions, from a multitude of equipment manufacturers.

In light of the number of cage-free commitments made by leading food companies, more and more producers are seeking alternatives to their caged systems for laying hens, and are asking us and themselves ‘what constitutes an acceptable cage free multi-tier system?’. Systems must be FIT FOR PURPOSE and FIT FOR FUTURE – able to deliver meaningful improvements to the lives of hens, and stand the test of time of societal acceptability. With that in mind, Compassion’s preference of system is for free range or the highly designed innovative systems such as Kipster and Rondeel, followed by barn systems with verandas / wintergardens.

The conversion of caged systems to cage free multi-tier / aviary barn systems within existing buildings is however going to feature significantly in the cage free movement - and since designs range from highly intensive multi-tiers to spacious aviaries - it is important to set minimum standards for key criteria needed to deliver an acceptable level of welfare for the hen. Multi-storey buildings offer a solution when converting from multi-level caged systems. To minimise risk to bird health each storey should be independent from another, including a separate air space with sufficient ventilation capacity to maintain a good air quality for the flock size per storey. Movement of birds in and out of storeys should be a smooth and organised process to reduce the risk of stress to birds.

**Combination systems<sup>1</sup> are NOT permitted, and includes any system that:**

- Allows hens to be permanently enclosed
- Restricts movement within the tier via internal partitions

**Compassion recommends spacious aviaries, based on science and best practice, including:**

- 9 hens/m<sup>2</sup> and preferably 7 hens/m<sup>2</sup> within the structure
- Maximum of 15 hens/m<sup>2</sup> at the floor area
- Minimum head height between tiers of 50 cm
- At least 2 meters between rows of aviary tiers
- Easy access between tiers and ease of movement through each row (with the inclusion of ramps, platforms and/or stepped systems)
- Minimum of 15cm perch space per bird and preferably as much as 22cm
- Enclosed nests with comfortable and soft floor; ideally tipping boxes excluding hens at night to maintain good hygiene
- Dry friable litter that promotes dustbathing, pecking and foraging; ideally more than 560cm<sup>2</sup> litter available per hen
- More than 4 different pecking substrates per 1000 hens

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<sup>1</sup>Combi systems are multi-tiered structures that have robust doors and internal partitions that convert the unit into a caged system when the doors are closed, and restrict movement through the tier irrespective of doors open or closed. They also operate at high stocking density (~22 birds/m<sup>2</sup> floor area)

- Matching systems for pullet rearing

See Annex 1 for detailed information on Compassion's recommendations for a 'better' and 'best' multi-tier system. Due to the wide variety of systems on the market and the scale of variability in existing buildings, there may be a mix of better and best features within your system. New systems should always strive to match the best model.

For producers with existing combi-systems, at the very least, the doors should be taken off; partitions should be removed (and structure strengthened); stocking density should be reduced, and movement between the tiers should be assessed and improved. Installation of new combi-systems will be viewed negatively, compromise the welfare of the hen, and present reputational risk and an unwise investment in a system that may be outdated and outlawed well before the end of its commercial life-span.

## Introduction

Multi-tier systems can pose significant challenges to the hen depending on their design, specification of key criteria and the familiarity of the hen to the system. When compared to flat deck systems, multi-tier systems require hens to navigate 3-dimensionally, which demands an element of 'learnt ability' and can be both physically and mentally challenging. System design and the materials used are therefore important for good physical outcomes, good nesting behaviour and free movement through the system. For instance, a recent study of free range flat deck and multi-tier systems showed a higher incidence of keel bone fractures and keel bone deviations in multi-tier systems<sup>2</sup>. Rearing systems that match those in lay are also important for hens to learn how to navigate the system safely, and the provision of enrichment substrates is important for the expression of natural behaviour, particularly scratching, pecking/foraging, and dustbathing.

This document outlines the main factors to consider when designing your multi system, in order to keep the needs of the hen at the centre of all decision-making. The following factors are discussed:

- 3-dimensional movement through the structure
- Important behaviours such as nesting and perching
- Environmental enrichment for dustbathing and foraging
- Maintaining a good environment
- Measuring welfare outcomes
- Pullet rearing
- Staff training

## 3-dimensional movement through system

In a good cage-free multi-tier system the hens' needs (image 1) are provided across the different physical levels of the system. The hens' ability to move freely and safely throughout the levels is therefore essential to her welfare. When looking at the design of a multi-tier system, you must consider its 3-dimensional nature and ensure hens have freedom to move in all directions (image 2), with good access to feeders, drinkers, nest boxes and enrichment materials.

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<sup>2</sup> The welfare and economic benefits of multi-tier and flat deck free range systems BFREPA, 2018  
<http://www.bfrepa.co.uk/content/DigitalIssue/2181/56/>

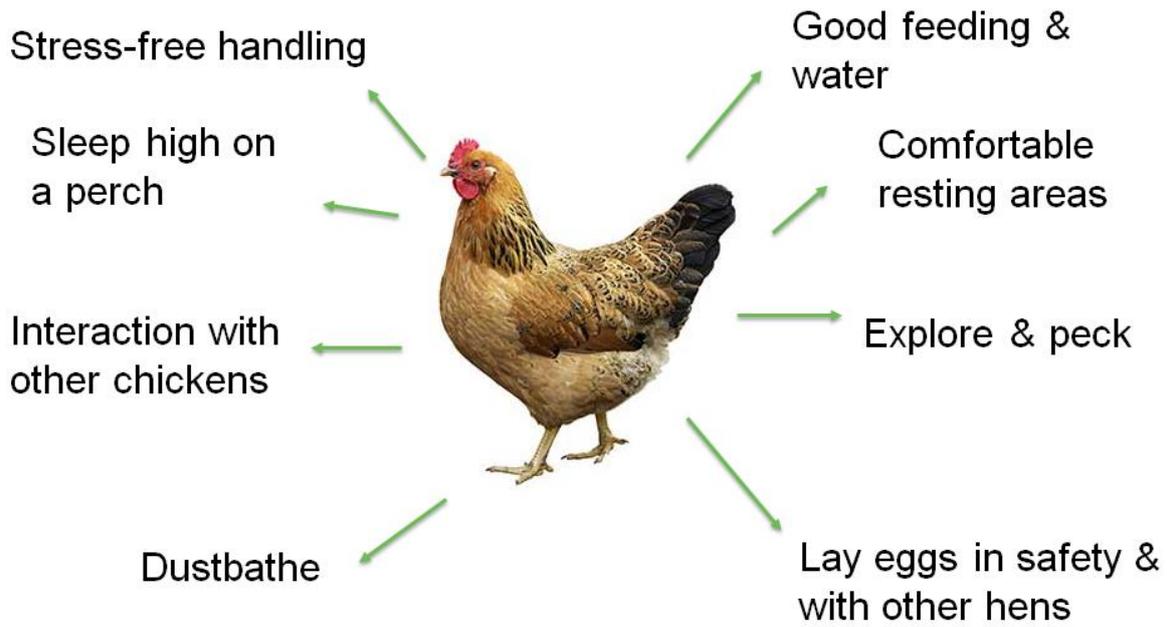


Image 1 - What a hen wants and needs

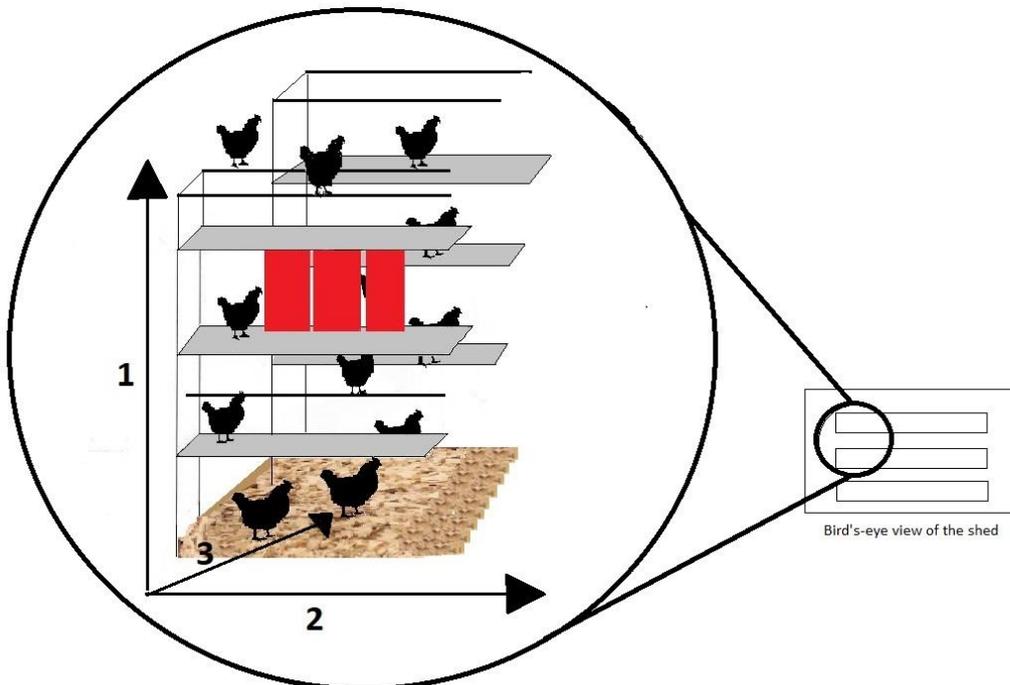


Image 2 - Illustration of the movement of hens within in a section of two rows of tiers in a layer shed. 1- Movement between the tiers (up and down); 2 – Movement within the tiers; 3 – Movement between rows of tiers

Features of the system that can either limit or help the movement of the hens in the three dimensions are as follows:

### 1 – Movement between levels:

- a. Ramps linking the levels vertically to enable free and safe movement all the way from the highest perches and tiers, down to floor level. Ramps can be installed outside the tiers, from the floor to the upper tiers (image 3), or be integrated within the tiers, offering a connection between each tier (image 4). Platforms can also be used for easy access between the tiers, as well as between the rows (image 5). Platforms should have their corners and sharp edges protected.



Image 3- Ramps outside the tiers



Image 4 - Ramps within the tiers



Image 5 – Platforms

- b. Any enclosure should be temporary for catching, vaccination and for hens to get used to the system once they move from the rearing house. Enclosing hens should not be needed if the rearing system matches the laying house, as pullets learn from an early age to navigate the 3-dimensional space safely, and are already familiar with the structure in their new house. The system should never be designed with doors that can be permanently closed. When in the open position, all doors should secure properly to not hinder the movement around the system or cause injury. Preferably, doors, however temporary, are not used – other flexible measures should be considered.
- c. The number of levels has a direct influence on the ability of the bird to navigate the system. Increasing the number of tiers increases the complexity of the system. The RSPCA Assured Standard recommends a maximum of 2 tiers or 3 levels if including the floor<sup>3</sup>. It is also important to keep in mind that the number of tiers should not compromise the ability to inspect the animals. If there are tiers above the operators' eye level, measures should be adopted to allow inspection of animals in the higher tiers, such as mobile platforms.

### 2 – Movement within the tier:

- a. Partitions within the tier should not be used. Division of tiers can prevent animals moving within/along the tier, which the hen does to avoid crowded areas, or to look for an area with less competition for food or water. Shed partitions are standard practice and a requirement to manage colony size within a larger flock.
- b. Areas free of obstacles, such as perches, feeding and water lines must be present in each tier to allow free movement within every tier.

### 3 – Movement between rows of tiers:

- a. Distance between tiers should be short enough to allow hens to jump safely from one row of tiers to another, or wide enough to ensure movement between rows is via the floor. RSPCA Assured Standards recommend this distance be equal to or less than 80 cm to allow birds to jump safely between rows, or greater than 2 meters to prevent birds jumping between rows.<sup>3</sup> If preventing birds jumping between rows, then it is important that movement up and down the levels is maximised to aid movement between tiers from the floor. Distances larger than 80 cm are associated with an increased frequency of clumsy landings, misses and collisions with furniture, as well as reduced movement between rows.
- b. Perches within the tiers if wrongly placed can inhibit movement and lead to injurious pecking. When perching, hens need sufficient head height to perch comfortably without having to stoop. To prevent vent pecking, birds that are perching should not have their vent at the level of another bird's head. Due to height restrictions a balance between a good head height and a good perch height can be difficult to achieve within a tier, therefore we recommend that hens be provided with other options to perch and roost, such as aerial perches located on the higher tier or perches at the edges of the tiers. More research in multi-tier systems is needed regarding the needs/ preferences of hens when perching, in particular perch height and placement, best gripping solutions for the hen, and best material to reduce keel bone damage. Sirovnik et al. (2018)<sup>4</sup> found that feeding whilst standing on a perch instead of a platform can be beneficial with reduced jostling, aggression and mortality. Soft perches are also beneficial in reducing fractures (Stratmann et al., 2015)<sup>5</sup>.
- c. Access to the range in free range multi-tier systems, should be provided on both sides of the shed. Pettersson et al. (2018)<sup>6</sup> found that birds roosting on the far side of a multi-tier system (further from pop-holes leading to the range) were less likely to use the range the following day.

**Note:** All these characteristics have been described separately due to the structure of the document. Nevertheless, it is important to highlight that the characteristics of a multi-tier system are not independent from each other. For example, maintaining a balance between space per animal, head height and number of levels is extremely important to provide the hens with what they want and need. When considering a lower stocking density, the system may not need 4 levels (3 tiers plus the floor). However, four levels (with good access between them) may provide more opportunity to create the functional space referred in this document, BUT may compromise head height. (Image 6).

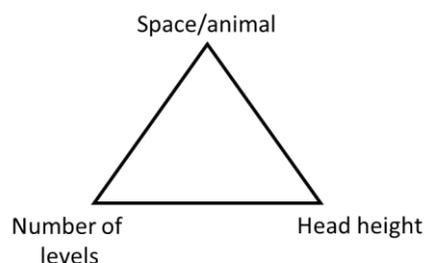


Image 6 – The important balance between space/animal, number of levels and head height

<sup>3</sup> RSPCA welfare standards for laying hens (August, 2017)

<https://science.rspca.org.uk/ImageLocator/LocateAsset?asset=document&assetId=1232741072801&mode=prd>

<sup>4</sup> Sirovnik, J., Stratmann, A., Gebhardt-Henrich, S. G., Würbel, H., & Toscano, M. J. (2018). Feeding from perches in an aviary system reduces aggression and mortality in laying hens. *Applied animal behaviour science*, 202, 53-62.

<sup>5</sup> Stratmann, A., Fröhlich, E. K., Harlander-Matauschek, A., Schrader, L., Toscano, M. J., Würbel, H., & Gebhardt-Henrich, S. G. (2015). Soft perches in an aviary system reduce incidence of keel bone damage in laying hens. *PloS one*, 10(3), e0122568.

<sup>6</sup> Pettersson, I. C., Weeks, C. A., Norman, K. I., Knowles, T. G., & Nicol, C. J. (2018). Internal roosting location is associated with differential use of the outdoor range by free-range laying hens. *British poultry science*, 59(2), 135-140.

## Other features to consider:

- **Feed and water** should be equally distributed throughout the tiers and rows to avoid congestion and aggression, and allow for easy access for all hens
- **Nests** vary hugely between commercially-available multi-tier systems. Some designs incorporate a tier exclusively dedicated to nests, nests located in a section of the house, a nest in all tiers, or even nests at one end of the tier (images 6 to 9). Access and design of nest boxes, wherever they are placed in the system is crucial. Due to a large number of birds moving around the system - in particular around the nest box- there is a higher probability of displacement as well as congestion at/in the nest box. Free travel/transit around and within the nest is important. A solution to consider is the provision of 'walkways' around the nest. Solid sides of the nest are also crucial to provide a safer environment for the hens whilst laying. These should not be provided in risk smothering areas (e.g. edges of the colony). Finally, hens prefer a comfortable floor in the laying area, such as AstroTurf® (Hughes, 1993).<sup>7</sup>



Image 7 - Nest in one area of the system



Image 8 - One tier exclusively for nests



Image 9- Nest boxes in every tier



Image 10 – Individual integrated nest boxes, with solid sides

- **Dustbathing and scratching** usually take place on the floor. Access to the floor is therefore very important and should include the area under the tiered structure as well as the alley between tiers. The litter should be kept dry and friable (without increasing the dust levels to a detrimental point for bird and human health), and the material should be suitable for dustbathing (e.g. wood shavings). Additional dustbathing boxes incorporating substrates such as sand or peat can be provided at floor level.

<sup>7</sup> Hughes, B. O. (1993). Choice between artificial turf and wire floor as nest sites in individually caged laying hens. Applied Animal Behaviour Science, 36(4), 327-335.

- **Enrichment** substrates that stimulate and satisfy pecking / foraging behaviour, should be equally distributed for easy access along each tier. Pecking substrates such as straw bales, sawdust bales, alfalfa blocks, have been shown to be effective. Using the right environmental enrichment will also help to operate with intact beaks (see next section) and reduce the risk of feather pecking and cannibalism<sup>8</sup>.
- **Beak trimming** causes acute and chronic pain, and should be phased it out if practiced. Several countries such as Norway, Finland, Sweden, Austria, Switzerland, Denmark and more recently Germany have banned beak trimming. Designing and managing systems that allow hens to fulfil their foraging and dustbathing needs, and reduce the risk of feather pecking and the need for beak trimming (see [information sheet 4](#)) are therefore important factors for the delivery of good hen welfare. Beak smoothing enrichment devices such as the Pecking Pan from Vencomatic Group, are recommended as an alternative to beak trimming. These devices smooth the hook of the beak and are provided in addition to the feeding places. Beak smoothing materials should never be incorporated within the feeding system and should be provided separately to promote foraging behaviour.
- **Veranda** - The addition of a veranda (enclosed outside area) is essential for barn systems to provide activity areas for supplementary foraging and dustbathing opportunities. A veranda also ensures birds get natural light to sunbathe; direct light is also important in fulfilling dustbathing behaviour. Inclusion of a veranda is highly recommended. It is important to make the veranda appealing by adding: dry and friable litter, roughage, scattered grain, green fodder, such as freshly mown grass, drinking water, enrichment materials, perches and partitions to hide behind.
- **Light:** Light management is crucial to a well-managed system. Some areas must be kept brighter while others must be darker, but uniform brightness / diffuse lighting in those specific areas is important. Irregular light can lead to irregular behaviours, for example, excessive brightness can stimulate aggression.
  - 🐔 Activity areas – where feeding, drinking, scratching, dustbathing and socializing occur – should be kept brighter than areas for rest or nesting.
  - 🐔 Nest areas must be dark, as hens want to lay their eggs in a dark place. Areas inside the house that are not bright enough can become attractive for egg laying, such as the floor.
  - 🐔 Lights must be placed inside the system to direct birds to food and water and placed underneath the system to keep birds from laying floor eggs.
  - 🐔 Lights can encourage birds to move up into the higher tiers and perches of an aviary at night and descend down to nest boxes in the morning. Dimming the lights at the proper rate (and sequence) to create dawn and dusk lighting periods is important to this principal.
  - 🐔 Farmers must be careful to replace broken or non-uniform lights as soon as possible to promote consistent lighting.<sup>9</sup>

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<sup>8</sup> <https://www.compassioninfoodbusiness.com/media/6207575/improving-feather-cover-featherwel-a-guide-to-reducing-the-risk-of-injurious-pecking-occurring-in-non-cage-laying-hens.pdf>

<sup>9</sup> <https://www.wattagnet.com/articles/30639-latest-cage-free-ventilation-lighting-and-litter-tactics>

- **Ventilation** - Ventilation and heating systems should provide a comfortable and uniform air flow throughout the barn. It is important to provide enough empty space so the air can flow through the system and to also ensure a dry and friable litter quality can be maintained.
- **Dust/ ammonia control** - With the presence of litter and dustbathing activity the levels of dust and ammonia can reach dangerous levels for the health of the hens as well as for the health of the staff. Finding the right balance between keeping the litter dry to avoid production of ammonia, but not too dry that leads to very high dust levels, is important.
- **Pullet Rearing.** Due to the complexity of the system, hens need to know how to navigate it from the day they enter the layer farm. A synchronicity / matching of systems between rearing and laying is highly beneficial for a smooth transition to the layer house. Access to perches and platforms should be provided to birds as early as possible – e.g. from 7 or 10 days, sooner than often provided commercially (Norman et al., in prep). Grid ramps are easier for young chicks to negotiate than ladder type ramps (Pettersson et al., 2017)<sup>10</sup> and learning to navigate the 3-dimensional space at a young age, reduces the incidence of keel bone damage later in life (Janczak & Ribber, 2015).<sup>11</sup>
- **Engagement and training of staff.** Movement to a cage-free system that has a flow of birds in 3 different dimensions, such as the multi-tier system, can be a challenge for the employees as well. Staff should be exposed to this system early, preferably before the systems is put in place, by visiting other sites and speaking to other producers with experience of these systems. It is also important for all the staff to understand the reasons for the change of system, always with the animals' perspective in mind.<sup>12</sup>

## Outcome measures

Finally, to make sure that the system is providing a good quality of life to the hens, animal welfare outcomes should be measured and a plan for continuous improvement should be put in place.

Priorities are: feather cover at specific ages through the life cycle; incidence of keel bone fractures, and mortality by age and cause. For more info, please go to:

<https://www.compassioninworldfarming.com/resources/laying-hens/welfare-outcome-summary-laying-hens/>

## Different standards for multi-tier systems

There are various guidance and standards relating to multi-tier systems, as summarised in Annex 2 below.

In addition, see our booklet: [‘Higher welfare systems for laying hens - practical options’](#) for broader information regarding cage-free systems for hens.

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<sup>10</sup> Pettersson, I. C., Weeks, C. A., Norman, K. I., & Nicol, C. J. (2017). The ability of laying pullets to negotiate two ramp designs as measured by bird preference and behaviour. *PeerJ*, 5, e4069.

<sup>11</sup> Janczak, A. M., & Ribber, A. B. (2015). Review of rearing-related factors affecting the welfare of laying hens. *Poultry Science*, 94(7), 1454-1469.

<sup>12</sup> Egg producers discuss cage-free production challenges, King, D. (July, 2018). *Egg Industry*, volume 123 number 7 (pages 11-16)

## Disclaimer

We will incorporate new scientific information regarding multi-tier systems for laying hens into subsequent versions of this resource. Some of this research may alter our understanding of current established practice. Last update: February 2019.

## ANNEX 1 - Welfare Potential matrix for multi-tier barn systems

| <b>System:</b>  |   |  |  |
|---|---|--|--|
| <b>Convertible system</b>                                 | System allows for permanent confinement of birds  | It is not possible to permanently confine birds  |  |
| <b>Colony size</b>  | > 6000 hens   | Max. of 6000 hens  | Max. of 4000 hens  |
| <b>Stocking density (total usable area)</b>               | >9 hens/m <sup>2</sup> of useable space   | ≤ 9 hens/m <sup>2</sup> of usable space  | ≤7 hens/m <sup>2</sup> of usable space   |
| <b>Stocking density (floor area)</b>                      | More than 18 hens/m <sup>2</sup> (typically 22 birds/m <sup>2</sup> )   | Maximum 18 hens/m <sup>2</sup>   | Maximum of 15 hens/m <sup>2</sup>  |
| <b>Movement between levels:</b>                           |   |  |  |
| <b>Ramps, steps, other devices that may help movement</b> | No possibility of installation or can be retrofitted but only in a manner that causes obstruction and/or injury to birds  | Can be added to system without causing an obstruction or hindering bird movement. Systems with stepped back levels are also a suitable option.   | Internal stairways and/or external ramps/platforms are an integral part of system and are positioned in a manner to avoid injury to birds. Systems with stepped back levels are also a suitable option.  |
| <b>Aviary doors</b>                                       | Aviary doors can be used to permanently confine birds   | Aviary doors are installed but are only used for certain management procedures when necessary (e.g. vaccination/catching). At all other times doors are safely secured open                                  | Aviary doors are not an integral part of the system and are not used other than between the floor and the bottom tier when birds are first moved onto farm to prevent them accessing underneath the system   |
| <b>Number of tiers</b>                                    | Does not meet EU legislation: system has more than 3 tiers (4 levels). System is above head height and there is no method (e.g. raised walkway/platform) for inspection of higher tiers | System has 3 tiers (4 levels). If above head height there is a raised inspection walkway/platform  | System has 2 tiers (3 levels). The system provides functional areas and sufficient space including sufficient head height within tiers.  |
| <b>Movement within levels</b>                             |   |  |  |
| <b>Partitions within tiers</b>                            | Partitions within tiers prevent free movement along the length of the tier  | No partitions along the lengths of the tiers   |  |
| <b>Movement between rows of tiers</b>                     |   |  |  |
| <b>Level height</b>                                       | Meets EU legislation: Vertical distance of at least 45cm between tiers/levels   | Vertical distance of 50cm between tiers/levels   | Vertical distance of >50cm and ≤100 cm between tiers/levels.   |
| <b>Distance between rows of tiers</b>                     | Distance between rows of tiers is more than 80cm but less than 2m. No steps are taken to ensure ease of movement between rows of tiers.   | Distance between rows of tiers is less than 80cm to allow birds to jump between rows of tiers without injuring themselves through missed landings or collisions themselves when moving between rows of tiers | Distance between rows of tiers is > 2 m to ensure birds move between tiers via the floor and so prevent injuries from missed landings and collisions. The additional space reduces the intensity of the structure and is easier for operators to move around the system. |

|   |   |   |  |
|---|---|---|--|
| <b>Perches</b>  | Does not meet EU legislation: No perches are provided OR perches are provided at less than 15cm/bird OR perches provided are not usable       | Meets EU legislation: 15cm/bird usable <sup>13</sup> perching space is provided   | More perching space is provided (at least 22 cm/bird). Perches within the tiers allow birds to stand in a comfortable position and so birds below cannot peck perching birds. Other opportunities to perch outside the structure at different heights are provided |
| <b>Placement of perches within the tiers</b>          | Perches are placed within the tiers in a manner that hens are stooping when perching  | Hens can perch within the tier, without stooping.   | Hens have functional areas where they can comfortably perch at different times of the day.   |
| <b>Other features</b>                                 |   |   |  |
| <b>Nests</b>  | Does not meet EU legislation: > 7 hens/nest or for group nests <1m <sup>2</sup> of nest space per 120 hens                                    | Meets EU legislation: no more than 7 hens/nest or for group nests at least 1m <sup>2</sup> of nest space per 120 hens   | 1 nest box per 5 hens; more than 1m <sup>2</sup> nest area per 120 hens if needed; nests tip at night to exclude hens & maintain hygiene.  |
| <b>Nest characteristics</b>                           | Nests are not enclosed and flooring consists of wire or plastic coated wire   | Nests are enclosed, the sides of the nests are solid, and comfortable flooring such as astro-turf is used. This excludes smothering risk areas, such as colony partitions.  |  |
| <b>Environmental enrichment including dustbathing</b> | Does not meet EU legislation: Birds do not have access to litter or <1/3 of the floor area is litter. No environmental enrichment is provided | Litter <sup>14</sup> is provided on at least 1/3 of the floor area from day 0 at the layer farm. 2 Pecking substrates are supplied for each 1000 hens.  | Litter is provided over the whole floor area at least 560cm <sup>2</sup> per hen Extra opportunities for dustbathing are provided from day 0 at the layer farm. Minimum of 4 pecking substrates per 1000 hens.   |
| <b>Beak trimming</b>                                  | Beak trimming is undertaken   | Beak trimming is not undertaken and system is able to operate with good feather cover and low levels of feather pecking   |  |
| <b>Veranda</b>  | No veranda  |   | Well managed veranda that provides functional space  |
| <b>Light</b>  | Does not meet EU legislation: birds are reared in low lighting and provided with a dark period of <8hours                                     | Light levels are sufficient to allow all hens to see one another and a minimum of 20 lux. Birds are provided with a dark period of 8 hours. A dawn and dusk period is incorporated into the light management programme  | Natural light is provided and is incorporated into the light management programme with dawn and dusk period with 8 hours of darkness.  |
| <b>Pullet rearing</b>                                 | Rearing system does not provide any opportunity for training of birds. Birds may be reared in cages   | The system provides pullets with an opportunity to learn how to navigate different levels.  | Pullets are reared in an aviary system that matches the laying system. It should provide access to tiers, perches, enrichment nest boxes and litter  |
| <b>Welfare Outcomes measurements</b>                  | No welfare outcomes are collected OR only welfare outcomes regarding physical wellbeing are collected   | Welfare outcomes that take into account not only physical wellbeing but mental wellbeing and opportunity to express natural behaviour are measured at least once per production cycle and preferably at key stages in the laying cycle. An improvement programme is in place. |  |

<sup>13</sup> See RSPCA standards for criteria on usable perches

<sup>14</sup> Litter should be dry and friable and allow for expression of natural behaviours, such as dustbathing and scratching.

Annex 2 – Comparison tables of different European Standards and EU legislation for Laying hen welfare

| Criteria   | EU   | Lion Code   | RSPCA assured   | KAT (standard and animal welfare checked -AWC)  | Beter leven   |  |
|--|--|---|---|---|---|--|
| Space  | <b>Stocking density</b>                                | 9 birds/m2 (no limit to birds/m2 floor area).   | 9 birds/m2 (no limit to birds/m2 floor area).   | 9 birds/m2 (max 15 birds/m <sup>2</sup> of floor surface)   | 9 birds/m2 (max 18 birds/m <sup>2</sup> of floor surface). <b>AWC: 7 birds/m<sup>2</sup> ( max 14 birds/m<sup>2</sup> of floor surface)</b>   | 9 birds/m2 (no limit specified for birds/m2 floor area)  |
|  | <b>Maximum colony size</b>                             | Not specified   | 4000 birds  | 4000 birds  | 6000 birds. <b>AWC: 1500 birds</b>  | 6000 birds   |
|  | <b>Maximum flock size</b>                              | Not specified   | 32,000 birds  | 32,000 ( Free range - 16 000)   | Not specified   | Not specified  |
| Feed and drink   | <b>Minimum Feeding Space</b>                           | Chain feeder 10 cm/bird   | Linear feeders providing 10cm. per bird (or 5cm. of linear length with access to both sides of the trough). In multi-tier systems, feeding space must be provided at more than 1 tier level | Chain feeder 10 cm/bird   | Chain feeder 10 cm/bird   | Chain feeder 10 cm/bird  |
|  |  | With feedpan 4cm/bird   | 4cm. of circular, feeding space must be provided for each bird.   | With feedpan 4cm/bird   | With feedpan 4cm/bird   | With feedpan 4cm/bird  |
|  | <b>Minimum Drinking Space</b>                          | 1 Nipple/10 birds   | 1 Nipples/10 birds. All drinkers must be spaced evenly along the house. In multi-tier systems, drinkers must be provided at more than 1 tier level.   | 1 Nipples or cup/10 birds<br>Linear through space – 2.5 cm/bird   | With nipple or cup drinking bowls there must be two drinking bowls for up to 10 laying hens and an additional drinking bowl for each additional 10 laying hens  | with nipple or cup two drinking bowls for up to 10 laying hens + additional drinking bowl for each additional 10 laying hens                       |
|  |  | Bell/round drinker 1 cm/bird  | 1 bell drinker per 100 birds  | Bell/round drinker 1 cm/bird.   | Bell/round drinker 1 cm/bird  | Bell/round drinker 1 cm/bird   |
|  | <b>Minimum nest capacity</b>                           | 120 birds/m <sup>2</sup> of nest  | Individual nest boxes must provide not less than 1 box per 5 birds. Communal boxes must provide not less than 1m <sup>2</sup> of nesting area per 120 birds.                                | Must be provided at not less than 1 per 5 hens if individual boxes, or 1m2 of nesting substrate per 120 hens for group nesting. Must be enclosed and draught-free.                                      | 120 birds/m <sup>2</sup> of nest.   | 120 birds/m <sup>2</sup> of nest   |
| Nest   | <b>Nest features</b>                                   | separate space for egg laying, the floor components of which may not include wire mesh that can come into contact with the birds, for an individual hen or for a group of hens (group nest) | Nest boxes must be provided with a floor substrate which encourages nesting behaviour   | Encourages nesting behaviour minimises the risk of build-up of parasites and disease is managed hygienically does not consist of wire or plastic-coated wire that can come into contact with the birds. | The floor of the nest must consist of deformable material or artificial grass mats (minimum height 0.5 cm); “deformable” is material which can be manipulated by hens and does not leave the roll-away traces typical of cage rearing. Each hen must be able to lay its eggs undisturbed. |  |
|  | <b>Minimum perching space</b>                          | 15 cm/ bird   | 15 cm/ bird   | 15 cm/ bird of raised perches (set above the floor, slat, or tier surface at a height that allows hens to rest without disturbance from hens below) - Min 30 mm diameter                                | 15 cm/bird (recommended 25cm). <b>AWC: 20cm/bird</b>  | 15 cm/ bird- at least 10 cm need to be elevated  |
| Perches  | <b>Min. dist. between perches</b>                      | 30 cm   | 30 cm   | 30 cm (in all directions)   |   |  |
|  | <b>Min. dist. from the wall</b>                        | 20 cm   | 20 cm   | 20 cm   |   |  |
|  | <b>Max. angle between perches</b>                      |   |   | 45%   |   |  |
|  | <b>Distance from slat to first perch</b>               |   | Perches can be incorporated into a slatted floor (Not applicable in Scotland and N. Ireland).   | Not less than 45 cm and not more than 60 cm or positioned towards the end of the slats or sited on top tiers.   |   |  |
|  | <b>Material and shape of the perches</b>               | Good perches without sharp edges  | Must have no sharp edges  | Good perches without sharp edges  | Non-slip material. Entire foot should be able to rest on the perch  | With an oval or mushroom shape   |
|  | <b>Plastic-slat connections and integrated perches</b> | Plastic slat-connections may be calculated as perch length  |   | Integrated perches in slats may not be calculated as perch  | Integrated perches above the excrement pit must have a height of at least 2 cm.   | Integrated perches (max 5 cm per hen) must have a height of at least 2 cm.   |
|  | <b>Other perch features</b>                            | Not above the litter area   | Non-slip material. Not be mounted above the litter. Positioned to prevent fouling of any bird below   | Not above the litter area and allow birds to stand in an upright position. If below solid surface- at least 45 cm below.  | May not be attached above the litter area - 50% of them should be installed at varying heights  |  |
|  | <b>Max. number of levels allowed</b>                   | 4 levels including the floor  |   | 3 levels including the floor  | 3 levels including the floor  | 3 levels including the floor   |
|  | <b>Min. space between the tiers</b>                    | 45 cm   |   | 50 cm   | 45 cm   | 45 cm  |
|  | <b>Manure belts</b>                                    | Must have manure belt under the tier  |   | Must have manure belts under the tiers  | Must have manure belts under the tiers  | Must have manure belts under the tiers   |
|  | <b>Max. total height allowed</b>                       |   |   | 2m - where hens can reach the floor directly  |   | 2 meters   |
|  | Multi-tier specifics                                   | <b>Space between rows of tiers</b>  |   |   | No less than 80 cm or more than 2 meters  |  |
| <b>Min. width –usable area</b>                             |  | 30 cm   |   | 30 cm   | 30 cm   | 30 cm  |
| <b>Other considerations for calculation of usable area</b> |  | Max 14 degrees of slope<br>Headroom of at least 45 cm   |   | Max 8 degrees slope (14%)<br>Headroom of at least 50 cm   | max 8 degrees slope (14%)<br>Headroom of at least 45 cm   | max 8 degrees slope (14%)<br>Headroom of at least 45 cm  |
|  |  | Nest areas must not be included   |   | Nest areas must not be included, egg belt can be included   |   |  |
| <b>Light intensity</b>                                     |  |   |   | min 20 lux - in the open areas of the house   | min 20 lux  | min 20 lux   |
| Light  | <b>Duration of light</b>                               | Max 16 hours per day  |   | Min period of 8 hours of light and min. period of 6 hours of darkness (except when natural period of darkness is shorter)   | Max 16 hours per day - with dusk phase (min 0.5lux during dark period)  | Max 16 hours per day   |
|  | <b>Natural light</b>                                   | Not mandatory   |   | Not mandatory   | Mandatory (for buildings after 2002).   | Mandatory  |
|  | <b>Natural light features</b>                          | None  |   |   | Min. 20 lux. Apertures must correspond to at least 3% of the ground area and ensure a uniform distribution of light. Rows of windows with blackout option in the roof area are recommended. <b>AWC: Apertures must be equivalent to at least 5% of the floor area.</b>                    | Mandatory (min 20 lux) - equally distributed throughout the barn. Daylight-permeable surfaces should be at least 3% of the floor area of the barn. |
|  | <b>Litter area</b>                                     | 250 cm <sup>2</sup> per bird  |   | 250 cm <sup>2</sup> per bird  | 250 cm <sup>2</sup> per bird  | 250 cm <sup>2</sup> per bird   |
| Enrichment   |  | Min. 1/3 house surface  | 33% of total floor area available to the birds. Min. depth of at least 5cm birds to be able to dust bathe. Unrestricted access during bird’s light hours.                                   | Min. 1/3 of usable area. Maintained at 5 cm depth first 2 months of placement and 10 cm after.  | Min. 1/3 house surface - each hen must have 250 cm <sup>2</sup> available with the maximum 40 hens/m <sup>2</sup>   | Min. 1/3 house surface - each hen must have 250 cm <sup>2</sup> available with the maximum 40 hens/m <sup>2</sup>                                  |
|  | <b>Environmental enrichment</b>                        | None  |   | 2 items per 1000 birds, plus insoluble grit at least 1 a week.  | Pecking stones or other materials should be provided  | At least 1 pecking substrates per 1000 birds   |
|  | <b>Veranda</b>   | Not mandatory   |   | Not mandatory   | Mandatory   | Mandatory  |

## Examples of good systems for laying hens



Figure 1. Vencomatic Bollegg Gallery system in use. Photo courtesy of Vencomatic Group

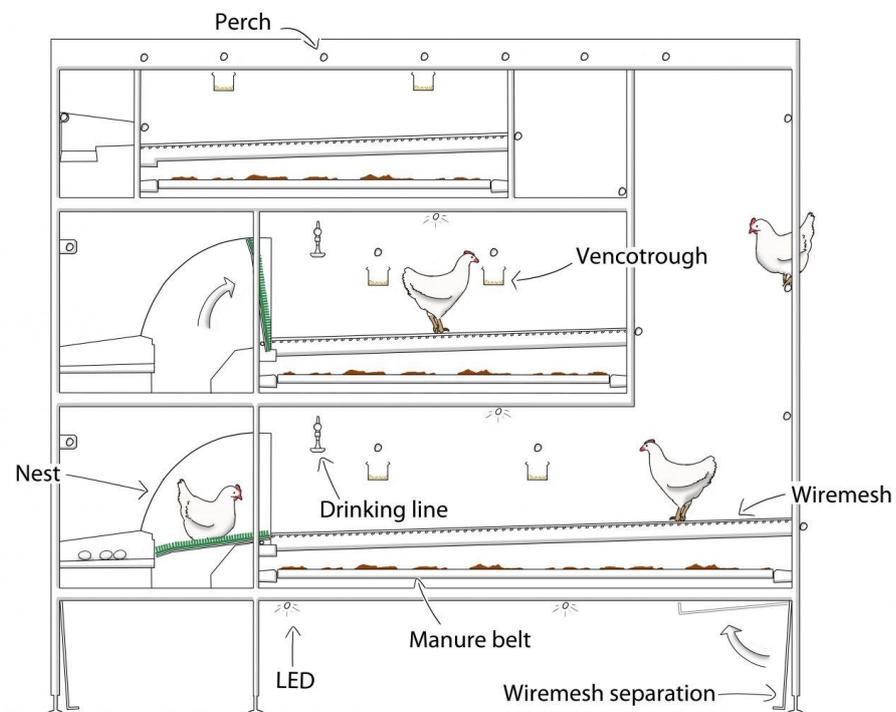


Figure 1- Vencomatic Bollegg Gallery system - <https://www.vencomaticgroup.com/en/products/layers/housing-solutions/boleqq-gallery>



Figure 3. Vencomatic Red-L system in use. Photo courtesy of Vencomatic Group

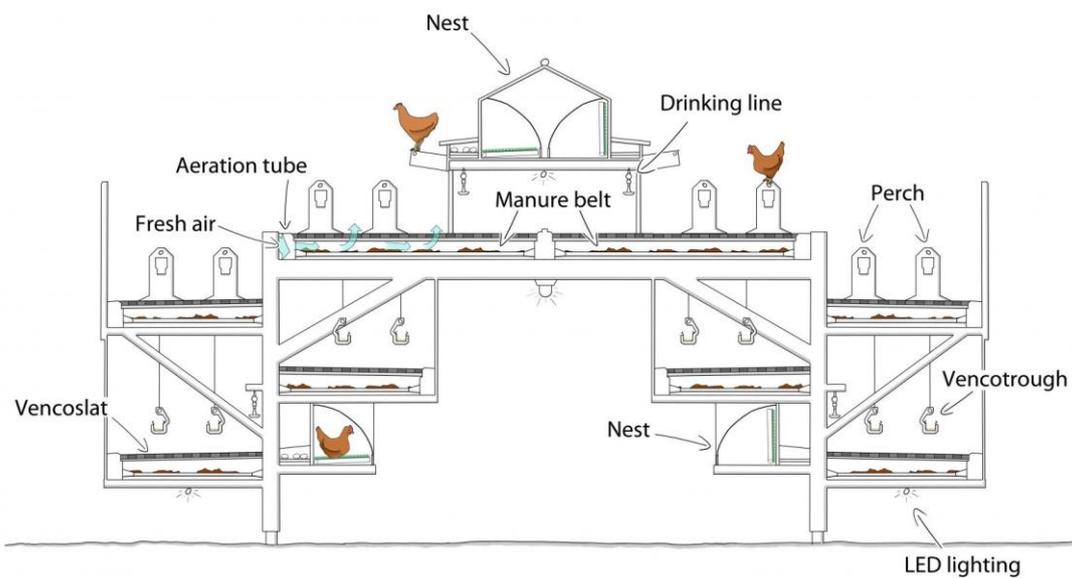


Figure 4. Vencomatic Red-L system- <https://www.vencomaticgroup.com/en/products/layers/housing-solutions/red-l>



Figure 5. Nature Step System in use, with wide aisles. Photo courtesy of Glenrath Farms

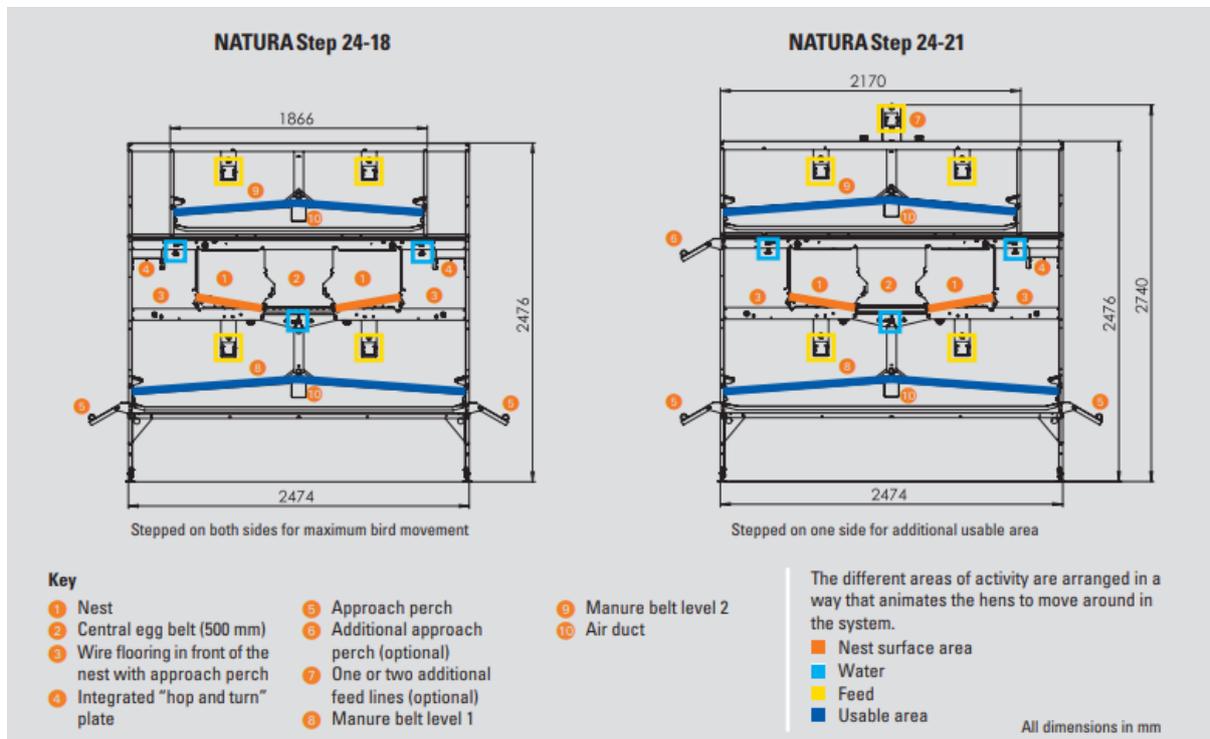


Figure 6. Big Dutchman Natura step System- <https://cdn.bigdutchman.com/fileadmin/content/egg/products/en/Egg-production-aviary-systems-Natura-Step-Big-Dutchman-en.pdf>