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# Exploring perch provision options for commercial broiler chickens

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ABSTRACT

Two related experiments involving broiler chickens are presented. Experiment 1 evaluated the use of six perch types: (1) an A-frame design (incorporating a platform and ramps), (2) a 'flat top' ramp, (3) a curved ramp, (4) a suspended bar, (5) a fixed bar and (6) a suspended platform. Two of each perch type was provided in one commercial house on each of two farms over two 6-week production cycles. Each perch was videoed for a 24 h period in weeks 1–6 of cycle 1, and weeks 1–5 of cycle 2. Scan sampling was used to assign an occupancy score to different perch components (platform, bar and ramp, where appropriate), and an overall weighted occupancy score also calculated. Counts were made of perching and failed perching attempts following selected scans in cycle 1. There were significantly higher occupancy scores for platform than for bar or ramp components, and this was apparent across the production cycle. This resulted in a higher overall weighted occupancy score for suspended platforms. The percentage of failed perching attempts was significantly greater with fixed and suspended bar perches than with the curved ramp. Three treatments were assessed in Experiment 2: (1) provision of six suspended platform perches (P), (2) provision of six suspended platform perches and four peat-filled dust baths (PD), and (3) control treatment with no platform perches or dust baths. Treatments were applied in one of three houses on each of two farms, and replicated over three cycles. Two perches in each of the P and PD treatments were videoed for a 25 min period in weeks 3, 4 and 5, and number of birds using the perches recorded. The severity of angular leg deformities, hock burn and pododermatitis lesions, and walking ability were scored in weeks 3, 4 and 5, and prevalence of pododermatitis and hock burn recorded at slaughter. Litter moisture and production-related measures were also taken. On average, 26 birds (12.6 birds/m$^2$) occupied the perches, and this was not affected by provision of dust baths or age. Treatment did not significantly affect any of the measures taken. It is concluded that broilers prefer to perch on platforms rather than bars or ramps, and thus that platforms better cater for an important behavioural need. However, provision of platform perches, even in combination with dust baths, did not improve leg health, and future research should investigate greater levels of provision of these enrichments.

## 1. Introduction

Perching is an anti-predation measure performed by fowl during resting (Newberry et al., 2001). It typically involves seeking an elevated structure that birds can grasp with their feet, and from which they can survey their environment (EFSA, 2015). Past research suggests that the underlying motivation to perch persists in fast growing commercial broiler chicken breeds (Ventura et al., 2012; Bailie and O'Connell, 2015). Despite this, low levels of perching behaviour have traditionally been recorded in these birds (Su et al., 2000; Pettit-Riley and Estevez, 2001; Rodriguez-Aurrekoetxea et al., 2015). This suggests that common perch designs offered to broiler chickens are unsuitable. These designs typically require broilers to balance on a wooden or metal bar which they grasp with their claws. These types of behaviours may be difficult to perform for modern commercial broilers due to changes in their morphological conformation associated with genetic selection for rapid growth and increased breast muscle, which has caused their centre of gravity to shift forwards (Corr et al., 2003), potentially adversely affecting their ability to balance on a traditional perch. Leg health issues may also make it difficult to grasp a bar. Therefore it is possible that perches incorporating elevated platforms may be more suitable than elevated bars or poles.

The inability of fowl to carry out behaviours they are strongly motivated to perform, such as perching, may result in behavioural frustration (Duncan, 1970), and thus compromise welfare. As well as this, provision of perches has previously been shown to attenuate the age-related increase in fearfulness in broiler breeders (Brake et al., 1994). Facilitating an increase in perching behaviour, through the provision of suitable perches, may therefore improve welfare in commercial broilers by reducing levels of frustration and fear. Increased

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perching behaviour may also improve leg health by increasing exercise associated with stepping on to and off perches (Bizeray et al., 2002). Leg health issues associated with contact with litter, such as pododermatitis and hock burn, may also be reduced if birds spend more time perching (Su et al., 2000). Improved leg health may lead to reduced levels of mortality and culling, and may also promote growth performance by facilitating access to feed.

The objective of the first experiment in this paper was to determine the preference of commercial broiler chickens for different perch types. Six perch types were assessed which typically differed in design, in material of construction and in perching space available. It was hypothesised that perch designs incorporating access to platform perching space would be preferred to those not offering this. This study was also used to gain more general information about ease of use of different perch designs, and about the effects of age and time of day on occupancy of perches. The objective of the second experiment was to examine the overall effects on welfare- and performance-related parameters of providing commercial broiler chickens with access to a preferred perch type. It was hypothesised that increased usage associated with having access to a preferred perch type would result in improved leg health, and consequent improvements in production performance. This study also investigated if the use and effectiveness of preferred perches was influenced by access to another type of environmental enrichment in the house in the form of peat-filled dustbaths. Dust bathing, like perching, may be considered a highly motivated behaviour in domestic fowl (Olsson and Keeling, 2005). The provision of dust baths filled with peat, a preferred dust bathing substrate (Petherick and Duncan, 1989), has the potential to stimulate an increase in bird activity levels which may have additional benefits for leg health. These leg health benefits may, in turn, make it easier for broilers to access perches. Therefore it was hypothesised that use of perches, and overall effects of access to perches on welfare-related parameters, would be improved if access to dust baths was also provided.

## 2. Materials and methods

Both experiments in this paper were approved by the School of Biological Sciences (Queen's University Belfast) Research Ethics Committee (reference number QUB-BE-AREC-17-001).

### 2.1. Experiment 1

#### 2.1.1. Treatments and experimental design

Perch design preference was assessed across two rearing cycles on each of two farms in Northern Ireland between June and November 2015. One house on each farm (Houses 1 and 2) was virtually divided into halves (front and back) and six perch designs were placed in each half house from the beginning of each rearing cycle. Perch type 1 ('A-frame', Supplementary Photo 1) was comprised of a plastic mesh platform area measuring 240 × 60 cm (located 66 cm above litter), and three wooden bars with rounded edges each measuring 300 × 4 cm (two bars each located 23 cm above litter and one bar located 88 cm above litter). Additional wooden bars with rounded edges were used to support the platform area and provided an additional 480 $cm^2$ of surface area in total. The perch also contained two metal mesh ramps each measuring 54 × 122 cm which could also be used for perching. Perch 2 ('flat top' ramp, Supplementary Photo 2) was comprised of a plastic mesh platform area measuring 58 × 59 cm (located 66 cm above litter) and four wooden bars with rounded edges (two of which supported the platform). Available wooden bars provided an additional 992 $cm^2$ of surface area in total and the two metal mesh ramps each measured 54 × 122 cm. Perch 3 ('curved ramp', Supplementary Photo 3) was comprised of a rectangle of wire mesh which was bent in order to provide a central summit measuring 5 × 98 cm (located 32 cm above litter), and two curved ramps each measuring 58.5 × 98 cm. Perches 4 and 5 ('fixed bar', Supplementary Photo 4, and 'suspended bar') were comprised of wooden bars with rounded edges measuring 300 × 4 cm. The bar from perch 4 was located 15 cm above the litter. The suspended bars were presented at ground level during Week 1 of the rearing cycle and were raised by 5 cm at the beginning of each week until a maximum height of 20 cm was reached at the beginning of Week 5 of the rearing cycle. Perch 6 ('suspended platform') was comprised of a plastic mesh platform measuring 240 × 60 cm. It was raised as described for the suspended bar above. Slots measured 2 × 5 cm in the plastic mesh and 3 × 3 cm in the wire mesh.

Perch designs included in this study represented those already in use on farms, or new designs being considered for commercial implementation. Perch types 1, 2, 3 and 4 were free standing, whereas perches 5 and 6 were suspended. Suspended bars were fixed to roof supports in Houses 1 and 2. Suspended platforms were suspended from roof supports in House 1. However, in order to avoid damaging metal roof supports, platforms were suspended within a free standing metal cradle within House 2. The location of perches was balanced as much as possible across each half of the house in order to control for placement effects. This meant that, where possible given existing house equipment, perch types were placed in opposing quarters of a particular house (Fig. 1), and this position remained constant across cycles.

#### 2.1.2. Animals, husbandry and housing

A total of 69,500 Ross 308 broiler chickens obtained from 1 breeding company (Aviagen Ltd, UK) were used. Birds were placed in houses 'as hatched', resulting in mixed sex houses, and both houses were matched exactly for strain of birds. Both houses were stocked to a target stocking density of 30 kg/$m^2$ during Cycles 1 and 2. Thinning did not take place in either house during Cycle 1, and an initial stocking density of 12birds/$m^2$ was used. However, during Cycle 2 approximately half of the birds from each house were removed for slaughter after day 30 of the production cycle, and the remaining birds were removed between days 32 and 42. Both Houses 1 and 2 were therefore stocked at a higher initial stocking density of 17birds/$m^2$.

Both houses were of a similar rectangular design and had windows placed down each of the long sides. House 1 was constructed of wood and House 2 of steel. Temperature, ventilation and feeding regimes, and feed sources and blends were identical between houses. Birds were fed on an *ad libitum* basis and received 3 different diets across the production cycle. All feeds were wheat/soya-based and were manufactured in a commercial feedmill (diet 1 was a starter crumb offered from days 0–10 days (21.5% crude protein (CP)); diet 2 was a grower pellet offered from 11 to 22 days (19.5% CP); diet 3 was a finisher pellet offered from 23 days to slaughter (18% CP)). All drinkers were of the nipple variety and included cups. The artificial lighting regime was identical across all houses and has been previously detailed in Bailie et al. (2013). The dark period was between 2300 h and 0500 h for both houses. Both lights and shutters were automatically controlled using timers. Shutters were set to automatically close at the onset of, and open at the end of, the dark period. Houses had centrally controlled indirect heating installed. Bedding comprised of wood shavings and was placed in the house prior to the birds arriving. Additional sawdust was then added to specific areas of the houses when deemed necessary by the farmer.

#### 2.1.3. Measurements

*2.1.3.1. Perch occupancy*. CCTV cameras (Swann Communications Ltd, Milton Keynes, UK) were used to record perches in both halves of each house across a 24 h period once a week during weeks 1–6 of Cycle 1 and weeks 1–5 of Cycle 2. Two cameras on tripods, set on opposite sides of the perches, were used to record the A-frame, 'flat top' ramp and curved ramp designs in order to ensure visibility of the entire perches, whereas one camera was used for other designs. The percentage occupancy of each perch was recorded using instantaneous scan sampling at 4 h intervals across each 24 h period (starting at 0000 h). Footage was