RSPCA standards justification

Meat chickens

Contents

Introduction

This document provides the rationale underpinning the setting of certain, key standards within the RSPCA Welfare Standards for Meat Chickens. As such, this document provides the justification behind the setting of such standards.

Not all standards are covered within this document, as either further explanation is not required, e.g. the justification is clear within the standard itself, or the standard is based on a legal requirement. However, those standards that go above legal minimum requirements and could be set at a range of levels are generally included.

Justifications are not exhaustive, but are typically representative of the evidence base (where this exists) for that issue.

In some cases, a summary of the full standard wording has been provided. Therefore, please refer to the RSPCA Welfare Standards for Meat Chickens for the full standard wording.

References to legal requirements relate to domestic legislation.

Food and Water

Food

- **Feeder space: A minimum of 25mm of linear (single sided) feeding space must be provided and accessible for each bird. Where birds can feed from both sides of a linear feeder, such as a trough, at the same time then a minimum of 12.5mm of feeding space per bird can be provided.**

  This standard was introduced when the first version of the standards were developed in 1996. During the initial development of the standards, many chicken producers were consulted and visited. It was felt that these figures represent best practice in terms of providing sufficient space for the birds to feed, thus avoiding competition during feeding.

- **Track feeders: Track feeders are prohibited.**

  The prohibition on the use of track feeders was introduced into the January 2010 version of the standards. This decision was based on information from industry, producers and practical experience, and centred around two key concerns. Firstly, track feeders can pose a risk to bird welfare, especially chicks, as they can become trapped in the drive unit or injured by the track conveyor itself. Such situations have been reported by concerned stock-keepers. Second, track feeders can also impede the movement of the birds around the house. They can experience particular difficulty navigating the tracks if they are spooked, which can cause injury to the birds. Incidentally, and anecdotally, it has been reported that litter condition is improved with pan feeders due to improved air flow around these feeders.

  In conclusion, the RSPCA believes that the alternative system of pan feeders offers a better mechanism for delivering feed to the birds without unduly compromising their welfare.

Water

- **Drinker space (numbers/bird):**

Bell	**1 per 100 chickens**
Nipple	**1 per 10 chickens**
Cup	**1 per 28 chickens**

The requirements relating to drinker space have been included since the first version of the standards was developed in 1996. These recommendations are based on a combination of practical experience and expert opinion and were considered to represent good practice within the industry at that time. These standards have now been implemented on farms via the RSPCA Assured (formerly Freedom Food) scheme for over 30 years, and appear to be working well. Further, the 2023 European Food Safety Authority's (EFSA) *scientific opinion on the welfare of broilers on farm* also recommends a maximum of 10 birds per nipple drinker.

It is important that an adequate number of drinkers are provided, not only to avoid thirst and dehydration, but also to avoid undue competition, which can result in injury. Further, studies have shown that the availability of nipple drinkers per unit area is negatively associated with levels of leg rotation (Jones *et al.*, 2005b).

Environment

Floor and litter

- **Litter quality and quantity:**
  The litter must:

  a) **be of a good quality**
  b) **be stored hygienically and kept dry**
  c) **be of a suitable material and particle size with no large clumps**
  d) **be managed to maintain it in a dry, friable (loose and free flowing) condition (and replaced where necessary)**
  e) **be an average depth of 5cm to allow for the dilution of faeces**
  f) **allow birds to dustbathe**
  g) **be topped up daily if necessary, with fresh litter**
  h) **be managed hygienically**

  In addition, the standards contain numerous information boxes expanding on these requirements and offering further guidance. In addition, it is stated that wood shavings are the preferred substrate.

Many of these requirements have been included within the standards since their launch in 1996. Others, such as the minimum litter depth of 5cm, which was introduced in the 2000 version, have been added as further research has identified additional benefits of suitable, sufficient and properly managed litter

Both the quality and quantity of litter can have a large impact on bird welfare, as chickens usually spend their whole life on the litter floor. Good-quality bedding material absorbs moisture, provides a thermally comfortable place to rest, allows opportunities for birds to carry out their natural behaviours such as foraging and dust bathing, and affects air quality.

Legally, chickens must have permanent access to litter which is dry and friable, i.e. broken up or crumbly, on the surface. Poor litter quality can result from a range of factors, including water spillage, inappropriate feed composition, intestinal infections, poor ventilation and overcrowding. It can have serious health and welfare consequences for the birds; it can increase dirtiness of the chickens (BenSassi *et al.*, 2019), lead to footpad dermatitis (lesions on the feet) and hock burns (lesions on the upper leg joints) (Shepherd *et al.*, 2017), breast blisters, increased levels of disease, and ammonia within the building and is related to an increased condemnation rate at slaughter (BenSassi *et al.*, 2019), probably due to infection with bacteria present in the litter (Shepherd *et al.*, 2017). These outcomes can have further detrimental impacts on bird health and welfare:

- *Ammonia*

Besides the unpleasant smell, ammonia can irritate the birds' eyes, throat and mucous membranes, leading to eye damage (Bestman *et al.*, 2011). It also greatly reduces the immune response of birds, making them more susceptible to diseases. The smell of ammonia is noticeable to a human observer from a concentration as little as 20ppm (Bestman *et al.*, 2011) and, when given a choice, chickens will avoid concentrations of above 10 ppm, which are commonly present in poultry houses (Jones *et al.*, 2005a). If ammonia can be smelt in a poultry shed, the concentration is too high (Bestman *et al.*, 2011).

- *Disease*

Wet litter can promote the growth of pathogens that can harm the birds. This is especially true of coccidiosis, which is often the trigger event for *Clostridium perfringens* (an intestinal disease) proliferation.

- *Foot pad dermatitis (lesions on the feet)*

The 2000 report from the Scientific Committee on Animal Health and Animal Welfare highlights the importance of litter quality in relation to this condition, stating that *"Wet litter is a very important problem as it can be the origin of parasitic infestation and also hock burns, contact dermatitis or breast blister."* Lesions, as well as being painful, can lead to bacterial infection, which may spread through the bloodstream and cause joint inflammations and impaired product quality in other ways (Schulze Kersting, 1996). There are also financial implications for the flock, if high levels of foot pad dermatitis are seen. For example, research has demonstrated that broilers with severe foot pad dermatitis grow more slowly (Martland, 1985; Ekstrand & Algers, 1997), which has been suggested to be a result of pain-induced lack of appetite (Martland, 1985).

- *Comfort and behaviour*

The presence of dry and friable litter is important for bird comfort and to enable the performance of natural behaviours. In the wild, chickens will spend around half of their time scratching and foraging for food. Commercial chicken breeds are still motivated to forage and will still do so in the litter even when food is provided in a feeder (Bestman *et al*., 2011). Litter that is loose and dry will allow them to perform this important behaviour. Dustbathing is important for birds to keep their feathers in good condition by removing old fat and parasites. This behaviour can only be performed in litter that is sufficiently fine, such as sand or peat (Bestman *et al.*, 2011, Van Liere *et al.*, 1990). In the absence of a suitable substrate, birds may only perform some aspects of dust bathing behaviour, but be unable to complete the sequence (Bestman *et al.*, 2011).

With regards to the litter type, research has shown that the use of wood shavings and peat decrease the risk of footpad dermatitis compared to straw (Kyvsgaard *et al.*, 2013; Shepherd *et al.*, 2017) . Although sand has been shown to be preferred by birds for performing dust-bathing and comfort behaviours, wood-shavings are a suitable alternative. If only sand or wood-shavings are provided, the frequency with which birds perform their natural behaviours (such as dustbathing) is similar on either material (Shields *et al.*, 2005).

Lighting

- **On/off periods: Artificial light must be switched on and off in a stepped or gradual manner over a period of at least 15 minutes.**

Included since the launch of the standards in 1996, stepped lighting, (turning artificial lights on and off gradually) can help promote natural settling behaviour (Prescott *et al.*, 2004) and stimulate the birds to have a last meal before dark, which may help increase their feed conversion efficiency (Savory, 1976). There is also some evidence that birds reared in systems where the light is dimmed have bone morphology that may be indicative of lower environmental stress, than those subject to abrupt light-dark transitions (van der Pol *et al.*, 2015).

The Scientific Committee for Animal Health and Animal Welfare's report on *The Welfare of Chickens Kept for Meat Production* (2000, p. 61) recommends that changes in illuminance should take place over about 30 minutes, to allow chickens sufficient time to prepare for the light and dark period. In 2006 the standards were amended to require the gradual increase/decrease in light to take place over a period of at least 15 minutes, with guidance in the form of an information box stating that it is intended to move towards a minimum of 30 minutes in the near future.

- **Natural light: Chickens must be provided with natural daylight. The natural light openings in the house must correspond to at least 3% of the total floor area of the house.**

The requirement for natural light was introduced in the February 2008 version of the standards, although producers were given until 1st January 2010 to implement this requirement.

There are numerous benefits to providing chickens with natural light:

a) *Vision* - Chickens have well developed vision and, like ourselves, it is their dominant sense and has evolved for use in brightly lit conditions. In particular, they have well developed colour vision,

which has been determined from a variety of behavioural and physiological tests (summarised in Prescott *et al.*, 2003). However, a high light intensity is required for this visual system to work well. The intensity of natural light is many orders of magnitude brighter than the artificially lit environments of poultry houses. Further, natural light provides the full spectrum of light, including UV light. Therefore daylight is necessary for chickens to utilise this sense to its full potential.

b) *Increased activity* – Chickens provided with natural light have increased activity levels, i.e. they spend less time lying and more time standing (Bailie *et al.*, 2013; Bailie & Weeks, 2013; Lewis & O'Connell, 2011). In these studies, this increase in activity led to improved leg health (reduced gait scores), whilst not affecting the levels of preening, resting and aggressive behaviour in the birds. Further, the provision of UV light, as provided by natural daylight, has been found to increase the diversity of natural behaviours performed by birds (Rana & Campbell, 2021). Higher light intensities, which are easily achieved by providing natural daylight, have also been shown to result in the performance of more preening and foraging behaviour (Alvino *et al.*, 2009).

c) *Litter quality* – The provision of natural light improves litter quality (lower moisture levels within the litter), as a result of increased activity including ground pecking/scratching (Bailie & Weeks, 2013; Lewis & O'Connell, 2011; Bailie *et al.*, 2013).

d) *Choice* - Higher light intensities have been shown to decrease fear responses (Mohamed *et al.*, 2020) and, when given the choice, are consistently preferred by chickens (Manser, 1996; Prescott *et al.,* 2003). Not only are such light intensities easily achieved by providing natural light, studies have demonstrated that birds have a preference for natural light. In a study by Sans *et al.* (2021) when given free choice between a barn side with artificial lighting only as opposed to the other barn side with natural light (windows) and artificial light, chickens preferred the side with natural light once the heating light was removed. Further, birds expressed more natural behaviours and activity in the side with natural light. The authors concluded that "*...the birds indicated that natural light from windows makes a relevant difference in their lives, as it is what they choose when the only other option is the same in-barn environment with only artificial lighting.*" These preferences for light change with age and with the type of behaviour being performed. Usually, behaviours which require visual acuity are performed under bright light and those such as resting and preening in dimmer light (van der Eijk *et al.*, 2022). Therefore spatial variation in light provision is also important, which can be provided within houses with windows, whereby the environment naturally becomes darker lit towards the centre of the house.

e) *Enrichment* - Natural light is itself also likely to enrich the birds' environment, as it provides a range of light levels in different areas within the house, which will change throughout the day, and provides a range of light levels for the performance of different behaviours.

f) *Stock-keepers* - Stock-keepers have reported that they prefer working in a naturally lit environment as they can manage and inspect the birds more clearly. Many also report that natural light helps with the cleaning of the shed at the end of the flock, enabling the operator to inspect more thoroughly whether the house has been effectively cleaned and disinfected.

The 2023 European Food Safety Authority's (EFSA) *scientific opinion on the welfare of broilers on farm* concludes that "*…when a veranda is not available for the birds, animals should have access to natural light in the barn*."

- **Dark period: Broilers must be provided with a minimum period of 6 hours, and a maximum of 12 hours, continuous dark, except for birds up to a maximum of 3 days of age and 3 days prior to slaughter, when the minimum continuous darkness must be at least 2 hours.**

The drive for a shorter dark period is an economic one; the longer the lights are on, the longer the period birds will be feeding, and therefore the faster the growth rate. The Scientific Committee for Animal Health and Animal Welfare's (SCAHAW) report on *The Welfare of Chickens Kept for Meat Production (2000)* states that '*Broilers …benefit from a clear pattern of day and night by having distinct periods of rest and more vigorous periods of activity*.' It is important that birds are given sufficient dark periods in order to rest. Shorter dark periods have been shown to be significantly associated with poorer leg health (Knowles *et al*.,

2008), presumably as a result of the increased physical activity that has been demonstrated to occur during the light period (Schwean-Lardner *et al*., 2012). In addition, longer dark periods have been shown to be associated with more content, positively occupied, and energetic flocks (Bassler *et al.*, 2013).

Ideally, the dark period would be longer than 6 hours; the SCAHAW report suggests a dark period of 8-12h. This is supported by more recent research which suggest that darkness periods of 7-8 hours are optimal for bird welfare (Schwean-Lardner *et al.*, 2012; Schwean-Lardner *et al.*, 2013).

Space requirements and flock size

- **Stocking density: Stocking density must not exceed 30kg/m^2.**

The Scientific Committee for Animal Health and Animal Welfare's report on The Welfare of Chickens Kept for Meat Production (2000) concluded that: '*It is clear from behaviour and leg disorder studies that the stocking density must be 25kg/m^2 or lower for major welfare problems to be largely avoided and that above 30kg/m^2, even with very good environmental control systems, there is a steep rise in the frequency of serious problems… . The greatest threat to broiler welfare due to behavioural restriction would appear to be likely constraints on locomotor and litter directed activities caused by high stocking densities, and consequences for leg weakness, poor litter quality and contact dermatitis.*'

Specific issues related to stocking density include:

a) *Leg & foot health* - Leg health has been shown to deteriorate with an increase in stocking density to such an extent that it affects the bird's ability to walk normally (Knowles *et al.*, 2008). In addition, the incidence of lesions to the birds' legs – known as hock and foot pad burn – have been shown to be positively correlated with stocking density (Haslam, 2005), increasing significantly between 30 and 38kg/m^2 (RSPCA, 2006).

b) *Lameness* – Lameness increased as stocking density increases (Sanotra *et al.*, 2001). Reduced space limits the opportunity to exercise, and less active birds are more prone to lameness.

c) *Behavioural restriction* - Stocking densities above 30kg/m^2 can result in behavioural restriction, which limits the birds' ability to perform natural behaviours (including comfort behaviours), such as stretching, wing spreading and walking, due to hindrance from other birds (SCAHAW, 2000; Defra, 2003; Meluzzi & Sirri, 2009). Further, it denies them the opportunity to sleep, lie and rest without being disturbed by other birds (SCAHAW, 2000; Hall, 2001); Dawkins *et al.*, 2004; Ventura *et al.*, 2012; Buijs *et al.*, 2011a).

d) *Preference* - In studies that have been designed to get an insight into how chickens feel about being kept at different stocking densities, meat chickens overcame a high barrier to get away from a crowded area to one where there's fewer chickens, indicating they strongly prefer to be in areas that are less crowded (Buijs *et al.*, 2011b). This is a notable result, as chickens are reluctant to overcome high barriers to access food unless they've been food deprived for a considerable period. Further, at densities greater than 29kg/m^2, chickens chose to be further apart from each other, showing evidence that they start to experience crowding at this level.

e) *Litter quality* - Lowering stocking density will increase litter quality, because it reduces the amount of faeces and increases bird activity (de Jong *et al.*, 2012). It is more challenging to appropriately manage the environment when birds are stocked at high densities, which can contribute to the development of poor litter. Poor quality litter can increase the incidence and severity of lesions to the birds' legs.

Based on our current understanding of what chickens want and how they feel, together with the weight of the evidence from research that has examined the impact of stocking density on bird health and behaviour, we can be confident that meat chicken welfare is compromised at densities exceeding 30kg/m^2. However, the 2023 European Food Safety Authority's (EFSA) *scientific opinion on the welfare of broilers on farm*

concluded that when stocking exceeds 11 kg/m^2, the incidence of foot pad dermatitis increases, walking ability is reduced and the ability of birds to express their natural behaviour is impaired due to lack of space. The RSPCA will be considering this conclusion during the further development of the RSPCA welfare standards.

With respect to flock size, more research is needed on the impact of group size on chicken welfare in general to be able to specify a maximum flock size in the RSPCA welfare standards, although an information box is included stating that flock sizes should not exceed 30,000 birds for indoor systems and 15,000 for free-range systems. This is based on what is currently considered best practice in relation to preventing and managing diseases and their transmission, minimising the impact of emergencies on bird welfare, and helping ensure effective inspection and management practices. To date there is little scientific evidence to set a definitive maximum flock size. A study by Sarıca *et al.* (2022) found that kept at group sizes of 3,000 and 4,000, birds showed reduced foot pad dermatitis, hock burn and breast blisters than broilers kept in group sizes of 6,000 and 20,000. However, the authors attributed this to a more unequal distribution of birds and therefore unequal accessibility of resources in larger groups (Sarıca *et al.*, 2022).

NB For free-range brood and move production, the stocking density for indoor (19 birds/m^2) can be used until the birds have access to outside. The organic regulation does not provide separate stocking densities for the brood stage. The 10 birds/m^2 (fixed housing) and 16 birds/m^2 (mobile housing) required by Commission Regulation (EC) 889/2008 applies for the entire life of the birds.

- **Stocking rate: Stocking rate must not exceed 19 birds/m^2.**

Exceeding 20 birds/m^2 is likely to increase competition for floor space, feed and water (Hall, 2001). Research also indicates that birds placed at above 19 birds/m^2 have higher mortality at seven days of age, a higher number of daily leg culls, and are more behaviourally restricted (Hall, 2001). It is also easier to manage and control the litter with fewer birds in a shed. This standard was introduced in the 2006 version of the standards.

- **Thinning: Thinning is not permitted in the standards.**

From the 1st January 2016 thinning has been prohibited. Prior to this date, one thin was permitted for indoor production only.

Thinning involves removing a proportion of the birds on one or more occasions from the building at planned times to ensure the maximum stocking density is not exceeded. As such, the maximum stocking density is achieved on more than one occasion prior to depopulation. The practice of thinning makes the most economical use of a building as it allows more birds to be reared per unit area. However, thinning compromises chicken welfare in several important areas, as follows:

a) Being subject to high stocking densities more than once

Birds that remain in the shed until depopulation will have been subject to the maximum stocking density on more than one occasion. It is at higher stocking densities where birds have the least amount of space and where the highest incidences of welfare problems are generally seen.

b) Stress of the thinning process

Thinning is known to cause stress to those birds remaining in the house (Haslam, 2011). For example, those birds remaining in the house after catching can be affected by:

- the setting up of the house for catching
- temporary withdrawal of feed and water
- noise and disruption from the catching process
- forklift operation in the house
- bird migration to the end of the house as catching progresses
- birds being injured during the catching process
- the condition of the house after catching, especially the effect on the quality of the litter
- the disturbance caused by returning the house to its condition prior to catching
- thermal discomfort from rapid temperature changes – especially when catching during the colder months of the year

- potential issues with biosecurity, e.g. the introduction of modules and a forklift, could potentially introduce infectious agents, such as campylobacter and potential diseases such as Avian Influenza.

The issue of stress during the process has been acknowledged in the UK Government's own recommendations, where they state, '…*thinning should be avoided as this causes unnecessary distress to the birds…*' (Defra, 2002).

c) Increased lameness

In a large scale UK commercial study, thinning was associated with an increased average gait score i.e. an increase in the number of birds experiencing difficulty walking properly. This was over and above that which could be attributed to the age of the birds when they were assessed, and was considered likely to be due to the effect of the stress of thinning (Knowles *et al.*, 2008).

d) Increase in disease

Campylobacter is more invasive in stressed birds and as thinning is stressful this practice has been reported to double the risk of infection in those birds remaining in the house after catching (Finland research cited by University of Bristol). Finland banned thinning some time ago as a measure to control Campylobacter. Some large-scale chicken producers, such as the Germany's Wiesenhof, Thailand's Saha Farms, and Brazil's Brazil Foods, also have a no thinning policy due to concerns regarding salmonella and campylobacter infections, as well as the stress caused to the birds (Personal Communication, 2017). In 2015, a UK retailer claimed that their overall decrease in the proportion of birds being infected with campylobacter to achieve the target set by the Food Standards Agency was due to ending thinning alongside enhanced biosecurity and 'blast surface chilling' carcases in the slaughterhouse (Davis, 2015).

Environmental enrichment

Suitable enrichment items can significantly improve bird health and behaviour (Vas *et al.*, 2023). Commercial data clearly indicates that environmental enrichment, such as the introduction of straw bales and perches, has improved the welfare of their chickens (CIWF, 2013). Improvements include a reduction in the levels of hockburn, pododermatitis and breast blisters. It has also been reported that due to the enriched environment provided, physical activity is significantly increased, which helps improve leg strength, walking ability and the overall wellbeing of the birds (Bailie & Weeks, 2013; CIWF, 2013; Reiter & Bessei, 1998). As well as an increase in general activity levels, the behaviour of chickens reared in enriched environments has been shown to be more varied because they have the opportunity to interact with the various objects. Furthermore, a consistent trend towards reduced skin lesions has been observed in chickens reared in enriched environments (Bailie & Weeks, 2013).

- **Straw bales: 1.5 standard sized, long chopped straw bales must be provided for every 1,000 birds.**

The provision of straw bales has been demonstrated to improve activity levels and leg health in commercial broilers (Kells & Dawkins, 2001; Lewis & O'Connell, 2011). Birds not only use the bales to huddle and sleep next to, but those provided with bales stand for longer when disturbed compared to those without access to bales, suggesting a positive effect on leg condition (Bailie & Weeks, 2013). Conventional straw bales in particular have proved to be an excellent form of enrichment for poultry, as they allow and encourage the expression of a variety of behaviours, such as pecking. A desirable benefit of such bales is that they are more robust and last longer, being gradually dismantled over time, with the additional benefit of being accessible from all around the bale. Bales of plastic wrapped chopped straw may not serve the same function as conventional straw bales, although research on this is lacking.

The efficacy of shavings bales as a suitable alternative to straw bales is questionable, as shavings do not have the same functional properties as straw. Shavings bales do not necessarily allow chickens to engage in pecking, pulling and other oral manipulative and 'play' behaviours that are seen when straw bales are provided. In addition, shavings bales are likely to lose their form far more quickly than straw bales and therefore require more frequent replacement.

- **Perching: 2m of perch space must be provided for every 1,000 birds. Perches must be elevated and support the whole of the bird's foot allowing the bird to curl its toes around the object without obstruction to express normal perching behaviour, and be deep enough so that the chickens cannot puncture their own footpads by curling their toenails around the bottom of the perch.**

  Providing perches allows birds to express their natural behaviour, allowing them to rest, preen and observe the activity of other birds below (Bailie & O'Connell, 2015). When provided with the correct type of perch, birds will use them - especially during the night period. The provision of perches has also been shown to help improve bird health (e.g. birds with access to perches have been shown to have fewer foot pad burns, likely a result of reduced contact between the birds feet and litter and better distribution of birds vertically, improving air and ventilation of the litter surface) with no negative effects on breast meat quality reported (Bailie & Weeks, 2013; Oester & Wiedmer, 2005). In addition, perching has been suggested to be beneficial in alleviating leg problems and improving locomotion, and has also been associated with improvements in bone health (Birgul *et al.*, 2012 and Norring *et al.*, 2016).

- **Pecking objects: one pecking object, e.g. peck-a-blocks, brassicas (e.g. cabbage, cauliflower, sprouts, broccoli), hanging wooden blocks, must be provided for every 1,000 birds.**

  The provision of pecking objects has been shown to have the potential to improve welfare as it serves as an enrichment stimulus (Bailie & O'Connell, 2015). Some studies have observed reduced gait scores in chickens provided with string compared to those without, suggesting positive effects of string on walking ability (Bailie & Weeks, 2013; Bailie & O'Connell, 2015). However, care needs to be exercised when deciding what to introduce as a pecking object; string could be ingested leading to health problems. It is therefore not recommended. Alternative pecking objects such as those listed in the standard, are more suitable.

The range

Access to the range

- **Popholes dimensions: Each pophole must be no smaller than 450mm high and 500mm wide. There must be at least 1 pophole per 700 birds, with a minimum of two popholes.**

These figures were based on practice at the time, although the RSPCA strongly recommends that more popholes are provided than the minimum stated within the standard, to allow for variations in weather conditions. For example, to remain compliant on a windy day, some popholes could be closed to help maintain good conditions within the building if there are a sufficient number installed.

Range enrichment

- **Range enrichment: Producers must take all reasonable steps to encourage use of the range by the birds including the provision of sufficient shade and shelter, which must equate to a minimum of 8m^2 per 1,000 birds.**

Poultry originate from Asian jungle fowl and evidence suggests domesticated breeds still have a high preference for cover on the range as a refuge from perceived aerial threats and predators, as well as adverse weather (Dawkins *et al.*, 2003). Research has demonstrated that shelters encourage slower growing birds to utilise more of the range, especially the area furthest from the sheds (Fanatico *et al*., 2016). As such, free-range chickens should have access to areas of shelter to not only offer cover from adverse weather conditions but also to offer regions of variation and encourage them to use the range.

Natural cover

- **Natural cover: Natural cover must be present in the form of newly planted trees/shrubs/other vegetation at an area equal to at least 5% of the total range area.**

The aim of this standard is to encourage birds to use the range more fully, by enriching the range with natural 'cover'. This is not the same as providing overhead shade and shelter; the intention is to provide a more naturalistic, enriching and 'safe' environment - from the birds perspective, as they are prey species. Dawkins *et al.* (2003) reported that relatively few birds use artificial shade and shelter (wooden sunshades), so much so that they excluded these as a 'habitat' type for analysis in their study, indicating these provide something functionally different to the birds compared to natural cover. Natural cover, such as trees, also act as windbreaks and sun shades, in addition to providing security, which may be particularly important during the winter months. Further, additional benefits of natural cover include the reduction of poaching around the popholes and improved litter indoors, a reduced risk of disease spread due to greater dispersal of manure load, and a more varied diet from the vegetation itself and the invertebrates attracted by it. Further, providing natural shelters in terms of trees and tall grass stands has been reported to reduce mortality caused by predation in broilers (Dal Bosco *et al.*, 2014; Stadig *et al.*, 2017).

Natural cover can be achieved with a range of vegetation types, although tree cover in particular has been shown to be particularly effective. Dawkins *et al.* (2003) reported that the number of broilers found to be ranging was positively correlated with the amount of tree cover available on the range: the more tree cover available, the more birds were found ranging. However, whatever vegetation is provided, it must afford the birds with cover (i.e. be overhead – canopy cover), and shade and shelter. Therefore, many long grasses are not considered suitable. However, corridors/strips of long grass may encourage birds to enter the range. Some crops, such as perennial chicory, kale, and dwarf sorghum have characteristics which may be considered suitable to satisfy the standard. Crops should stand well throughout winter, provide good canopy and not grow too densely. Hawthorn, elder and dogwood provide fast growing hardy shrub cover. Hawthorn doesn't have a large root system, which may make it suitable for less permanent sites. Whatever

vegetation is used, it should not obscure the view of the rest of the range and should not be so dense as to prevent birds seeing into it.

Cover should be planted as close to the popholes as possible to encourage birds onto the range – as close as 5m is recommended.

Health

Health and welfare

- **Culling for lameness: Birds must be humanely killed without delay if they have a gait score of 3 or more (as defined in the University of Bristol's Gait Scoring Guide).**

  Research has demonstrated that birds with such gait scores can be in pain and discomfort and, as a result, their welfare is unduly compromised (Danbury *et al.*, 2000; McGeown *et al.*, 1999).

Breed

- **Breed: Any chicken breed/s used must be accepted for use by the RSPCA.**

  Introduced in November 2013, the standards require the welfare of chicken breed's to be independently assessed according to the RSPCA Broiler Welfare Assessment Protocol. The RSPCA no longer uses the term 'slow growing', instead using the term 'higher welfare breed'. For a breed to be considered higher welfare it needs to be assessed according to the RSPCA Broiler Breed Welfare Assessment Protocol and the results comparable with those of the control breed. The protocol contains a guideline maximum threshold value for growth rate which is applicable to birds being reared for both indoor and free-range production.

  Previously the standards only permitted the use of slower growing breeds, i.e. those that had a maximum genetic growth rate of less than 45 grams per day. However, there were limitations to the effectiveness of just using growth rate as a mechanism for safeguarding chicken welfare. This is partly because the data concerning the genetic growth rate potential of breeds is provided by breeding companies and there is no standardised process to establish this figure. In addition, as the genetic growth rate potential of a breed is often arrived at using data from a number of different sources, including field trials by producers, it does not necessarily reflect the true genetic growth potential of a breed. These issues made it difficult to know a breed's true genetic growth rate, set meaningful limits and make meaningful comparisons.

  Further, growth rate only offers an indirect measure of welfare and, as such, does not offer any firm evidence either way about a breed's actual level of welfare. Although these issues did not hinder significant progress in this area at the time, and proved a useful way to help progress this issue, the RSPCA recognised the limitations associated with the approach. So, a more robust and meaningful approach was developed to help ensure breeds of broilers have a good - or at least acceptable - level of welfare.

  In 2012 the RSPCA Broiler Welfare Assessment Protocol was developed. The protocol describes how birds must be assessed for a number of key welfare parameters, including leg health, hock burn, foot pad burn and mortality. This approach provides independent and meaningful information regarding the welfare of a breed, which is then used to inform a decision as to whether the breed should be accepted for use. We therefore have more direct and specific information relating to the welfare of a breed and avoid having to assume the level of welfare based on its growth rate alone.

  The Broiler Welfare Assessment Protocol can be viewed at: http://science.rspca.org.uk/sciencegroup/farmanimals/standards/chickens.

  As previously stated, the protocol contains a guideline maximum threshold value for growth rate; of 60g/day for indoor production. The previous maximum growth rate of 45g per day was based on the published growth rate of the Hubbard JA757. At that time, the breed was being used by a number of producers and displayed demonstrably higher welfare outcomes both in terms of feedback from producers and data published by the breeding company. When the JA757 was tested according to the protocol the average daily growth rate was slightly higher than 45g/day (at a weight of 2.2kg). This guideline figure was set as a mechanism to help protect the parent birds - to help limit the severe level of feed restriction they endure, i.e. there were concerns that a breed being tested could potentially display good welfare outcomes, but still grow quite quickly - negatively affecting the health and welfare of the parent birds. The 60g/day limit is

based on another breed that was tested where it showed good welfare outcomes in general and the level of restriction on the parent birds was significantly better than the commercial breeds.

The JA757 was chosen as the control breed as, at the time these standards were developed, the JA757 was being used commercially by a number of producers and, from observations together with the feedback from producers and vets, was showing positive welfare outcomes compared to the more conventional breeds. In addition, data published by the breeding company (Hubbard) showed good welfare results. The parent flock was also examined and there was very little/no feed restriction on the female line. So, it was the only commercially viable breed that displayed higher welfare outcomes that was available. Further, due to the '57 female being Label Rouge accredited, the genetics of that breed cannot be changed significantly, i.e. the breeding company cannot increase the growth rate of this line - so it stays fairly constant over time. This is favourable for a number of reasons. In tests to date this breed has continued to be a valuable benchmark breed.

The genetics of test breeds has the potential to change over time both positively and negatively so the protocol includes a requirement for all breeds to be re-tested every 8 years. This allows sufficient time for any changes to become apparent yet is not too onerous a process for the breeding companies.

As a result of this standard, fast growing breeds are not permitted for use under the RSPCA welfare standards. Fast growing breeds are more likely to experience locomotor disorders, are more at risk of developing cardiovascular diseases and contact dermatitis, are less able to perform natural behaviours such as foraging, dustbathing and perching, and are more likely to die or need culling for health/welfare reasons (Bailie *et al.*, 2018; Dixon, 2020; Rayner *et al.*, 2020; Wijesurendra *et al.*, 2017). The health and welfare issues associated with the use of fast growing breeds of chicken led the European Food Safety Authority (EFSA) in their 2023 *scientific opinion on the welfare of broilers on farm* to recommend that "*Growth rate should be limited to a maximum of 50 g/day to allow the broilers to maintain better health and being active*." Breeds with a reported average daily growth rate of under 60g/day in the RSPCA broiler breed welfare assessment protocol achieve an average daily growth rate of around 50g/day in commercial (field) conditions.

- **Permitted methods of casualty killing/slaughter: The only permitted methods for on-farm casualty slaughter/killing are hand held electrical stunning, immediately followed by neck cutting, neck dislocation and captive-bolt. Neck dislocation must involve stretching the neck to sever the spinal cord and cause extensive damage to the major blood vessels. Equipment that crushes the neck (e.g. killing pliers) must not be used.**

  Equipment that crushes the neck is neither quick nor humane. Various welfare concerns have been raised regarding the use of manual cervical dislocation for culling chickens (Gregory & Wotton, 1990; Erasmus *et al.*, 2010; Hopkins *et al.*, 2015) and more humane alternatives are encouraged.

Transport

Management

- **Food deprivation prior to slaughter: No bird must be deprived of food for more than 10 hours prior to slaughter.**

  As a result of their high metabolic rate, broilers should not be deprived of food for long periods before slaughter (EFSA, 2004a). There is no definitive evidence for the value of different fasting times with regards to food safety (EFSA, 2004a).

- **Transport time: All birds must be slaughtered within 8 hours of loading the first bird. The time from when the birds leave the farm to arriving at the processing plant must be no longer than 4 hours.**

  The 2004 European Food Safety Authority report on *the welfare of animals during transport* states that journey times should be kept to a minimum, as mortality rate has been shown to increase with the length of the journey. The report recommends that domestic fowl should not be held in transport containers for longer than 6 hours, stating that "… *in journeys longer than 4h mortality was 0.28% as compared to 0.16% in journeys of less than 4h.*" The University of Bristol (2006) has also highlighted the importance of limiting journey time for broilers to 4 hours.

Slaughter / killing

Lairage

- **Lairage time: All birds must be slaughtered as soon as possible on arrival at the processing plant and in any case within 4 hours.**

  Reducing the amount of time birds spend in lairage helps prevent unnecessary stress, such as that caused by poor bird-level ventilation and behavioural restriction (MAFF, 1998).

Shackling / restraining

- **Shackling: The shackling of conscious birds is only permitted where birds are slaughtered/killed on the farm where they were reared for finishing and birds are not subjected to any transport by vehicle to the place of slaughter/killing. In addition, it is only permitted where the only commercially/practically viable option available is to slaughter/kill the birds using a system that requires shackling. In these situations, written permission must be sought from and granted by the RSPCA Farm Animals Department. The shacking of conscious birds may also be permitted in the event of an emergency and when the most humane and only available alternative is to slaughter/kill birds using a system that requires shackling.**

  The 2004 EFSA report states that "*Since welfare is poor when the shackling line and water bath electrical stunning method is used, and birds are occasionally not stunned before slaughter, the method should be replaced as soon as possible*." Not only is there the pain and distress associated with inversion (hanging upside down) and shackling (compression of metatarsal bones), the process induces wing flapping in the

majority of birds, resulting in the potential for dislocations and fractures to occur in a significant number of birds.

Gas killing

- **Carbon dioxide gas: Carbon dioxide (delivered in two phases) is permitted provided that it does not exceed an *average* maximum concentration of 30%, and a maximum concentration of 33%, until birds have lost consciousness.**

  Carbon dioxide is aversive to poultry and has been described as an acidic gas – pungent to inhale at high concentrations and a potent respiratory stimulant – which can cause birds to experience unpleasant sensations (FAWC, 2009; EFSA, 2004b; McKeegan *et al.*, 2006; Raj & Tserveni-Gousi, 2000). The degree of aversion to carbon dioxide increases as the concentration rises (McKeegan *et al.*, 2006), with research suggesting that birds start to detect its presence at around 7% (Ray & Gregory, 1991) and aversion being seen in some individuals at 25% (McKeegan *et al.*, 2006). Concentrations of carbon dioxide above 40% are considered to be particularly aversive (FAWC, 2009; EFSA, 2004b; McKeegan *et al.*, 2006). However, it has also been suggested that concentrations above 30% are aversive (EFSA, 2004b; Humane Slaughter Association, 2005). The 2004 European Food Safety Authority opinion on *the welfare aspects of the main systems of stunning and killing the main commercial species of animals* suggested that discomfort may appear at concentrations of around 25% in chickens and 30% in turkeys. Using carbon dioxide at concentrations of 30% to induce unconsciousness has been recommended by some researchers (Raj & Tserveni-Gousi, 2000) and it has been suggested that using this concentration minimises the gases pungency (Ray *et al.*, 1992).

  Prior to the introduction of this standard in 2017, the RSPCA welfare standards for laying hens; meat chickens; and turkeys already permitted exposure of birds to 30% carbon dioxide mixed with inert gases. Research that looked at varying levels of carbon dioxide in air and in nitrogen, suggested that as the behaviours observed were similar (i.e. headshaking rose monotonically and respiratory disruption observed at all concentrations) in both gas mixtures, it is the carbon dioxide causing the response rather than the carrier gas (McKeegan *et al.*, 2006). Further, results from a study by Gerritzen *et al.* (2004) showed that headshaking began at the same carbon dioxide concentration in all the gas mixtures they tested, and therefore suggested it was likely that headshaking is a reaction to increasing carbon dioxide levels. As such, it is reasonable to expect similar behavioural responses to carbon dioxide whether delivered in inert gases or in air, and therefore maintaining a 30% maximum limit in the standards was considered appropriate.

  Therefore, the RSPCA welfare standards permit an average maximum concentration of 30% carbon dioxide. However, due to the nature of gas injection systems, it is acknowledged that there will be some variability in the concentration of carbon dioxide within the system. Therefore, a 10% tolerance on this concentration has been applied, i.e. permitting a maximum concentration of 33% carbon dioxide.

  Following loss of consciousness by exposure to carbon dioxide gas only, it is a legal requirement to expose poultry to a concentration of carbon dioxide above 40% until death, which is classified as *Phase 2* (EC, 2009).

- **Gradually increasing concentrations of carbon dioxide: For processors choosing to use carbon dioxide gas only, new systems installed from 1st January 2018 must be designed and operated to expose birds to a gradually increasing concentration of carbon dioxide until the birds have lost consciousness.**

  Research suggests that exposure to a gradually increasing concentration of carbon dioxide will result in a smoother transition to unconsciousness and avoid the negative effects of high concentrations of carbon dioxide whilst birds are conscious (Gerritzen *et al.*, 2004; Gerritzen *at al.*, 2007). This is supported by direct observation of different gas killing systems. However, systems that expose birds to a maximum concentration of 30% carbon dioxide on induction until loss of consciousness may be considered acceptable (see rationale for '*Carbon dioxide only gas killing*'), but a gradual increase starting from a low

level is preferred. Therefore this standard takes a practical approach to ensure that going forwards any new systems installed gradually increase concentrations of carbon dioxide.

- **Monitoring birds within the gas killing system: There must be a means of clearly visually monitoring in real time the birds throughout the gas killing process, i.e. from start/point of entry to finish/exit.**

  The *Welfare of Animals at the Time of Killing (England) Regulations 2015* require a means of visually monitoring poultry in the gas stunner. From a practical perspective, it is important to be able to check that induction to unconsciousness is calm and to assess when birds lose consciousness. This is particularly important for systems using carbon dioxide only (in two phases), as it is a legal requirement for conscious birds not to be exposed to concentrations above 40%.

  For tunnel systems, the installation of appropriately positioned windows at regular intervals along the entire length of the system can be sufficient to satisfy this standard, provided that the effect of the gas on birds can be clearly seen. Ideally, cameras should be installed, either to follow the birds through the system or at critical monitoring points. Where windows are used to monitor birds it may be necessary for them to be cleaned regularly to ensure visibility of the birds is maintained and thus the requirement is met at all times.

- **Monitoring birds within the gas killing system: There must be a means of clearly visually monitoring in real time the birds throughout the gas killing process, i.e. from start/point of entry to finish/exit.**

  Gas killing offers a number of potential welfare benefits over conventional water bath systems, including avoiding inversion and the shackling of conscious birds, and the elimination of problems associated with electrical stunning, such as pre-stun electrical shocks and ineffective stunning (EFSA, 2004b; FAWC, 2009; Humane Slaughter Association, 2005). To maintain this welfare advantage it is important that the induction to unconsciousness is calm. This has been highlighted by the UK's Farm Animal Welfare Council who suggested that as gas killing systems do not render birds immediately unconscious, induction to insensibility (i.e. unconsciousness) without avoidable pain or distress was a key requirement (FAWC, 2009).

  During exposure to carbon dioxide poultry exhibit a number of behaviours; it is not clear and opinions vary on how to interpret some of these behaviours and this makes it challenging to understand the welfare impact from observation of these behaviours alone. Such behaviours include head shaking (McKeegan *et al.*, 2006; Gerritzen *et al.*, 2007; Sandilands *et al.*, 2011) and deep breathing and gasping (Gerritzen *et al.*, 2007). However, bird welfare is likely to be improved when these behaviours are performed less frequently. Generally, the presence of such behaviours can be considered of lower welfare concern compared to, for example, escape behaviours and conscious wing flapping, which should not be observed as they are indicative of poor welfare. The Welfare Ranking developed by Grandin (2013) rated gasping with continuous wing flapping from the time birds enter the gas until loss of posture as not acceptable, and where all birds flap continuously or attempt to climb out of the container from entering the gas until loss of posture as a serious problem.

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