

When using gas mixtures **for stun / killing**, live poultry should only be conveyed into the gas mixtures either in transport crates or on conveyor belts. Birds should reach the recommended gas mixtures within 10 seconds of leaving atmospheric air.

Under no circumstances should gases at freezing temperatures enter the chamber. Appropriate gas concentrations should be monitored continuously at bird level inside the chamber.

The recommended gas mixtures are: (a) a minimum of 2 minutes exposure to argon, nitrogen or other inert gases, or any mixture of these gases, in atmospheric air with a maximum of 2% oxygen by volume; (b) a minimum of 2 minutes exposure to any mixture of argon, nitrogen, or other inert gases with atmospheric air and CO<sub>2</sub> provided that the CO<sub>2</sub> concentration does not exceed 30% by volume and the oxygen concentration does not exceed 2% by volume.

All the birds should be killed by the gas mixtures and under no circumstances should they show signs of recovery of consciousness once they had been through the chamber.

Stun / killing poultry in transport crates using hypoxia and shackling of relaxed carcasses would result in best welfare since it would not only eliminate live bird handling and shackling at the processing plants but also effectively kill all the birds. In this regard, the use of hypoxia (less than 2% by volume of oxygen) induced by argon, nitrogen, inert gases or mixtures of these may be the best option from an animal welfare point of view.

### 5.3.3. High research priorities

Stunning of poultry with gas mixtures needs further investigation to determine more humane gas mixtures as well as the duration of unconsciousness, appropriate stun-to-neck cutting interval, blood vessels to be severed and the time to onset of brain death.

Gas stunning mixtures should be improved and validated so they can be quickly and widely used in slaughterhouse, thus decreasing distress and pain due to shackling.

Bleeding techniques that do not need shackling of gas-stunned birds need to be evaluated and developed.

## 5.4. OTHER METHODS

### 5.4.1. Conclusions

The use of **needle bolts** for poultry or **microwave irradiation** have been tested experimentally but have not been further developed due to disadvantages on animal welfare and operative health and safety grounds.

### 5.4.2. Recommendation

**Needle bolts** or **microwave irradiation** should not be used for poultry.

## 6. METHODS FOR STUNNING AND STUN / KILLING HORSES

Penetrating captive bolt stunning is the most common used method in European abattoirs. When performed correctly, captive bolt and free bullet can be effective methods for respectively stunning and killing horses and for both methods, loss of consciousness is immediate.

### 6.1. PENETRATING CAPTIVE BOLT STUNNING

#### 6.1.1. Conclusions

Although scientific investigations in mechanisms and effectiveness of captive bolt stunning in horses were not available for the scientific report, practical information and experience