Killing of spent laying hens using CO$_2$ in poultry barns

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Abstract

In Sweden, laying hens are killed using the following methods: i) traditional slaughter; ii) on-farm with CO$_2$ in a mobile container combined with a grinder; or iii) with CO$_2$ inside the barn. The number of hens killed using the latter method has increased. During these killings a veterinarian is required to be present and report to the Swedish Board of Agriculture. Data were registered during four commercial killings and extracted from all official veterinary reports at CO$_2$ whole-house killings in 2008–2010. On-farm monitoring showed that temperature decreased greatly and with high variability. The time until birds became unconscious after coming into contact with the gas, based on time until loss of balance, was 3–5 min. Veterinary reports show that 1.5 million laying hens were killed, in 150 separate instances. The most common non-compliance with legislation was failure to notify the regional animal welfare authorities prior to the killings. Six out of 150 killings were defined as animal welfare failures, eg delivery of insufficient CO$_2$ or failure to seal buildings to achieve adequate gas concentration. Eleven were either potentially or completely unacceptable from the perspective of animal welfare. We conclude that, on the whole, the CO$_2$ whole-house gas killing of spent hens was carried out in accordance with the appropriate legislation. Death was achieved reliably. However, there remain several risks to animal welfare and increased knowledge would appear vital in order to limit mistakes related to miscalculations of house volume, improper sealing or premature ventilation turn-off.

Keywords: animal welfare, carbon dioxide, killing, laying hen, on-farm, whole house

Introduction

Normally, at the end of their laying period, spent laying hens from conventional production have no economic value, since the cost of carcase processing greatly exceeds any profit from the sale of meat. Furthermore, some end-of-lay flocks are not suitable for traditional slaughter and transport due to disease problems, poor plumage condition or poor skeletal strength. For example, Weeks et al (2012) found these factors significantly affected the number of hens found dead on arrival at the slaughter plant. Another problem is that journey time from the farm to the nearest slaughterhouse often exceeds the maximum time stated by national legislation. Hence, other methods, including killing of laying hens inside barns, have been developed and used as alternatives to traditional slaughter.

The welfare of hens and other types of poultry at euthanasia has been discussed and investigated by, for example, Shields and Raj (2010), for several years. On-farm killings, using CO$_2$, CO$_2$ whole-house killings and mobile killing devices were studied by Gerritzen et al (2006) during the 2003 avian influenza outbreak. The main welfare issues identified were: i) the catching and handling of birds for slaughter or killing outside the barn; and ii) the time to unconsciousness when killing birds inside the barn. Examples of whole-house methods are the introduction of agents such as hydrogen cyanide (HCN) or carbon dioxide (CO$_2$) gas (Berg 2009) or nitrogen (N$_2$) gas (A Huda, personal communication 2013) into the barns. There have also been trials investigating the use of CO$_2$- (Gerritzen & Sparrey 2008) and nitrogen-filled foam (Sparrey et al 2012; McKeegan et al 2013).

Behaviour and welfare

Birds from the Gallus family seem able to detect CO$_2$ at concentrations of 5.0–7.5% (Raj & Gregory 1991; Gerritzen et al 2007), which is lower than concentrations used for the purposes of killing. Furthermore, these birds actively avoid (Lambooj et al 1999; Webster & Fletcher 2004; Sandilands et al 2011) atmospheres with CO$_2$ levels above 7.5% (Raj & Gregory 1991). A recent study showed that birds provided with an opportunity to choose, avoided breathing in air with 60% CO$_2$ (Sandilands et al 2011). Despite this knowledge, CO$_2$ is commonly used for stunning/killing animals at slaughter plants and for emergency killings during disease outbreaks, possibly because it is nevertheless considered a ‘lesser evil’ when compared to other methods available.

Behavioural indicators used to estimate negative welfare in birds during euthanasia with CO$_2$ are head-shaking, gasping