

The benefits of enrichment for indoor meat chickens

This fact sheet outlines scientific principles for enrichment for all poultry, with specific evidence for indoor meat chickens and perches, platforms, straw bales, plus other objects for pecking, retreat and dust bathing.

The problem with barren environments:

The European Food Standards Agency (2010) clearly states that a barren environment hampers behavioural expression of broilers. Conventional broiler housing systems are often barren and provide little opportunity for natural behaviours such as foraging, perching, scratching, retreat and dust bathing. This can impact welfare negatively, in terms of fear, cognitive impairment (Tahamtani et al, 2015), deprivation of behavioural needs, and development of abnormal behaviours and leg weakness. Damaging behaviours may be increased if animals are deprived of sufficient amounts of stimulation as reported with chickens (Leone & Estévez, 2008). Barren environments can also compound other existing health and welfare risks associated with conventional meat chickens.

Meat chickens can spend a significant proportion (60-80%) of time resting (Baillie *et al.*, 2013; Bizeray *et al.*, 2002). High levels of inactivity are significantly correlated to fat levels (Simsek *et al.*, 2009) and arguably exercise may reduce the impact of leg problems in broilers by increasing muscle strength. Consequently, this can have economic benefits by reducing the financial losses caused by culling and carcass downgrades (Simsek *et al.*, 2008 & Pettit-Riley, 2001). Broilers reared under commercial conditions show a reduction in activity from 3 weeks of age and high levels of inactivity have been linked to increased incidence of leg problems (Baillie *et al.*, 2013). Reduced activity levels associated with increased stocking density have been suggested as a factor involved in the development of leg problems in broiler chickens (Baillie *et al.*, 2013).

Importance, examples and benefits of enrichment for meat chickens:

Enrichment can be defined as providing opportunity for greater behavioural expression with "improvement in the biological functioning of captive animals resulting from modifications to their environment", evidence of which may include increased reproductive success and improved health (Newberry, 1995). Methods of enrichment are often incorporated into an animal's environment to improve health, welfare and promote activity and natural behaviours. Enrichment should encourage animal-environment interactions (visual, tactile, olfactory or auditory stimulation) (Kells *et al.*, 2001).

- Provision of enrichment items such as perching materials or platforms, straw bales and pecking objects provide additional **foraging** material for birds, promote **increased activity** and movement within the house and therefore contribute to **improved leg health and litter quality**.

- Enrichment, especially from early in life, can also **increase exploratory behaviour and reduce fearfulness and flightiness** in response to novel stimuli and/or humans. Fearfulness can not only have a negative effect on welfare but also on productivity where sudden or prolonged fear can cause pain, injury and distress due to panic responses. Broken bones, scratching and bruising as a result of panic responses can result in **productivity impacts** by increasing carcass downgrading levels. Research indicates that fearful birds show poorer growth and decreased feed efficiency and can impact on management due to difficulty in handling. The cost of reduced feed efficiency has previously been estimated to add an extra £5 million on the feed bill for the UK broiler industry and twice that for the egg industry in reduced production (Robins & Philips, 2011).
- Providing **stimulation** in the environment through the provision of alternating toys such as balls, plastic bottles and mirrors from placement has been shown to decrease fearfulness (during events such as heat stress, noise and crating) when compared with broilers that were not provided with enrichment (Altan et al., 2013; Nicol et al., 2017; Riber et al., 2018). Perches can provide a means of escape from aggressive encounters.
- Experts propose that enrichment provided **from the first 2 weeks of life** was the most effective, and aligns with concepts of imprinting, development of preferences and cognitive abilities as well as adaptability. (Sanotra et al., 1995; Jones et al., 2000, Jones 1982)
- The provision of enrichment also **increases space use** within the house and encourages a more even distribution of animals as well as **reducing disturbances and aggressive interactions** (Leone & Estévez, 2008). Research has shown that chickens will move readily through a gate in a wall to reach an adjoining pen containing novel objects, suggesting that chickens do find enriched environments attractive and are willing to work to gain access to these environments or items (Leone & Estévez, 2008).
- Provision of objects to scratch, climb and perch has been shown to contribute to **improvements in leg conditions** in broilers (Bessei, 2006; Simsek, 2009). Perching behaviours (accessing perch and maintaining balance) exercise the musculoskeletal system in a different way to walking. The use of platforms and perches have shown an improvement of leg health via a **lower gait score** (Riber et al., 2018) via lower incidence of tibial dyschondroplasia and improved bone mineral content (Kaukonen, E. Norring, M. Valros, A. 2016). Results from Ventura *et al.* (2010) showed reductions on the incidence of footpad in birds where simple perching structures were provided. Kiyma, Küçükylmaz, & Orojpour (2016) suggested that perch use reduces the

prevalence of foot pad lesions, probably through increased exercise and utilization of vertical space and therefore reduced density accompanied with better litter quality, as already suggested by Robins & Philips (2011) demonstrating **reduced the incidence of contact dermatitis**: breast and hock burn and foot pad dermatitis. Zhao et al. (2013) also found a reduction of food pad dermatitis associated with access to perches. Since straw bale and platform enrichment reduce the contact of the broiler with wet litter, these enrichments also reduce the probability of footpad lesions.

- Providing perches for broiler chickens can also have benefits to welfare by allowing the birds the opportunity to perform a natural behaviour and exert some **control over their environment**. The greater the **accessibility of perches** the greater the perch use (Pettit-Riley & Estevez, 2001; Bizeray *et al.*, 2002). Bizeray *et al.* (2002) showed that lying time decreased in broilers that were given access to perching and that the height and location of perches between resources was important for encouraging birds to interact with their environment.
- The use of perches is not always been high but recent research with **platforms show they are better used and by more birds** demonstrating the motivation persists to access height (Norrington, Kaukonen, & Valros, 2016). Reduced perch use may be associated with **physical challenges** (eg. from fast growth genetics and leg deformation/weakness) which inhibit greater perch use which involves more balance also. ⁱCombined with slower growth genetics and access to natural light, increased perching (and platform use) would be expected in commercial settings as in organic systems. ⁱⁱ Fear reducing effects were found for fast-growing broilers when platform were placed the broiler house (Riber et al, 2018).
- **Straw bales** have been shown to promote **increased activity** (pecking and movement regardless of whether birds were in direct contact with the straw bales) as well as perching. Bessei (2006) reported that bouts of resting were longer and bouts of locomotion, standing and drinking were shorter in unenriched houses
- Access to perches is believed to improve the thermoregulation as they can get away from heat-emitting litter, and will get air under their bodies; this way, perch may **reduce heat stress** (Riber et al., 2018). The **plumage is kept cleaner** when perches are provided, as perches decrease contact with litter (Zhao et al., 2013). Kiyama et al. (2016) also found a positive impact of perches on plumage cleanliness. As straw bales and platforms also enable the broiler to get away from heat-emitting litter, platforms are also believed to reduce heat stress and plumage dirtiness (De Jong, personal communication, February 2, 2018).

- Simsek *et al.* (2009) found that providing perches as well as sand bedded areas and woodshavings (for dustbathing and /or foraging) showed significant decreases in hock burn. Baxter M, Carley L, O'Connell N (2018) similarly showed that oat hulls provided a good foraging and dustbathing substrate, also conveying greater **walking ability** than straw bales alone or no enrichment.
- **Good lighting, especially natural lighting** also encourages greater use of enrichment. Bailie *et al.* (2008) showed that birds reared under artificial light with no enrichment had higher gait scores and poorer walking ability than birds reared with natural light and straw bales although there were no significant differences in hock burn, pododermatitis, slaughter weight or culling levels. Birds with natural light and straw bales also showed an increased latency to lie suggesting improved leg health. Natural light was suggested as the dominating contributing factor for this as straw bales were perhaps not provided at high enough numbers throughout the house to show significant effects on behavioural increases.
- Covered areas may be provided as a form of enrichment and enable not only greater behavioural opportunities for birds but also improve use of space and **reduce stress levels**. Leone and Estévez (2008) showed that **productivity factors including fertility, egg production and hatchability could be improved** by providing enrichment into commercial broiler breeder houses in the form of **cover panels**. Floor eggs were also reduced. Economic gains from the effect of providing enrichment on productivity were reported at approximately US\$3.3 million (Leone and Estévez, 2008).

Altan O, Seremet C, and Bayraktar H (2013) The effect of early environmental enrichment on performance, fear and physiological responses to acute stress of broiler. *Arch. Geflügelkd.* 77:23–28.

Bailie, C.L., Ball, M.E.E. & O'Connell, N.E. (2013) Influence of the provision of natural light and straw bales on activity levels and leg health in commercial broiler chickens. *Animal* 7:618-626

Baxter M, Carley L, O'Connell N (in press) Evaluation of a dustbathing substrate and straw bales as environmental enrichments in commercial broiler housing. *Applied Animal Behaviour Science*.

Bessei, W. (2006) Welfare of broilers: a review. *World's Poultry Association* 62: 455-557

Bizeray D., Estevez, I., Letterier, C. & Faure, J.M. (2002) Effects of increasing environmental complexity on the physical activity of broiler chickens. *Applied Animal Behaviour Science* 79: 27-41

Donaldson, C.J. & O'Connell, N.E. (2012) The influence of access to aerial perches on fearfulness, social behaviour and production parameters in free-range laying hens. *Applied Animal Behaviour Science* 142: 51-60

EFSA. (2010). *Scientific Opinion on the influence of genetic parameters on the welfare and the resistance to stress of commercial broilers*.

Jones, B.R. (2002) Roles of comparative psychology in the development of effective environmental strategies to improve poultry welfare. *International Journal of Comparative Psychology* 15: 77-106

Jones, RB, Carmichael, NL and Rayner, E. (2000). Pecking preferences and predispositions in domestic chicks: implications for the development of environmental enrichment devices. *Applied Animal Behaviour Science*, 69: 291–312.

Jones, RB. 1982. Effects of early environmental enrichment upon open-field behavior and timidity in the domestic chick. *Developmental Psychobiology* 15:105–111.

Kaukonen, E. Norring, M. Valros, A. (2016) Perches and elevated platforms in commercial broiler farms: use and effect on walking ability, incidence of tibial dyschondroplasia and bone mineral content. *Animal*, page 1 of 8

- Kells, A., Dawkins, M.S. & Cortina Borja, M. (2001) The effect of 'Freedom Food' enrichment on the behaviour of broilers on commercial farms. *Animal Welfare* 10:347-356
- Kiyama, Z., Küçükyılmaz, K., & Orojpour, A. (2016). Effects of perch availability on performance, carcass characteristics, and footpad lesions in broilers. *Archiv fuer Tierzucht*, 59(1), 19.
- Leone, E.H. & Estévez, I. (2008) Economic and welfare benefits of environmental enrichment for broiler breeders. *Poultry Science* 87:14-21
- Newberry, R.C. (1995) Environmental enrichment: Increasing the biological relevance of captive environments. *Applied Animal Behaviour Science* 44: 229-243
- Nicol CJ, Bouwsema J, Caplen G, Davies AC, Hockenhull J, Lambton SL, Lines JA, Mullan S, Weeks CA (2017) Farmed Bird Welfare Science Review. Department of Economic Development, Jobs, Transport and Resources. 1–321.
- Norring, M. Kaukonen, E. Valros, A. (2016) The use of perches and platforms by broiler chickens. *Applied An Behav Sci* 184:91-96
- Pettit-Riley, R. & Estevez, I. (2001) Effects of density on perching behaviour of broiler chickens. *Applied Animal Behaviour Science* 71: 127-140
- Riber, A. B., Van de Weerd, H., De Jong, I., & Steinfeldt, S. (2018). Review of environmental enrichment for broiler chickens. *Poultry science*, 97(2), 378-396.
- Robins, A. & Philips, C.J.C. (2011) International approaches to the welfare of meat chickens. *World's Poultry Science Journal* 67: 351-369
- Sanotra, GS, Vestergaard, KS, Agger, JF and Lawson, LG. (1995). The relative preferences for feathers, straw, wood-shavings and sand for dustbathing, pecking and scratching in domestic chicks. *Applied Animal Behaviour Science*, 43: 263–277.
- Simsek, U.G., Dalkilic, B., Ciftci, M., Cerci, I.H. & Bahsi, M. (2009) Effects of enriched housing design on broiler performance, welfare, chicken meat composition and serum cholesterol. *Acta Vet. Brno* 78:67-74
- Tahamtani FM, Nordgreen J, Nordquist RE and Janczak AM (2015) Early life in a barren environment adversely affects spatial cognition in laying hens (*Gallus gallus domesticus*) *Front. Vet. Sci.* 2:3.
- Ventura, B.A., Siewerdt, F. & Estevez, I. (2010) Effects of barrier perches and density on broiler leg health, fear and performance. *Poultry Science* 89: 1574-1583
- Yngvesson, J. Wallenbeck, A. Jonsson, L. Gunnarsson, S. 2016 Behaviour of broilers in semi-commercial organic rearing – behaviour and mortality of hybrids with rapid or slow growth rate. International Society for Applied Ethology Abstracts Edinburgh 2016 congress, p239
- Zhao, J., Jiao, H., Jiang, Y., Song, Z., Wang, X., & Lin, H. (2013). Cool perches improve the growth performance and welfare status of broiler chickens reared at different stocking densities and high temperatures. *Poultry science*, 92(8), 1962-1971.
-