The impact of thinning (partial depopulation) on broiler welfare

Thinning, also referred to as 'partial depopulation' or 'multiple pick-ups' is where a proportion of birds are removed from a house prior to final depopulation. In meat chicken (broiler) rearing, this process is common practice in many parts of Europe and the US, where one or two thins take place towards the end of the growing period, usually at approximately 35 days (Newell & Fearnley, 2003; Robins & Phillips, 2011). The number of thins or whether thinning occurs at all can depend on the market demand for lighter or heavier birds, for example, in New Zealand and Australia thinning may take place up to four times (Robins & Phillips, 2011).

Thinning is largely undertaken for economic reasons (Humphrey, 2013). It enables production systems to initially stock a higher number of birds than would be allowed if thinning was not to take place i.e. the number of birds housed would exceed recommended stocking density limits if all birds remained until slaughter (Humphrey, 2013). Consequently, this means that there is increased utilisation of floor space with increased kilograms of meat per m^2 as stocking density guidelines are maximised (Bilgili, n.d.; Humphrey, 2013).

Birds may be housed in several ways to facilitate planned thinning:

- Separated within a house according to sex. Females (the smaller birds) are removed first (see figure 1).
- Reared in mixed sex houses and birds removed dependent on weights required to meet demand.

It is more likely that multiple thins will occur with the latter housing type (Bilgili, n.d.; Robins & Phillips, 2011). Figure 1 (below) illustrates how stocking density and volume of meat produced is maximised by initially stocking a higher number of birds in one house and separating them according to sex. Females are then removed prior to depopulation.

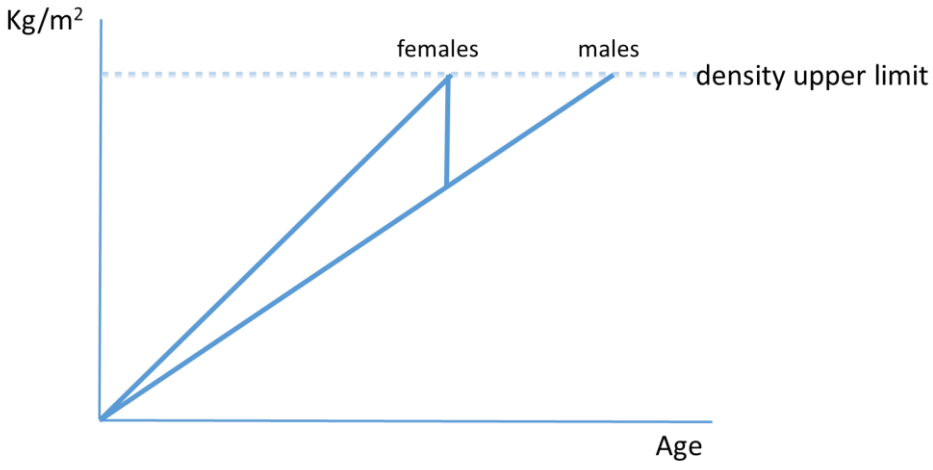

Figure 1. Outline of the effect on stocking density within a house when females are removed prior to final depopulation.

Although the economic benefit of stocking birds in this manner may be clear, undertaking thinning can have a negative impact on welfare as well as posing other risks such as the contribution to food safety risks. The implications that thinning can have on bird welfare, productivity and food safety are outlined below.

Effect of thinning on bird welfare:

Stocking density

- High stocking density is a major welfare issue within intensive broiler production (Bessei, 2004). Welfare problems include restricted movement and space, elevated fear levels, increased temperatures and risk of heat stress, particularly in warmer climates, as well as footpad dermatitis, leg issues and breast lesions associated with poor litter quality (De Jong *et al.*, 2012; Bessei, 2004).
- As birds approach maximum stocking density these issues may be exascerbated and those birds that are not depopulated will reach maximum stocking density on more than one occasion and repeatedly suffer the associated stress as a result. Knowles *et al.* (2008) reported a deterioration in gait score (i.e. a decrease in leg health) for every 1kg/m^2 increase in the stocking density of remaining birds after partial depopulation had taken place.

Feed restriction

- Feed will be withdrawn from birds prior to depopulation in order to reduce faecal waste and contamination during processing. If the structure or equipment within the house does not allow, all birds within the house may have feed withdrawn subjecting all birds to hunger.
- As motivation to feed is high in broilers, feed withdrawal can cause frustration and impaired welfare (De Jong *et al.*, 2012). Behavioural monitoring at lairage has shown that fasting time influences behaviours indicative of reduced welfare such as panting (thermoregulatory control), and distress behaviours such as increased activity and vocalisation (Pereira *et al.*, 2013). Agonistic behaviours also increase as fasting time increases.
- Fasting can also cause a disturbance of the intestinal micro-flora as bacteria within the intestine are not emptied. As such there can be a rapid multiplication of *coccidia* (parasitic organisms that cause intestinal disease) in the absence of anticoccidial protection (Bilgili, n.d.).
- Remaining birds may gorge when feed is returned. As well as causing intestinal issues, gorging can lead to increased feed competition and aggressive interactions which can affect the uniformity of the flock as well as affecting skin and carcass quality during processing (Bilgili, n.d.).
- Feed and water deprivation decreases birds' resistance to *Campylobacter*.

Biosecurity & catching

- Catching of birds can cause stress for birds being depopulated and also for the remaining birds (Humphrey, 2007).
- Birds that are collected at a later time undergo the repeated trauma and stress associated with catching.
- Stress caused by catchers is associated not only with the entry of the catching crew into the house but also the time of catching, which may occur during resting periods. This is evidenced whereby

gait score has been shown to worsen after thinning which may be attributed to the stress caused (Knowles *et al.*, 2008).

- Increased wing flapping associated with a disturbance such as catching within a flock can lead to increased wing damage as well as an increase in deep pectoral myopathy (necrosis of the deep pectoral muscle associated with sudden or sustained exertion) which can result in a higher level of carcase downgrades at processing (Bilgili, n.d.)
- Birds remaining after thinning can exhibit marked signs of stress which may have a consequential impact on meat quality.
- Stress caused to birds from the thinning process can increase their susceptibility to bacterial and viral infections (Humphrey, 2007).
- Catching is associated with a break in biosecurity and as such increases the risk of introducing campylobacter and/or salmonella into the flock. Both are frequently found on catching crew clothing and footwear as well as vehicles, lorries and crates (Bilgili, n.d.).

Effect of thinning on food safety:

- World Health Organization figures indicate that *Campylobacter* is the most frequent cause of food borne bacterial gastroenteritis in the world (Bull *et al.*, 2008; Humphrey *et al.*, 2014). All types of poultry can carry *Campylobacter* and high levels of *Campylobacter* in the intestinal tract of birds can contaminate meat during processing. Within the EU, it has been estimated that up to 80% of Campylobacter infections are linked back to chicken meat (EFSA, 2011).
- Stress can make birds more susceptible to *Campylobacter* due to the associated change within the intestinal environment and so birds remaining in a flock after partial depopulation are more likely to be *Campylobacter* positive (Humphrey, 2013). The process of partial depopulation has been shown to double *Campylobacter* rates (Humphrey, 2007).
- Where disease resistance is already compromised by poor health and welfare there is an increased risk of *Campylobacter* infection in birds suffering from acute or chronic stress (Humphrey, n.d.).
- Increased levels of mortality, hock marks and pododermatitis (which will be increased at higher stocking densities) have been found to be risk factors for *Campylobacter* infection (Bull *et al.*, 2008; Humphrey, n.d.).

Solutions

Some methods employed by producers to reduce the stress associated with thinning are:

- Full division of a house, with male and female birds reared separately within one house. This can be done using curtains and may allow for separation of light regimes in each side of the house and less disturbance to the birds that are remaining in the house after thinning. However, feeding and lighting equipment would have to be set up to allow for separate rearing. Ventilation within

the house may also be restricted if this method is used unless controls are put in place to effectively manage this.

- Catching during the dark period and using blue lighting to try to minimise bird stress. This means that lighting regimes would not have to be altered prior to catching and night/day lighting regimes can be maintained. However, stress caused to birds by disturbance at unusual times would not be avoided.

To avoid the issues associated with thinning the most effective solution is to abandon the practice and stock at a lower level, so maximum stocking density is only reached on one occasion. This can be facilitated by determining the sex of birds at the hatchery and housing males and females in separate housing, thereby operating an 'all in-all out' system in each house. This method may also mean that the economic impacts of abandoning thinning can be reduced as market demands for different carcass weights can still be met. Housing birds in this way will also reduce welfare issues and carcass damage that can occur at the slaughter and processing stages, as a result of slaughtering birds of different weights together (i.e. males and females). These issues are caused by mis-stunning of smaller birds (where shackling equipment and machines are set for an average size bird, resulting in ineffective stunning of smaller birds) and poor plucking or carcass damage to birds dependent on machinery set up.

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