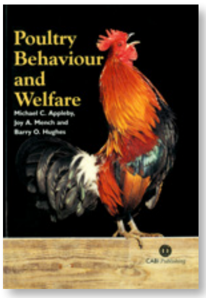
SCIENCE TEXTS

Extended Written Texts (Non-Fiction)

Appleby, M.C., Mench, J.A. & Hughes, B.O. ***Poultry Behaviour and Welfare.*** CAB International (2004).
Extracts from chapter 4 (pp. 47, 50, 60 & 61).



4 Maintenance

4.3 Development of Feeding and Drinking Behaviour

Chicks under commercial conditions have some difficulty in learning to peck at nipple drinkers; this movement has to be learnt. For this reason, the pressure in the system is often increased for the first few days, so that water drips slowly from the drinkers, thus encouraging the chicks to peck at the shiny drops.

4.4 Foraging Behaviour

Whether or not birds are highly motivated to obtain loose material, the absence of varied or manipulable substrates in systems leads to other problems. Perhaps most importantly, it probably contributes to the development of feather pecking and cannibalism (Section 5.10) in cages or wire floor systems: in one experiment, pullets in pens that were deprived of such substrates showed an increased frequency of redirected pecking (Blokhuis, 1989).

4.9 Movement

No other poultry production system is so restrictive of movement as battery cages. For laying hens, even provision of the 750 cm^2 per bird that will be required in the EU by 2012 would allow 13.3 $birds/m^2$. There is no single-tier floor system in which it is recommended that birds are stocked as densely as this, and in fact the new EU standards require than hens in non-cage systems be given more than 1100 cm^2 of space each (Chapter 12). Freedom of movement is reflected in the actual number of movements made by birds. One study comparing different systems (Knowles and Broom, 1990) found that hens took an average of 72 steps/h in cages and 208 in a perchery. Wing movements occurred twice per hour and flying 0.4 times/h in the perchery, whereas the latter was completely absent in cages. Another study found similar differences in wing flapping between hens housed in deep litter systems and those in cages (Norgaard-Nielsen, 1990). These differences affect bone strength. Tibia strength is increased by up to 41% and humerus strength by up to 85% in percheries and deep litter systems compared with cages (McLean *et al.*, 1986; Knowles and Broom, 1990; Norgaard-Nielsen, 1990). Bone strength and structure may also be improved in cages simply by adding a perch, although not as much as in alternative systems (Hughes and Appleby, 1989). Weak bones are more likely to be broken both within the system and when birds are removed for slaughter (Knowles and Wilkins, 1999). Up to 30% of caged birds suffer broken bones during catching and transportation, and more during processing, but there are around half as many breakages in birds from free range or percheries as in caged birds (Gregory and Wilkins, 1989; Gregory *et al.*, 1990).

Restriction of movement will also result in the prevention of specific behaviour patterns, because these need more space than standing (Fig. 4.8; see Table 8.1). Such prevention may cause frustration, as discussed later in the chapter, and restriction of movement can also have physiological consequences. Birds use postural changes such as erecting their feathers or elevating their wings to dissipate heat, so their ability to thermoregulate by behavioural means will be decreased under crowded conditions.

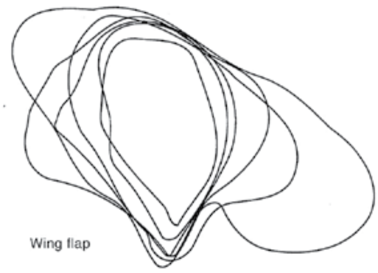


Fig. 4.8. The space used for wing flapping by an unrestricted hen. Successive outlines of the bird were drawn from an overhead video picture, starting with the smallest outline when the bird was standing still (Dawkins and Nicol, 1989). On average, wing flapping used 1876 cm^2 of space.

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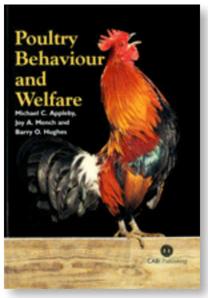

4.11 Comfort Behaviours

Preening and other comfort behaviours, such as wing flapping, feather ruffling and stretching, are important for keeping the plumage well groomed in both natural and from the uropygial gland (Fig. 4.11), which helps to maintain good feather condition, and birds will also dislodge and consume parasites living on their skin, such as ticks, while preening (Ostfeld and Lewis, 1999). These behaviours vary between systems in frequency, form, synchrony and, to some extent, also function. This variation is primarily associated with stocking density, because comfort behaviours require a large area for performance (Fig. 4.8; Table 8.1). In hens, they are therefore less frequent in battery cages than in more spacious systems and less frequent in small cages than large ones (Nicol, 1987a,b; Tanaka and Hurnik, 1992). To a lesser extent, they are also constrained by cage height (Nicol, 1987a) and in fact the cage height of 35–40 cm currently required by the EU restricts quite a lot of behaviour. Hence the new EU requirement for enriched cages is that at least 600 cm^2 of space per hen be 45 cm high. With unrestricted height, nearly 25% of hens' head movements occur above 40 cm. When hens are moved out of small cages, they perform comfort behaviours at an increased frequency, which suggests that constraints on comfort behaviours cause frustration (Nicol, 1987b).

4.12 Dust Bathing and Water Bathing

A dust bathing bout begins with the bird pulling loose substrate close to its body. Fluttering movements work this material up into the feathers, where it helps to distribute or remove oily secretions (Fig. 4.12). Although dust bathing thus occurs most often in housing systems with loose material, it can also occur in other housing systems in a 'vacuum' form, in which the bird carries out similar actions on slats or wire, although in longer bouts (Vestergaard *et al.*, 1990). This is sometimes interpreted as indicating high motivation, in which case birds deprived of loose material might suffer frustration. That birds are strongly motivated to dust bathe is suggested by an experiment demonstrating that chicks compensate for an interrupted dust bathing bout by dust bathing more than is typical the next time a substrate is available (Vestergaard *et al.*, 1999). Preference experiments, though, have failed to demonstrate consistent evidence for such strong motivation (e.g. Dawkins and Beardsley, 1986). However, hens deprived of dusting material after having been exposed to it for more than 2 years respond with increased corticosterone levels, suggesting that there is stress associated with dust deprivation for experienced birds (Vestergaard *et al.*, 1997). Experienced hens are also willing to work to gain access to a dusty substrate, even if they have not been deprived of the opportunity to dust bathe (Widowski and Duncan, 2000), indicating that the substrate itself has reinforcing properties for them.

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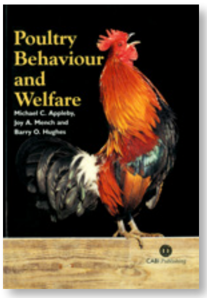
Appleby, M.C., Mench, J.A. & Hughes, B.O. ***Poultry Behaviour and Welfare.*** CAB International (2004). *Extracts from chapter 5 (pp. 81, 83, 84 & 87).*



CHAPTER 5 LIVING IN GROUPS

5.8 Stocking Density, Group Size and Spacing Behaviour

Stocking density and group size can affect both production and behaviour. In conventional cages, higher stocking densities and larger group sizes are associated with decreased egg production, higher mortality, more feather pecking and cannibalism and increased fearfulness (Adams and Craig, 1985; Mench and Keeling, 2001). In general, small group size is advantageous. For example, in cages for laying hens, small groups show higher production levels compared with larger unit sizes (Hughes, 1975b). There is also some evidence that in cages, stress decreases linearly with decreasing group size (Mashaly *et al*., 1984; Roush *et al*., 1984). Furnished cages that retain small group sizes may have similar advantages (Appleby, 1998). However, hens do not necessarily prefer small group sizes unless adequate space is also provided (Lindberg and Nicol, 1996).

It is not known whether birds become used to these continual encounters with unfamiliar individuals but, in small groups of chickens, contact with strangers results in increased heart rate (Candland *et al*., 1969), increased aggression (Craig *et al*., 1969) and growth of the adrenal glands (Siegel and Siegel, 1961), which are indicators of stress.

5.9 Feather Pecking

There are two kinds of feather pecking: gentle pecking that results in little damage (sometimes called allopecking or allopreening), and severe feather pecking that results in feather damage or loss. Feather pecking is different from aggressive pecking, both in character and in effect. The movements involved are not rapid and violent, as in aggression, but instead deliberate and similar to feeding movements (Wennrich, 1975). In more severe forms, the feathers are grasped and then pulled. Pecking is often directed at feathers that are damaged or distinctive, or which are out of line (McAdie and Keeling, 2000).

There are also major environmental influences on the behaviour. Predisposing factors identified in a recent survey of alternative housing systems in the UK were dietary changes, low temperature, high lighting levels during inspection, the use of bell drinkers, lack of use of the outdoor area and absence of loose litter at the end of lay (Green *et al*., 2000). As the last two factors suggest, feather pecking is worse in barren conditions, presumably because the availability of other, varied stimuli for pecking is then reduced (Blokhuis, 1989). It is therefore often a major problem in cages, reflected in the fact that worse feather loss has often been recorded in cages than in other systems (McLean *et al*., 1986; Appleby *et al*., 1988b).

Fig. 5.6. An extreme case of feather loss. While some feather loss is caused by abrasion, most is due to feather pecking.

5.10 Cannibalism

The same factors that result in higher levels of feather pecking also result in higher levels of cloacal cannibalism, but flocks do not necessarily experience both problems at the same time.