



# Laying Hen Welfare: An investigative look into overcrowding in nest boxes, keel bone deformities, and feather pecking

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## Background

As housing of commercial laying hens moves away from conventional cages, new protocols regarding laying hen welfare are being established to assess these changes in furnished cages and free-run systems. Three topics are investigated as opportunities to further increase laying hen welfare and consequently, production output: nest box overcrowding, keel bone deformities, and feather pecking and plumage damage.

### Overcrowding in Nest Boxes

Nesting is a behavioural need in hens and, as social animals, it is common for hens to share nest boxes. However, overcrowding of the nest box can lead to infected scratch lesions, heat stress, lethargy, and/or suffocation along with increased dirty, cracked, or broken eggs (Clausen and Riber, 2012). It is believed that when hens are able to distinguish between nest boxes, overcrowding is decreased (Clausen and Riber, 2012).

### Keel Bone Deformities

The keel bone is the attachment site for a bird's wings. Hens without keel fractures have been shown to lay more eggs and have higher egg quality scores than hens with keel fractures (Nasr et al., 2012). Perch characteristics are important factors in keel bone deformities as fractures are likely to occur during descending flights or during collisions with equipment.

### Feather Pecking and Plumage Damage

Feather pecking occurs when a hen pecks at the feathers of another hen, plucking them and creating plumage damage. The underlying motivation of feather pecking is believed to be redirected foraging behaviour (Bright, 2007). Feather pecking in hens is a multi-factorial problem that occurs in conventional and alternative housing. The two major events that precede aggressive feather pecking include over-crowding and/or a barren environment.

## Assessing the Problem

The Welfare Quality® Assessment Protocol used in the European Union, is an easy to use assessment system that any producer can apply. This protocol is used to identify deviations from optimal standards regarding overcrowding in nest boxes, keel bone deformities, and plumage damage.

### Overcrowding in Nest Boxes

Nest box usage is graded on the presence and evenness of eggs in nest boxes. According to the Welfare Quality® Assessment Protocol, nest box usage is evaluated by examining the distribution of eggs over the egg belt within each nest row. There should be, on average, the same number of eggs on the first, middle, and last part of the egg belt and the same number of eggs between nest rows.

### Keel Bone Deformities

According to the Welfare Quality® Assessment Protocol, keel bone deformities are assessed on a two point scale, with 0 points indicating a normal, straight keel without any dips, bulbs, deviations, or thickened sections. 2 points indicates the presence of a deviation or deformation of the keel bone, including thickened sections (Figure 1).

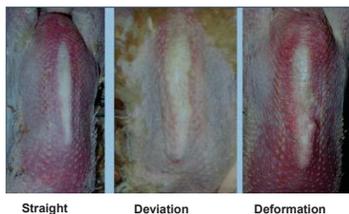


Figure 1. Increasing abnormalities from the straight (left) keel bone of the laying hen. (Source: Welfare Quality® Assessment Protocol for poultry, pg.66, 2009).

### Feather Pecking and Plumage Damage

According to the Welfare Quality® Assessment Protocol, plumage damage in laying hens is graded at three different body locations: the back and rump, head and neck, and the belly (Figure 2). Damage is graded into three categories: (1) no or slight wear, complete feathers or only a few lacking, (2) Moderate wear, one or more featherless areas less than 5cm in diameter, (3) At least one featherless area greater than 5cm in diameter.

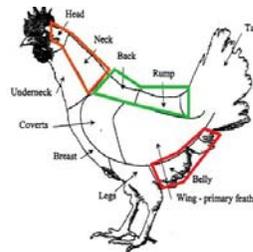


Figure 2. Laying hen body parts used to grade plumage damage. The three body parts, back and rump, belly, and head and neck, are graded individually on a 3 point scale according to the Welfare Quality® Assessment Protocol. (Source: Welfare Quality® Assessment Protocol for poultry, pg 73, 2009).

## Possible Solutions

Table 1. Solutions to overcrowding in nest boxes

<b>Nest Colour</b>	Middle nest boxes should be yellow, the preferred colour for the majority of hens (Figure 3). The corner or end nest boxes can be a natural colour (Clausen and Riber, 2012).
<b>Nesting Material</b>	The favoured bedding, straw, may be in the middle nest boxes with peat, wood shavings or artificial turf in the outer nest boxes, to encourage usage of middle boxes
<b>Nest Type</b>	Hens prefer both transparent and non-transparent flaps on nest boxes (Struelens et al., 2008).

Table 2. Solutions to keel bone deformities caused by perches

<b>Perch Size</b>	Perches should be 15cm per hen (Struelens and Tuytens, 2009).
<b>Perch Angles</b>	Angles should be less than 45 degrees between perches (Struelens and Tuytens, 2009).
<b>Perch Placement</b>	A perch parallel to the feed trough is necessary to orient for feeding. Elevated perches should be staggered.

Table 3. Solutions to aggressive feather pecking

<b>Bedding and Forage Material</b>	Straw and sand can decrease feather pecking (Dixon et al., 2010). Feather pecking occurs less in the presence of mash feeds than of pelleted feeds (Lindberg and Nicol, 1994).
<b>Lighting</b>	Low light intensity decreases feather pecking (Kjaer and Vestergaard, 1999).
<b>Enrichment</b>	Dust baths and/or hanging of novel objects such as tin foil, tissue paper, felt paper, chain devices, or string enrichments reduce feather pecking in hens.

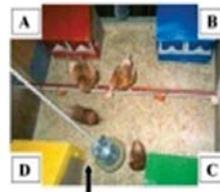


Figure 3. An experiment of colour preference of nest boxes in laying hens, A= red, B= blue, C= green, and D=yellow. Yellow nest box 'D' was the most preferred nestbox. Source: Zupan et al., 2007.

## Take Home Message

As the movement from conventional cages continues, new information and protocols regarding laying hen welfare are being developed to assess these changes. What initially begins as a solution to a problem can become a problem in itself if correct management practices are not utilized. Research is being conducted and strategies are currently available to help producers enhance the welfare of hens in their systems.

For more information see future editions of EggNotes or contact Dr. Clover Bench (Email: clover.bench@ualberta.ca; Phone: (780) 492-1883).