Killing wild geese with carbon dioxide or a mixture of carbon dioxide and argon

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Abstract

The killing of animals is the subject of societal and political debate. Wild geese are caught and killed on a regular basis for fauna conservation and damage control. Killing geese with carbon dioxide (CO₂) is commonly practiced, but not listed in legislation on the protection of flora and fauna, and societal concerns have been raised against this method. In this study, an experiment was carried out killing 30 wild-caught geese using either CO₂ or a mixture of CO₂ and argon (Ar). Brain function (EEG) and heart function (ECG) were measured to determine loss of consciousness and onset of death. The stage of unconsciousness was reached on average within one minute in both treatments (56 s for CO₂ and 50 s for CO₂ and Ar). States of minimal brain activity and ineffective heart beat were reached more quickly using CO₂ compared to CO₂ and Ar (112 versus 178 s for minimal brain activity and 312 versus 394 s for ineffective heart beat for CO₂ and the mixture of CO₂ and Ar, respectively). The mixture of carbon dioxide and argon did not significantly reduce time to loss of consciousness or death. Further studies on behaviour and stress physiology are needed to determine conclusively whether CO₂ alone is a satisfactory agent to kill wild-caught geese as the lower CO₂ concentration in the CO₂-Ar treatment may act as a sedative and reduce the aversiveness of the animals during exposure to lethal gas concentrations.

Keywords: animal welfare, argon, CO₂, geese, killing, stunning

Introduction

Population numbers of wild animals sometimes need to be controlled. Welfare considerations are increasingly recognised in the area of 'pest control' (eg Littin 2010). Numbers of wild geese are increasing in The Netherlands, due to overabundance of food, reduced hunting and improved breeding areas (van der Jeugd et al 2006). Grazing of wild geese may contribute to species diversity in nature areas, but it may also cause overgrazing and financial damage for property owners. Between 2000 and 2004, on average, €185,000 were paid for damage caused by geese that visit during the summer, especially Greylag geese (Anser anser) (van der Jeugd et al 2006). In 2010, the total damage caused by these geese had increased to €1.8 m (€6.2 m for the total of all geese; Faunafonds 2010). The issue of how to deal with overabundant wild geese is hotly debated in The Netherlands. The Flora and Fauna Act allows for the capturing and killing of wild animals. A commonly used method in The Netherlands is to gather wild geese during molting and to trap and kill the animals with carbon dioxide (CO₂). However, this method is not listed in the Dutch laws for the protection of flora and fauna, and societal concerns have been raised against this method. CO₂ is an acidic gas and causes aversive responses in poultry when administered in high concentrations due to irritation to mucous membranes (Raj et al 1992; McKeegan et al 2006). However, in low concentrations, CO₂ will act as a sedative, and as such, CO₂ can be used to support the killing of poultry by means of an inert gas like argon (Ar) or nitrogen (N₂) as is recommended in the UK (eg Raj 1998). Inert gases are odourless and do not cause irritation to mucous membranes (Raj & Gregory 1991). Effectivity of these gases is based on displacement in air available for breathing, by which a very low oxygen (O₂) supply to the blood is induced (hypoxaemia). It is advised that air that is inhaled consists of no more than 2% O₂.

Few studies have been conducted on the effects of gas stunning in geese, and the primary focus of these studies was on product quality. One study investigated effects of controlled atmosphere stunning (CAS) and conventional electrical stunning on meat and liver quality in geese (Turcsán et al 2001). During the first phase, geese were placed for one minute in a gas mixture that consisted of 30% O₂, 40% CO₂ and 30% N₂. In a second phase, geese were placed for two minutes in a gas mixture consisting of 5% O₂, 80% CO₂ and 15% N₂. A reduction in wing flapping was observed, which may indicate better welfare during stunning (McKeegan et al 2007a). However, no behavioural observations were conducted in the study by Turcsán et al (2001) and responses of geese to increased CO₂ concentrations were not recorded.

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