

Why a minimum 30kg/m² stocking density matters for meat chickens.

This fact sheet outlines scientific backing against overcrowding or high stocking density (SD) and argument for a 30kg/m² minimum SD for broilers. SD is one of the key factors directly impacting behaviour, litter quality and welfare plus a range of indirect impacts, interrelating with climate, ventilation, enrichment and genetics.

Problems with overcrowding (high stocking density):

High SD has a direct impact on welfare by reducing movement, resting, increasing stress, manure and altering behaviour and indirect impacts via reduced litter and air quality, increased skin, leg and carcass pathologies. There is ample earlier scientific evidence establishing the following key problems, while a recent welfare and economic review reiterate that high SD relates to a wide range of welfare outcomes including panting, lameness, hock burn, breast blisters, plumage dirtiness and behaviour¹. These problems also have an impact on production and variable costs.

Overcrowded chickens (high SD) can experience severe problems including:

- **Reduced ability to perform natural behaviors:** Motivation persists, but at high densities there is less opportunity to perform natural behaviours such as wing-flapping, while locomotion and environmental exploration are also inhibited and ground pecking decreased. It becomes harder for birds to move around, so more time is spent sitting and nearer feeders and drinkers, to ensure enough intake. Preening, lying and resting sessions are shorter due to disturbances and walk overs², and an increase in fearfulness results at high SD^{3 4 5}. Feeding behaviour is negatively associated with increasing stocking density, especially with additional heat stress.
- **Social aversion:** Assessment of chicken perception of social space is complex, as it depends on the motivation and activity performed at the time (e.g. wingflapping and dust bathing vs clustering during certain activities or panic). Some research has demonstrated that birds experience aversion to other birds even at around 6 birds/m², a very low density compared to commercial conditions⁶.
- **Restricted movement and resting** impacts broiler development, compounding bone development leg defects and results in weakness, pain, poor walkability and lameness. There is a relationship between gait score⁷ and stocking density, associated with reduced exercise and leg health⁸⁹. Rest is important for young, growing birds (which is what broilers are) and increased disturbances lead to reduced rest, which impacts development (bone density, strength and curvature) and welfare¹⁰. Decreased bone quality is further a concern as it predisposes birds to damage and fractures during catching and transport.
- **Mortalities and carcass bruising:** At 40kg/m² (compared to 34kg/m²), higher daily mortalities and more carcass bruising¹¹ occurred. Studies of heat stress and high SD are associated with higher mortalities (including marked increases in broiler stress and welfare in cages).
- **Leg strength, defects, lameness:** overall lameness increases in severity and prevalence with increasing stocking density¹². There is substantial evidence to show that leg strength and development decrease at higher SD, with negative impacts on tibia curvature, impairing walking and causing bruised and dislocated hocks, and fractures^{13 14 15}. Poor leg health and lameness is also associated with reduced activity (restricted movement) and higher levels of footpad dermatitis via poor litter quality (see below). Specifically:
 - A 2008 survey of 176 UK broiler flocks (representing 4.8 million broilers) found that 27.6% had severe walking problems and 3.3% were almost unable to walk; overall 97.5% of the birds had some degree of gait abnormality¹⁶

- Between 5-7 weeks of age, modern (conventional fast growth) broiler chickens spend 76-86% of their time sitting / resting, depending on the degree to which they suffer from lameness).
- **Contact dermatitis, feather damage and dirtiness** is often seen at higher rates in highly stocked systems due to excessive production of waste and ammonia from too many chickens in that space and then excessive contact with wet/dirty litter¹⁷¹⁸¹⁹. Overcrowding combined or not with leg defects and inactivity means more time sitting. Resulting inflammation of the skin of the breast (or breast blisters), hocks (hock burn) and footpad dermatitis (FPD) with higher SD²⁰²¹. In severe cases, inflammation can become very painful, combined with infection and ulceration, also leading to culling or condemnation.
- **Air quality, immunity, health, heat stress and growth:** Dust and ammonia concentrations increase with stocking density, and impact air quality, immunity and respiration and add additional stress to birds²². There is also a direct relationship with stress indicators²³, particularly at the highest stocking densities causing acute stress in female broilers²⁴ and other negative impacts on gut health and disease in younger chicks. High stocking densities can result in heat stress (hyperthermia)²⁵. This is especially noticeable in warmer climates and with fast growth genetics, and is expressed by an increased respiration (panting)²⁶.
- **Thinning** is commonly used in the broiler industry and involves the catching and removal of a portion of the flock for slaughter, to allow the remaining birds more room to grow on to a greater weight. This process causes stress and potential injury to the animals during catching as well as an increased risk of Campylobacter in the remaining flock which causes food poisoning in people.

Why SD of 30kg/sqm or less matters to chickens:

The meat chicken is derived originally from the Asian jungle fowl and retains the natural behaviours of this original bird in a manipulated pattern in industrial farming. The modern meat chicken is still inherently motivated and needs to freely move, scratch and peck to feed (forage), assess and explore their environment, dust bathe to maintain plumage health, perch for hierarchy and safety, retreat, sleep and socially interact with other birds²⁷. A reduction of stocking density can have positive effects on behaviour and chicken performance²⁸. Combined with targets for animal-based measures of lameness and contact dermatitis, lower limits on stocking density with are important for good animal welfare outcomes.²⁹

Lower SD allows space to **move, perform natural behaviours and develop properly**, avoiding significant leg deformities, health impacts plus a range of better outcomes associated with reduced stress, litter and air quality. In summary, less densely stocked birds are more active, have better walking ability, perform more natural behaviours (and right up to slaughter) and have reduced skin burns, respiratory challenge and risk of heat stress^{30 31}.

Substantial earlier science demonstrated that there was a tendency for depression of growth of broilers if SD was greater than 30kg/m² under litter conditions, though this impact disappeared with increasing ventilation rate. More recent research³² has demonstrated that feed conversion, bodyweight gain (and digestive health, and litter quality) have been found to be negatively affected when meat chickens were reared at 17 birds (~42kg) compared to 12 birds (~30kg) per m².

A minimum of 30kg/m² or less contributes to a life worth living for meat chickens. They usually experience:

- Significantly **reduced leg disorders** e.g. tibial deviation, rotation and related pathologies, **lameness and better gait scores**
- Better litter quality (less wet, less ammonia) and significantly **reduced contact dermatitis** (hock, beast burn) at SD at or above 30kg/m² compared to 24kg/m² (numerous references). Less footpad burn and better gait scores in a study comparing 26kg/m² and 42kg/m²³³
- Better air conditions and **reduced respiratory challenge**. In addition to ammonia, in dry conditions, increased SD can lead to increased airborne dust and more respiratory challenge, which reaches a plateau at SD greater than 30kg/m² ³⁴.
- **Reduced risk or avoidance of heat stress**³⁵.
- **Reduced feather damage**³⁶ and **cleaner plumage**
- **Reduced stress and improved immunity** when compared to higher commercial stocking densities³⁷
- **More normal levels of activity and repertoire of behavior**: more walking, running, preening and calm behavior and more active generally and in the last weeks before slaughter. Walking ability is severely affected at high SD and worse at 32 than 25 kg/m². SD greater than 25kg/m² are associated with less active birds, performing fewer natural behaviours (e.g. exploring, preening and scratching less) and birds spend more time and move closer to feeders and drinkers, particularly in the latter stages of growth, to obtain enough food and water^{38 39}.
- **Better resting and related physical development** due to less restlessness and fewer birds stepping on each other (sometimes causing hip injuries or lesions) and shorter, undisturbed bouts of resting. SD greater than 28kg/m² was reported as too high for normal resting to occur ⁴⁰.
- **Chickens show a preference and motivation for lower stocking densities**: Motivational testing demonstrated willingness to work to get to lower stocking densities (even < 31kg/m²), while other testing demonstrated a preference to move to SD lower than 40kg/m²⁴¹.

A 2000 European report concluded: 'it is clear from the behaviour and leg disorder studies that the stocking density must be 25kg/m² or lower for major welfare problems to be largely avoided and that above 30kg/m², even with good environmental control systems, there is a steep rise in the frequency of serious problems'⁴².

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