# Controlled Atmosphere Killing for Chickens and Turkeys
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Methods currently used for slaughtering chickens and turkeys are increasingly controversial, because of the effects on the animals, on the safety and quality of the food produced and on the slaughterhouse workers. This paper summarizes the advantages of newly-developed Controlled Atmosphere Killing methods, which reduce problems in all these areas.

**Animal welfare**

Controlled Atmosphere Killing is carried out by passing birds in their transport crates through a chamber containing gas. This gas is not poisonous, but causes death by anoxia. The dead birds are then hung on shackles for processing. Most work on this subject has been done in the UK, which has approved two alternative gas mixtures for humane killing: 90% argon in air, or 30% $CO_2$ and 60% argon in air (MAFF, 1995). One other alternative tested has been $CO_2$ on its own. There is some evidence that at the high levels necessary for a sufficiently long stun this is aversive to the birds, and that this is therefore not as humane as the UK-recommended gas mixtures: more research is needed on this topic.

The welfare problems associated with current killing methods are manifold, and are well described by the world authority on Controlled Atmosphere Killing, Dr. M. Raj of Bristol University, UK, when he points out (Raj, 1998) that gas killing eliminates:

> **stress and trauma associated with removing conscious birds from their transport containers, in particular, under the bird handling systems which require tipping or dumping of live poultry on conveyors; the inevitable stress, pain and trauma associated with shackling the conscious birds, i.e. compression of birds' hock bones by metal shackles; the stress and pain associated with conveying conscious birds hanging up side down on a shackle line which is a physiologically abnormal posture for birds; the pain experienced by some conscious birds that receive an electric shock before being stunned (pre-stun shocks); … the pain and distress experienced by some conscious birds which miss being stunned adequately (due to wing flapping at the entrance to the water bath stunners) and then pass through the neck cutting procedure; [and] the pain and distress associated with the recovery of consciousness during bleeding due to inadequate stunning and/or inappropriate neck cutting procedure.**

To that list must be added the pain and distress of some birds that are still conscious when they enter the scalding tanks for feather removal and die by scalding or drowning (Duncan, 1997).

By contrast, I.J.H. Duncan, Professor of Animal Welfare at the University of Guelph, Canada, said in his 1997 report on Controlled Atmosphere Killing that:

> In my opinion, this is the most stress-free, humane method of killing poultry ever developed. The birds are quiet throughout the operation. They remain in the transport crate until dead and the killing procedure itself is fast, painless, and efficient. There is no risk of recovery from unconsciousness.

**Environmental safety**

The two gases involved are naturally occurring and unreactive (argon is one of the "inert gases" and forms about 1% of the atmosphere), so, while OSHA regulations require monitoring to prevent workers being exposed to high concentrations, there is no risk of explosion, pollution, or contamination.

**Food safety and quality**

Many studies show improved carcass quality with gas stunning and killing. For example, Raj *et al*. (1990a) found that gas stunned birds had fewer muscle hemorrhages, more tender breast meat and were free of breast muscle bruises compared with electrically stunned birds. Other advantages include lower bone breakage (Raj *et al*., 1990b). These differences will lead to less carcasses being downgraded or condemned. There are also potential improvements in food safety: one concern with current methods is that birds still conscious when they enter the scalding tank inhale water with feces and other material, spreading infection from bird to bird.

One concern that is sometimes expressed about Controlled Atmosphere Killing is that birds which have died before reaching the slaughter plant progress through the gas chamber with the live ones, and might be processed for food. On the contrary, such birds can easily be differentiated from those newly killed, by skin color, and avoided by workers hanging the latter on shackles for processing.

**Conditions for workers**

Hanging dead birds on shackles is considerably easier than doing the same for live birds. One advantage is that the shackle line can be lower and then rise after the birds are shackled, which is a particular benefit for dealing with heavy turkeys. There are other labor benefits of gas killing, such as reduced dust and reduced time spent dealing with downgraded carcasses. With physically easier work and better working conditions, workers are likely to be more efficient and have less injuries and health problems.

**Implications for producers**

There is already one processing plant for turkeys and one for chickens in North America using Controlled Atmosphere Killing, so the technology and expertise are available for scaling up when needed. Conversion of plants will involve a financial outlay, although this will be considerably less significant if they convert when they would anyway be replacing existing equipment. Operating such plants will cost slightly more than previously (Thrash, 2003). However, these costs will be offset – and within a few years surpassed – by increased income from reduced carcass downgrades, improved meat quality, and reduced labor costs. There is therefore increasing interest in such methods from the poultry industry, leading to headlines such as “Gas stunning gains momentum” (Thrash, 2003). In 2004 Deans Foods, one of the largest processors of end-of-lay hens and breeders in the U.K., adopted Controlled Atmosphere Killing, and reports major advantages for bird welfare, carcass quality, plant efficiency and working conditions (Castaldo, 2004).

**Conclusion**

The needs of the animals, the workers, the public and the poultry industry combine to make it clear that the industry should move to use of Controlled Atmosphere Killing for chickens and turkeys as soon as possible.

**References**


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