

The minimum currents necessary to achieve effective stunning and killing need to be established. The impact of electrical stunning (head-only or water bath) current waveform, frequency and the amount of current on the depth and duration of unconsciousness induced in poultry need to be clearly established using neuro-physiological parameters to understand the effect of these variables.

The time to cessation of wing flapping from the moment of hanging turkeys on a moving shackle line under commercial conditions needs to be determined to specify a minimum shackling duration for this species (there is only one survey study available for turkeys comparing to broilers for which many reports exist).

The prevalence of pre-stun electric shocks occurring prior to electrical water bath stunning of chickens under commercial conditions is not known and needs to be determined.

The prevalence of alive and conscious poultry (chickens and turkeys) entering scald tanks under commercial processing conditions needs to be determined and methods found to prevent it.

### **b) Other future research**

The previously reported times to onset of brain death after cutting common carotid arteries and external jugular veins (or combination of blood vessels) in the necks of turkeys and chickens, as determined from the loss of visual evoked potentials in anaesthetised and mechanically ventilated birds, appear to be longer than the time normally needed to reach the scald tanks under commercial processing conditions. Poultry are known to defecate as they enter scald tanks and it is not certain whether this potential hygiene problem is an indicator of a serious welfare problem, i.e. birds entering scald tanks before the onset of brain death and hence defecating in the scald tanks.

Further investigations involving electrical stunning and slaughter procedures are needed to establish the cumulative impact of stunning and slaughter on the time to onset of brain death and recommend bleed out times that are appropriate to the species of bird.

## **5.3. GAS STUNNING OR STUN / KILLING METHODS**

### **5.3.1. Conclusions**

The balance of evidence suggests that controlled atmospheres containing concentrations of more than 30% CO<sub>2</sub> are aversive and may cause pain and respiratory distress before loss of consciousness. Hypoxia induced with argon and / or nitrogen with less than 2% by volume of oxygen is not aversive to poultry.

A controlled atmosphere containing 30% or less by volume of CO<sub>2</sub> in argon and / or nitrogen with less than 2% by volume of oxygen seems to be adequate for stun / killing poultry. In addition an alternative system anaesthetising birds with an atmosphere of 30 to 40% CO<sub>2</sub> (with O<sub>2</sub> and N<sub>2</sub>) for 1 minute, followed by 2 minutes in 80% CO<sub>2</sub> or more to cause death, is being evaluated.

The exposure times necessary to effectively stun poultry with any gas mixtures, without killing some birds and / or inadequately stunning some other birds, are not known. The duration of unconsciousness induced with the known gas mixtures are very short and therefore, it will be difficult to avoid return of consciousness either prior to or during bleeding. Birds showing signs of consciousness following stunning need to be effectively re-stunned, preferably using captive bolts, instead of neck dislocation.

### **5.3.2. Recommendations**

In the absence of sound scientific evidence concerning the depth and duration of unconsciousness induced with gas mixtures, minimum conditions for stunning poultry could not be defined.