Why cages must be prohibited for meat chickens

Broiler cages are found in commercial use in many countries and increasing in China (pers comment, Wageningen University, 2018). They are prohibited in the UK and the EU, but are still sold by some European companies. For example:

Jansen (Netherlands company) has commercial partners in Russia, India, Bangladesh, China, Taiwan, Philippines, Malaysia, Turkey, Saudi Arabia, Argentina, Brazil, Mexico, Nigeria, South Africa. Big Dutchman (BD, German) is represented at 100 trade shows per year and is active in 18 countries. BD has its main regional centres in US, Russia, China and Brazil, and other subsidiaries in South Africa, Thailand, Turkey and Ukraine. Farmer Automatic (German) has commercial partners in US, China, Mexico, Venezuela, India, Pakistan, Taiwan, Saudi Arabia.[1] There are also BD copycat companies in China and many other Chinese manufacturers of cages plus others in India, Turkey at least.

Typically, such cages may hold over 120 birds, and stacked in up to 4 tiers. In total, a single house with broiler cages may have 80,000 birds or more. They usually have wire, plastic mesh or bamboo flooring and are completely barren. Manufacturer claims of improved hygiene, foot health, higher production and adequate visibility with cages are often poorly substantiated or can be debunked. (Additional evidence is available.)

The welfare problem with broiler cages:

Severe Confinement: Birds in cages cannot adequately exercise, foraging, perch, dustbathe, escape or avoid aversive interactions. They are more fearful than birds in large group housing systems. Rearing in a cage environment has been shown to cause birds to react in a more fearful way when tested in experimental trials. The inability of caged broiler chickens to perform dustbathing behaviour in loose litter may be a detriment to their welfare.[2]

Excessive stocking densities is probably the main welfare issue: according to some manufacturer recommendations for stocking density vary but for European companies can be up to 50kg/sqm, and possibly higher with other systems. A process of 'thinning' may be applied, after higher stocking densities are initially applied. In addition, a 4-tier system effectively quadruples the density of animal bodies in the shed, and would be expected to increase the density of pathogens and degrade air quality.

There is evidence that the recommended cage densities of 50kg/m^2 (25 birds/m^2 at 2kg weight) will reduce broilers' activity and welfare, although most studies are related to floor pens rather than cages. However, we know broilers will make considerable efforts to cross barriers to get to an area of lower density[3]. A 2008 study from China found that broilers in cages were less active (less walking, eating, preening) at 17 birds/m^2 than at lower densities[4] from 4-5 weeks of age, and a 2012 study from South Africa found that a cage density of around 17 broilers/m^2 was optimal (600cm^2 per bird)[5].

Reduced leg and bone health: A 2008 Egyptian study comparing two commercial flocks found that caged broilers were less active and that only 48% of the caged birds had normal walking ability (Gait Score = 0) compared to 72% of the floor birds, a difference attributed to

crowding and lack of exercise in cages[6]. There are also several older studies (pre-1990s) showing reduced bone strength in caged broilers[7] and a 1997 study in Turkey found that the weight, length and ash (ie minerals) content of the humerus was lower in caged broilers[8].

Increased feather loss: For laying hens, feather loss is generally worse in cages compared to other systems. The same appears to hold true for broiler chickens kept in cages. Better feathering was found in floor-reared birds compared to those raised in cages. Feather loss or damage may be caused by abrasion with the cage wire or from crowding, as has been demonstrated in experiments with laying hens[9].

Wire or mesh flooring of cages also has negative impacts on claw, foot and leg health.

Litter is absent. Shields and Greger's review of broiler cages makes the following points about the need for broilers to have litter, which is not available in cages:

- Litter may serve as a seeding agent for competitive exclusion by other microorganisms, and so reduce the likelihood of colonization by Salmonella. The gizzards of caged chickens have been found to be relatively undeveloped, attributed to the relative lack of insoluble fiber stimulation of the muscular organ. Providing chickens with access to bedding may also prevent *Salmonella* infection by improving gastrointestinal function.
- Dustbathing keeps the birds' plumage in healthy condition by balancing lipid levels in the feathers[10] [11] and is considered also a pleasurable activity. In behavioral experiments, Junglefowl deprived of dustbathing substrate will compensate by dustbathing more vigorously when eventually given access to a suitable substrate, showing that this is a strong need for chickens[12].
- Dustbathing behaviour is seen in young broiler chicks even in the first week of life[13].
- Both Junglefowl and domestic chickens have a strong motivation to forage and spend 50% of their time in foraging in naturalistic surroundings[14].
- Chicks begin to express exploratory pecking shortly after hatching[15], and studies of feral fowl report that broods aged 3–7 weeks, like adult birds, spent about half their daily time budget in foraging behaviour.
- Chickens will continue to work for their food (using an operant conditioning panel in a Skinner box) even when identical feed pellets are freely available in a feeder[16].
- Litter has been suggested that litter is beneficial for gizzard development and possibly for immune function.

Reduced ventilation and overheating: Ventilation is important for welfare and survival. A 2014 study from Pakistan found lower mortality near ventilation in both cage and floor systems for broilers. The industry admits that in cage systems the birds move to the side of the cage to get to cooler air in the alley, suggesting that ventilation through the cage is inadequate.

Increased breast blisters: Chinese researchers investigated the incidence of breast blisters in broilers housed in wire-floored-cages, and bamboo-floored cages. The results showed a significantly higher incidence of breast blister in wire floored cage systems.[17]

Very limited inspection: Ladders may be available, but are unlikely to be used. And if used, is inspection of cages using a stepladder-trolley as effective than in intensive floor systems?

What is the cage system equivalent of walking the shed to check whether birds are capable of standing and walking?

Mortality rates are apparently similar in cage and floor systems, according to studies from 2001 to 2014 in India, Egypt and Nigeria[18].

Fast growth rate is already a significant commercial broiler welfare issue. If manufacture claims of faster growth rates are indeed correct, existing welfare issues would be presumed to be further compounded in cages and mortality could be even higher.

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