



## Compassion in World Farming

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### **Review of Council Directive 93/119/EC on the protection of animals at the time of slaughter or killing**

#### **Submission by Compassion in World Farming**

##### **Introduction**

Compassion in World Farming (CIWF) welcomes the forthcoming review of Directive 93/119 (the Slaughter Directive). We believe that scientific research and practical experience indicate that a number of the Directive's provisions need to be updated and strengthened.

Many of our comments are based on the 2004 Report and Opinion by the EFSA Scientific Panel on Animal Health and Welfare on the welfare aspects of the main systems of stunning and killing the main commercial species of animals. We also refer to the 2003 report on the slaughter and killing of red meat animals by the UK Farm Animal Welfare Council.

CIWF believes that the Directive must be based on the core principle that pain and suffering should be kept to a minimum during the slaughter process. To achieve this, animals must be stunned before slaughter or a method must be used that causes immediate death. Stunning must cause immediate unconsciousness or, if a method is used that only produces a gradual onset of unconsciousness, that method should be completely non-aversive for the animals.

In this submission, we set out our principal concerns; some of these can best be addressed by strengthening the Directive, others may be more appropriately addressed by a Guide to Good Practice. ***Accordingly, CIWF believes that the revised Directive should include an Article similar to Article 29 of Council Regulation 1/2005 on the protection of animals during transport. Article 29 requires guides to good practice to be drawn up at national level, among a number of Member States or at Community level.***

## **PRINCIPAL CONCERNS**

Many of the welfare problems that arise during slaughter stem from one of the following factors:

- Ineffective stunning; this can be caused by, for example, application of the stunning apparatus to the incorrect part of the head or the delivery of an electric current of insufficient magnitude or duration or inappropriate frequency. Worryingly, 4% of captive bolt stuns of cattle can be improper (EFSA Opinion).
- Prolonged stun-to-stick intervals
- Ineffective sticking, in particular a failure to sever both carotid arteries or the blood vessels from which they arise.

## **Red meat animals**

### **Ineffective stunning**

#### **Incorrect placement of stunning apparatus**

As indicated above, incorrect placing of the stunning apparatus is a major cause of poor stunning. For example, the EFSA Opinion stresses, as regards pigs, that "A major risk with electrical stunning, especially with unrestrained pigs, is improper manual placement of electrodes which can cause incomplete stunning and painful electric shocks". The Opinion also points out that incorrect placement of electrodes on pigs can arise in automated electrical systems using V-shaped restrainers due to varying animal size or bad design of the system.

#### ***CIWF believes that:***

- ***the revised Directive must clearly prohibit the incorrect placement of electrodes and captive bolt pistols, and***
- ***detailed guidance on correct placement for each species and each stunning method should be given in a guide to good practice.***

#### **Magnitude, duration and frequency of electric current**

The use of too little current or its application for too short a period or the use of too high a frequency can lead to ineffective stunning and to animals regaining consciousness before or during bleeding. ***CIWF believes that:***

- ***the revised Directive must require the use of a current that is of sufficient magnitude and duration and of appropriate frequency to produce immediate unconsciousness that lasts until death, and***
- ***detailed guidance should be given in a guide to good practice on current magnitude, duration and frequency for each species and for (i) head-only stunning and (ii) stun/kill methods. That guidance should be based on the figures given in the EFSA Opinion and Report except where more recent research indicates different figures.***

#### **Need for use of constant currents**

We agree with the EFSA Opinion on the need for constant currents (rather than constant voltages) to be used as constant voltages can, depending on the electrical resistance of individual animals, lead to some animals receiving too little current to produce an effective stun. ***CIWF believes that the Directive should require the use of constant currents.***

### Stun/kill methods

Stun/kill methods substantially reduce the risk of animals regaining consciousness before or during bleeding. ***Accordingly, the use of such methods should be encouraged in a guide to good practice. CIWF agrees with the EFSA Opinion that stun/kill methods must ensure that the current reaches the brain before or at the same time as it reaches the heart, lest the conscious animal be killed by cardiac arrest, an inhumane method.***

### Use of non-penetrating captive bolt for cattle

The EFSA Opinion's concludes that the non-penetrating captive bolt presently available is unreliable in stunning cattle and calves and so should not be used. The Opinion also concludes that non-penetrating captive bolts should not be used in stunning sheep because no investigations exist for adult sheep to prove that it is suitable for them. ***Accordingly, CIWF believes that the use of the presently available non-penetrating captive bolt should be prohibited for the stunning of cattle, calves and sheep.***

### Electro-immobilisation

The EFSA Opinion concludes that electro-immobilisation can mask the signs of consciousness in inadequately and poorly stunned animals and will cause pain to such animals. ***Accordingly, CIWF believes that the use of electro-immobilisation should be prohibited.***

### Stun-stick interval

CIWF fully agrees with the EFSA Opinion that the stun-stick interval should be sufficiently short to induce death through blood loss before the animal recovers from the stun. Prolonged stun-stick intervals increase the danger of animals regaining consciousness before or during bleeding. Short maximum stun-stick intervals are crucial after head-only electrical stunning. However, even when electrical stun/kill methods are used, animals should be stuck as soon as possible after the stun/kill to avoid animals regaining consciousness after an ineffective stun/kill. Similarly, animals should be stuck without delay after captive bolt stunning.

***CIWF believes that maximum stun-stick intervals should be laid down in the Directive for all major species and for other species for which good scientific evidence exists. The Directive should enable these intervals to be changed by a committee procedure to keep up to date with scientific and technical developments. We agree with the EFSA Opinion that the maximum stun-stick interval after head-only electrical stunning should be 15 seconds for pigs and 8 seconds for sheep.***

### Effective sticking

It is essential that animals are stuck in a way that ensures rapid bleed out and hence rapid death so as to minimise the risk of animals regaining consciousness from the stun during bleeding out. Rapid bleed out and death are best achieved by severing both carotid arteries or the blood vessels from which they

arise. This was the conclusion of the Scientific Veterinary Committee in their 1996 report and of the UK Farm Animal Welfare Council (FAWC) in their 2003 report.

Disappointingly, the current Directive only requires the severing of one of the carotid arteries or the blood vessels from which they arise. ***CIWF believes that the Directive should be amended to require the severing of both carotid arteries (or the blood vessels from which they arise).***

The FAWC report states that "A number of studies have also looked at the time taken for loss of brain function when animals are bled by severing the vessels close to the heart as compared with cutting the carotid arteries. In all cases, severing blood vessels close to the heart in the chest produces a quicker death and this is particularly the case with calves." ***CIWF agrees with FAWC that a code of practice should recommend that thoracic bleeding methods should be used wherever practicable.***

### **Carcass processing and electrical stimulation**

Paragraph 2, second indent of Annex D to Directive 93/119 provides that after incision of the blood vessels, no further dressing procedures nor any electrical stimulation should be performed "before the bleeding has ended". The EFSA Opinion recommends that "No carcass processing or electrical stimulation to improve meat quality should commence until the animal is dead". ***CIWF believes that the Directive should be amended to replace "before the bleeding has ended" with "before they are dead".***

### **Gas stunning and stun/killing of pigs**

#### **High concentrations of carbon dioxide**

CIWF is firmly opposed to the use of high concentrations of carbon dioxide to stun or stun/kill pigs. Raj and Gregory (1996) concluded that pigs show profound aversion to a high concentration of carbon dioxide and that this gas leads to "severe respiratory distress". The EFSA Opinion concluded that at concentrations above 30%, carbon dioxide is known to be aversive and cause hyperventilation and irritation of the mucous membranes that can be painful, and elicits hyperventilation and gasping before loss of consciousness. The EFSA Opinion stresses that "The gas used to induce unconsciousness should be non-aversive". High concentrations of carbon dioxide clearly do not fulfil the requirement of being non-aversive. The FAWC report concluded that use of high concentrations of carbon dioxide to stun and kill pigs is not acceptable and should be phased out in five years.

***In light of the above serious welfare problems, CIWF believes that the use of high concentrations of carbon dioxide to stun or stun/kill pigs should be prohibited.***

If high concentrations of carbon dioxide continue to be used, the Directive should be strengthened to require CO<sub>2</sub> to only be used to kill pigs, not just to stun them; this is the position under UK law. Pigs that are not killed by the CO<sub>2</sub> may emerge from the stunner appearing flaccid and recumbent (i.e. unconscious), but sensitivity may return or the animals may in fact be conscious and able to feel pain while appearing to be unconscious. We believe

that in practice pigs are generally only exposed to high concentrations of CO<sub>2</sub> for about 90 seconds. 90 seconds will not kill all pigs; those that are not killed may regain consciousness. To avoid this (i) pigs should be kept in the gas for longer than 90 seconds and (ii) sticking should be performed within 15 seconds of the end of stunning.

#### Other gas mixtures

***CIWF believes that the use of 90% argon or nitrogen in air for killing pigs should be encouraged as this gas mixture is less aversive than high concentrations of carbon dioxide or a mixture of 30% carbon dioxide and 60% argon or nitrogen (EFSA Opinion).***

We are concerned about the use of a mixture of 30% CO<sub>2</sub> and 60% argon or nitrogen in air as although this is less aversive than high concentrations of CO<sub>2</sub>, it is more aversive than 90% argon or nitrogen in air. Raj and Gregory (1996) found that exposing pigs to 90% argon induced minimal respiratory distress before loss of consciousness, whereas exposing them to a mixture of CO<sub>2</sub> and argon induced moderate distress. Exposing them to a range of concentrations of CO<sub>2</sub> induced severe respiratory distress. ***In our view if the CO<sub>2</sub>/argon mixture induces moderate distress, whereas 90% argon induces only minimal distress, the gas that induces minimal distress should be used in preference to the one that induces moderate distress.*** Raj (1999) summarised these results by saying that “from the point of view of the animals’ welfare, 90% argon in air would be the first choice, and a mixture of 30% carbon dioxide and 60% argon would be preferable to 80-90% carbon dioxide in air”.

***When 90% argon or nitrogen in air or a mixture of 30% CO<sub>2</sub> and 60% argon or nitrogen in air are used the pigs should be exposed to the gas for long enough to kill them.*** If they are just stunned there is a danger that they may regain consciousness before death is caused by bleeding. ***If pigs are not exposed to the gas for sufficiently long for all to be killed, the stun-stick interval must be kept to the minimum and must not exceed the intervals recommended by the EFSA Opinion.***

#### Training and competence

CIWF fully agrees with the EFSA Opinion’s recommendation that “All operators involved with stunning and slaughter should be properly trained, their skills and knowledge examined, in particular in the field of welfare, and the person should be certified to be competent and should have a positive attitude towards improving animal welfare. They should also attend retraining courses and their ability to implement new knowledge and acquire new skills should be assessed as new technologies evolve.”

***CIWF believes that the revised Directive must require personnel involved with stunning and slaughter to have a certificate of competence which may only be granted after completion of a training course approved by the competent authority and the passing of an examination, also approved by the competent authority, conducted by an independent assessor.*** The new training and competence provisions could be based on:

- the provisions in Articles 6 & 17 and Annex IV of Council Regulation 1/2005 on the protection of animals during transport, and
- the UK's Welfare of Animals (Slaughter or Killing) Regulations 1995 that transpose Directive 93/119 in the UK. Schedule 1 to these Regulations contains detailed provisions on the licensing of slaughtermen. It requires personnel involved in the restraint of animals, stunning, shackling and hoisting of stunned animals, slaughter and killing to be licensed. A licence may only be granted to a person who has a certificate of competence issued by a veterinarian who is authorised for this purpose by the competent authority. The veterinarian may only issue a certificate of competence if, after assessing the applicant for a licence, the veterinarian is of the opinion that the applicant—
  - a) is competent to carry out all the operations in respect of which s/he is applying for a certificate without causing avoidable pain, excitement or suffering to any animal and has sufficient knowledge of the provisions of all the relevant legislation and of any relevant current code,
  - b) is, in the opinion of the authorised veterinarian, a fit and proper person to hold a certificate, and
  - c) is not below the age of 18.

#### **Need for new designs of equipment and new technologies to be approved before use**

New designs of stunning and slaughter equipment and new technologies are being developed on a regular basis. It is important that such new equipment and technologies are tested before being put into use to ensure that they are not detrimental to animal welfare. For example, new electrical stunning frequencies have been brought into use to improve meat quality even though such frequencies produce a less effective stun.

***CIWF believes that the Directive should require new designs of equipment and new technologies (including new electrical stunning current or voltage magnitudes, frequencies or waveforms or gas mixtures) for use in restraint, stunning and slaughter to be tested from an animal protection viewpoint and not to be put into use unless they have been approved by the competent authority.***

#### **Maintenance**

Regular maintenance of equipment is essential. ***CIWF agrees with the FAWC report that inspectors should be able to serve 'improvement notices' to prevent poorly maintained equipment from being used. The Directive should require slaughterhouse operators to keep maintenance records.***

#### **Enforcement**

Problems can arise in slaughterhouses that adversely affect welfare but are not appropriate for court action. CIWF agrees with the FAWC report that there is a need for enforcement officials to be able to issue a notice, which prevents structures, equipment or practices being further used or undertaken until a particular fault or problem has been rectified. The ultimate sanction would be the ability to immediately close the slaughter line until improvements are made. ***CIWF believes that the Directive should introduce a system of formal improvement notices for structures, equipment or practices that***

***do not comply with the law and have the potential to cause animal welfare problems.*** In England the Department for Environment, Food and Rural Affairs has accepted a FAWC recommendation that such a system should be introduced in slaughterhouses.

### **Animal Welfare Officer**

The Directive should require slaughterhouse operators to appoint a named member of staff to be responsible for adherence to welfare requirements of the Directive and any relevant guide to good practice.

### **Poultry**

#### **Electrical stunning or stun/kill systems**

##### **Suspension from shackles**

The EFSA report states that hanging upside down on shackles “is a physiologically abnormal posture for poultry and compression of the metatarsal bones by the metal shackle is extremely painful”. In addition, the EFSA Opinion concludes that shackling is “extremely stressful” and that the pain and distress associated with inversion and shackling induces wing flapping in the majority of birds and there is the potential for dislocations and fractures to occur in a significant number of birds. ***Accordingly, CIWF believes that the maximum time for which birds may be suspended from the shackles should be limited by the Directive to 1 minute which is the limit recommended by the EFSA report.***

##### **Pre-stun electric shocks**

Painful pre-stun electric shocks have long been recognised as a major problem in the slaughter of turkeys, but they are also a problem in broiler slaughter. The EFSA report stresses that “the pain associated with pre-stun electric shock is severe”. The report states that “pre-stun shocks can induce wing flapping and, consequently, the birds may miss the electrified water bath completely or partially leading to total failure or inadequate stunning”. ***CIWF believes that the Directive should require slaughterhouse operators to take steps to eliminate, or at least substantially reduce the incidence of, pre-stun electric shocks.***

##### **Need for constant current stunners**

Constant current (variable voltage) stunners, which are practicable for use in commercial slaughterhouses, should be developed as a matter of urgency. The present constant voltage stunners lead to individual birds receiving different currents, some of them too low to produce an effective stun. The EFSA report states that “since the implementation of constant current stunning equipment will immensely improve bird welfare at stunning and slaughter, equipment manufacturers should develop systems that are cost effective and commercially viable”. ***Once reliable constant current stunners are available, the Directive should require such stunners, rather than constant voltage stunners, to be used.***

##### **High frequency currents**

It is generally accepted that the best approach with electric stunning of broilers is to stun/kill, i.e. to induce cardiac arrest at the stun (provided the bird is unconscious at the time of cardiac arrest) in order to preclude the danger of birds regaining consciousness before death. In practice this is rarely done as broiler slaughterhouses (at least in the UK) have moved to using high frequency currents (for meat quality reasons) and these do not produce cardiac arrest. Moreover, the EFSA Opinion stresses that the duration of unconsciousness decreases with increasing frequency (e.g. above 200Hz) of the stunning current; this is of great concern. Accordingly, ***CIWF believes that the use of high frequency currents should be discouraged or prohibited.*** It is not advisable to use cardiac arrest stunning in turkeys; the EFSA report states that a Gregory and Wotton study found that all the turkeys stunned with 250 mA suffered cardiac arrest, but some retained brain responsiveness for a minute following stunning.

#### Use of DC

Many UK slaughterhouses use DC (direct current) rather than AC (alternating current). ***The use of DC should be prohibited*** as (i) a higher current is needed to produce an effective stun, (ii) a lower proportion of broilers are effectively stunned (recent papers by Raj and others show that a minimum average current of 200 mA using 200 Hz pulsed DC is needed to effectively stun 80% of broilers, whereas a minimum current of 100 mA using 200 Hz sine wave AC will produce an effective stun in 90% of broilers (Raj and others, 2006a & b)), and (iii) DC can produce a cardiac arrest in birds that are still conscious (Raj and others, 2006b).

#### Interval between stunning and neck cutting

It is essential to keep the stun to neck cut interval short to reduce the risk of birds regaining consciousness. ***The Directive should lay down a maximum interval of 15 seconds*** (Raj, 2006c).

#### Need to sever both carotid arteries

Both carotid arteries and jugular veins should be severed to produce rapid bleed out and death; this reduces the danger of birds regaining consciousness before death (EFSA Report; Raj, 2006c). The EFSA report emphasises the importance of severing both carotid arteries. It says that, despite this importance, "the poultry industry practices continue to be to sever one external jugular vein or small vertebral arteries at the back of the neck of poultry. These inappropriate neck cutting procedures, if implemented following stunning with high frequency or low currents, could lead to recovery of consciousness during bleeding and, inevitably, live birds entering scald tanks." ***The Directive should require both carotid arteries and jugular veins to be severed.***

#### A proportion of birds are conscious at neck cutting or alive when entering the scald tank

Poultry may still be conscious at neck cutting either because the stun is ineffective or because some birds miss the stun bath completely, probably because they lift their head above water level as they pass the bath. This may



be due to wing flapping caused, as indicated earlier, by the pain and stress of inversion and shackling or pre-stun electric shocks.

### **Gas killing**

Gas killing can produce welfare benefits as the pain and distress of shackling are avoided. In light of these benefits, ***CIWF believes that the industry should be encouraged to replace electrical stunning and stun/kill systems with gas killing provided that only non-aversive gas mixtures are used.***

CIWF believes that argon or nitrogen with a maximum of 2% residual oxygen should be used. Some UK broiler slaughterhouses use this mixture so it is clearly commercially viable to do so. Other broiler slaughterhouses and many (or all) turkey slaughterhouses that use gas are including CO<sub>2</sub> in the mixture. The literature suggests that even low levels of CO<sub>2</sub> may be moderately aversive (Raj, 2006) and thus in our view should be avoided, but that welfare problems become much greater at levels over 30%. The EFSA Opinion concluded that more than 30% of CO<sub>2</sub> is aversive and may cause pain and respiratory distress before loss of consciousness. ***Accordingly, the maximum level of CO<sub>2</sub> should be 30% (preferably 20%) and the rest of the mixture should be argon or nitrogen with a maximum 2% of residual oxygen. Nonetheless, as indicated earlier, our strong preference is for the use of argon or nitrogen with a maximum of 2% residual oxygen with no CO<sub>2</sub>.***

***The Directive should require poultry to be killed, not just stunned, by the gas;*** this is the position under UK law. The EFSA Opinion stresses: "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." The reason why birds must be killed is that if they are only stunned by the gas mixture they will regain consciousness very rapidly; the EFSA Opinion states that the duration of unconsciousness produced by the known gas mixtures is "very short". In commercial conditions birds leave the gassing unit in large numbers and it is hard to believe that they can be bled quickly enough to prevent them regaining consciousness if they have only been stunned.

In some Member States certain slaughterhouses use 40% carbon dioxide, 30% oxygen and 30% nitrogen. CIWF opposes the use of oxygen (except maximum 2% with inert gases) as it prolongs the time to onset of unconsciousness (Raj and others, 1998).

### **Neck dislocation**

CIWF is opposed to the use of neck dislocation as a killing method in small on-farm operations as unconsciousness may not be instantaneous.

### **Approval of new equipment**

As with red meat animals, new equipment and technologies should be subject to an approval procedure before being put into commercial use.

### **Catching**

Both legs should be held at catching; to prevent the catching process taking longer (which would lead to birds caught early on spending more time on the truck), larger catching teams should be employed.

Catchers should be required to be trained and to have a certificate of competence. Ideally all catchers would have a certificate of competence; at the minimum the leader of a team should have a certificate.

### **Religious slaughter**

CIWF is opposed to religious slaughter when that involves animals' throats being cut while they are fully conscious. We believe that all animals and poultry should be stunned before slaughter. We oppose religious slaughter both because of the severe pain experienced at throat cutting by unstunned animals and because there is a prolonged period between throat cutting and loss of brain responsiveness during which animals can suffer extreme pain and distress. Our concerns are supported by the EFSA Report and Opinion. The Opinion concludes that "due to the serious animal welfare concerns associated with slaughter without stunning, pre-cut stunning should always be performed".

The EFSA Report states that there is a high risk that animals feel extreme pain during the cutting of the throat. The Report adds (p. 22) that during the period when the animal, whose throat has been cut, is still conscious, serious welfare problems are highly likely to occur since the animal can feel anxiety, pain, distress and other suffering.

The EFSA Opinion concludes that "cuts which are used in order that rapid bleeding occurs involve substantial tissue damage in areas well supplied with pain receptors. The rapid decrease in blood pressure which follows the blood loss is readily detected by the conscious animal and elicits fear and panic. Poor welfare also results when conscious animals inhale blood because of bleeding into the trachea. Without stunning, the time between cutting through the major blood vessels and insensibility, as deduced from behavioural and brain response, is up to 20 seconds in sheep, up to 25 seconds in pigs, up to 2 minutes in cattle, up to 2½ or more minutes in poultry, and sometimes 15 minutes or more in fish".

The UK FAWC report on the slaughter of red meat animals is also critical of religious slaughter. It states: "When a very large transverse incision is made across the neck a number of vital tissues are transected including: skin, muscle, trachea, oesophagus, carotid arteries, jugular veins, major nerve trunks (e.g. vagus and phrenic nerves) plus numerous minor nerves. Such a drastic cut will inevitably trigger a barrage of sensory information to the brain in a sensible (conscious) animal. We are persuaded that such a massive injury would result in very significant pain and distress in the period before insensibility supervenes."

In light of this conclusion and other welfare problems, the FAWC concluded that slaughter without pre-stunning is unacceptable and that the UK Government should repeal the current exemption which permits religious slaughter without pre-stunning.

***CIWF believes that all animals (including poultry) should be stunned before throat cutting. Accordingly, the exemption in the Directive that permits religious slaughter without pre-stunning should be withdrawn.***

When religious slaughter is carried out, it is essential that both carotid arteries are severed to ensure as rapid a bleed out and death as possible.

#### **Slaughter outwith slaughterhouses**

***CIWF believes that the Directive's provisions on slaughter outwith slaughterhouses need to be strengthened.*** An incident that took place in Ireland in 2002 where a farmer slaughtered his herd of some 4,000 pigs on his farm highlights some of the problems that can arise, particularly if a large number of animals are slaughtered on farm.

These problems, and our suggestions for changes to the Directive, are as follows:

1. The Directive does not restrict the number of animals that can be killed on-farm. In the Irish incident, a farmer killed some 4,000 pigs on-farm with very little assistance. We suggest that where the Directive refers to on-farm slaughter or killing which is not for disease control purposes, it should specify that this applies only to small and individual situations.
2. The Directive does not include a training or competence requirement for people carrying out on-farm slaughter. In the Irish incident, the farmer appears to have had very little training in the practice of slaughter. Using instruments such as a captive bolt pistol correctly requires training. We suggest that a requirement for training/competence for anyone carrying out on-farm slaughter or killing should be added to the Directive.
3. In on-farm slaughter of large numbers of animals, the Directive does not require a veterinarian or other competent person to be responsible for ensuring that the slaughter complies fully with legislation. We suggest that such a requirement should be added.

#### **Farmed fish**

A range of slaughter methods are used in fish farming some of which cause stress and aversion and involve the fish taking a long time to lose consciousness. The EFSA Opinion concluded: "many commercial killing methods expose fish to substantial suffering over a prolonged period of time. For some species, existing methods, whilst capable of killing fish humanely, are not doing so because operators don't have the knowledge to evaluate them".

In recent years, however, progress has been made in developing better systems. Percussive stunning which, if well-designed and properly operated, has the potential to deliver reasonable welfare for salmon, is now used in most of the Scottish salmon industry. In the UK rainbow trout farmers who supply the major retailers have installed electrical stun/kill systems, although there is some suggestion that a number of farmers are not using these systems on a regular basis. In most rainbow trout producing countries, however, the fish are killed by asphyxiation on ice, which is an inhumane method.

A leading expert has said that there is no doubt that many fish slaughter methods are “appalling from an animal welfare point of view” (Hastein, 2004). Atlantic salmon are sometimes slaughtered by carbon dioxide stunning followed by gill cutting. Trout are often killed by suffocation on ice; sometimes carbon dioxide is used with trout. These methods are inhumane and their use, together with that of suffocation in air, should be prohibited.

The central principle is that, as with terrestrial farm animals, pain and suffering should be kept to a minimum during the slaughter process. To achieve this, a method should be used that either causes immediate death or immediate unconsciousness which lasts until the fish are dead; if unconsciousness is not immediate it should be induced without pain or fear or adverse behaviour.

***Ideally, slaughter systems should be used that do not involve removal of fish from the water. Where this cannot be avoided, fish should never be out of water for longer than 15 seconds*** (HSA, 2005).

#### **Asphyxiation in air or on ice**

Asphyxiation in air involves removing the fish from the water and leaving them to die. Removal from water is highly aversive for fish; in most cases violent attempts to escape are made and maximal stress response is initiated (EFSA Opinion). When fish are removed from water their gills collapse which largely prevents oxygen exchange with the environment (Robb and others, 2002). The time required for fish to die depends on the temperature. At 2 °C rainbow trout removed from the water take 9.6 minutes to lose brain function, 3.0 minutes at 14 °C and 2.6 minutes at 20 °C (Robb and others, 2002).

The EFSA Report concluded that asphyxiation in air “cannot be considered humane” and warned that loss of movement may occur well before loss of consciousness, leading to the danger that fish may be processed while still sensible. In any killing method that sometimes leads to loss of movement before unconsciousness, there is a danger that processors will mistakenly assume that the fish are unconscious and eviscerate them whilst they are still conscious.

A more commonly used alternative is for fish to be removed from water into bins or tanks containing ice where again they die of asphyxiation. In many countries portion-sized rainbow trout (around 350- 400 g) are killed in this way. Temperate fish species take longer to lose brain function when left to die on ice than in air (EFSA Report). As indicated above, at 2 °C fish removed from water take 9.6 minutes to lose brain function compared with 3.0 minutes at 14 °C. The EFSA Panel concluded that asphyxiation on ice “should not be used”. The ice can immobilise the fish before loss of consciousness; this can lead to fish being bled and eviscerated while still conscious.

Both methods of allowing fish to suffocate, in air or on ice, cause immense suffering to fish and simply would not be tolerated as slaughter methods for terrestrial farm animals. ***Slaughter by suffocation in air or on ice should be prohibited urgently.***

#### **Bleeding without prior stunning**

Cutting the gills without prior stunning was formerly employed as a commercial slaughter method for farmed Atlantic salmon but our understanding is that it is no longer used. This is a slow method for killing fish. Atlantic salmon killed by

gill cutting without stunning take an average of 4.7 minutes to lose brain function (Robb and others, 2000). This method results in violent movements for up to 4 minutes in Atlantic salmon which indicates that it is highly aversive (Robb and others, 2000). ***CIWF agrees with the EFSA Report's concluded that exsanguination without stunning "is not humane and should not be used".***

Where the gill arches are severed following a stunning method, all 4 gill arches on one side of the head should be severed in order to promote a rapid bleed out and so minimise the risk of recovery from the stun before death ensues. Where gill arches are severed without prior stunning (a practice that we believe should be prohibited), it is important to cut all 8 gill arches on both sides of the head to produce as rapid an onset of unconsciousness as possible.

### **Carbon dioxide**

Fish are placed in a water bath saturated with carbon dioxide, a process which they find "very aversive" (EFSA Report). Salmon show vigorous aversive reactions for up to 2 minutes after immersion in carbon dioxide (Robb and others, 2000). Similarly, trout show strong aversion for at least 30 seconds, although times over 3 minutes have been recorded (Robb and others, 2002). The high activity in the carbon dioxide stunning bath routinely results in gill haemorrhage (EFSA Report).

Fish immersed in carbon dioxide take a very long time to lose brain function completely. Atlantic salmon placed in carbon dioxide take an average 6.1 minutes to lose brain function, although it can take as long as 9 minutes (Robb and others, 2000). For trout loss of brain function takes 4.7 minutes (Robb and others, 2002).

Because fish stunned in carbon dioxide become immobile before loss of consciousness, there is a real danger that they may be bled or eviscerated while still conscious (EFSA Report). Fish should be left in the carbon dioxide for at least 10 minutes to cause unconsciousness in every fish (HSA, 2005). In practice fish are often removed from the water when movement stops after 2-3 minutes (EFSA Report). This means that many fish are not being left for a sufficient time in the carbon dioxide to lose consciousness and are exsanguinated while still conscious (EFSA Report). As many fish are not bled effectively, they still have some level of consciousness when they pass to the next stage of the operation: evisceration (EFSA Report).

***Scientific research shows that carbon dioxide stunning is highly aversive and that the fish take a very long time to lose brain function. Accordingly, this method should be prohibited.*** Indeed, its use will be prohibited in Norway for farmed salmon and trout from July 2008.

### **Live chilling prior to carbon dioxide stunning or gill cutting**

Live chilling is becoming more widely used prior to the slaughter of farmed Atlantic salmon and rainbow trout. The fish are chilled down to around 1 °C before immersion in carbon dioxide or gill cutting. The aim is to sedate fish prior to slaughter in order to preserve flesh quality.

In some cases live chilling is performed rapidly with fish being transferred from high water temperatures to water at 1 °C. This causes significant stress (Sjokervold and others, 2001) and fish may show violent movement and escape

behaviour (HSA, 2005). In other cases live chilling is carried out slowly with the rate of temperature reduction not exceeding 1.5 °C per hour; this is preferable to rapid live chilling.

Live chilling sedates and may immobilise fish, but it does not induce unconsciousness. Accordingly live-chilled fish will be fully conscious when their gills are cut. Equally, they will be conscious if they are immersed in carbon dioxide and, because loss of consciousness is prolonged at lower temperatures, it may take longer for live-chilled fish placed in carbon dioxide to lose consciousness (Robb and Roth, 2003). ***Because unconsciousness is not induced and because of its aversive impact, the EFSA Opinion recommended that live chilling, even when carried out slowly, should not be used.***

### **Percussive stunning**

We welcome the increasingly widespread use of percussive stunning in the slaughter of Atlantic salmon.

If sufficient force is applied and the correct part of the head is struck, the fish will be rendered immediately unconscious and in most cases will die without regaining consciousness. However, because in some cases fish can recover from the stun, they should be bled by gill cutting following stunning. Fish should be bled within 10 seconds of the stun to minimise the risk of them regaining consciousness.

### **Electrical stunning and stun/kill systems**

Electrical systems that both stun and kill small fish appear to be the best method for the slaughter of portion-sized rainbow trout. It is important that the system both stuns and kills as commercially trout are slaughtered in large numbers and, if they were only stunned, it would be impractical to cause death by bleeding in all the fish before they began to recover consciousness.

Crucially, the stun must cause immediate unconsciousness of the trout and the fish must remain unconscious until they are dead; an electrical stun of sufficient magnitude, duration and frequency leads to dysfunction of the brain which prevents the breathing reflex from working, causing death from lack of oxygen. In order to achieve this, sufficiently high currents must be applied for a sufficient amount of time, i.e. both current magnitude and duration of application are important (Robb and others, 2002).

If insufficient current or duration is used or if the frequency is too high, fish may be stunned for only a short period after which they will begin to recover consciousness. Alternatively, inadequate current, duration or frequency may result in fish being paralysed rather than stunned. When paralysed, fish cannot express pain or show escape behaviour and so may be bled or eviscerated while fully conscious. The EFSA Opinion warns that electrical systems can cause substantial suffering when incorrectly applied.

A major concern for the industry is that electrical stunning can lead to carcase damage such as haemorrhages. To avoid this, higher frequencies can be used. Higher frequencies can avoid carcase damage, but are less effective at producing immediate insensibility and death. If a high frequency is used to avoid carcase damage, it must not be so high as to fail to stun/kill.

One major advantage of electrical stun/killing is that in a well-designed system, stressful pre-slaughter handling and restraint can be minimised or eliminated (EFSA Report). In addition, the stressful event of removal from water can be avoided.

Research shows that electrical stunning can produce immediate unconsciousness in Atlantic salmon (Robb and Roth, 2003). Systems that both stun and kill must be used to prevent the salmon regaining consciousness.

If systems that only stun are used, the period of unconsciousness produced by the stun in Atlantic salmon must last until death results from blood loss following gill cutting. The EFSA Scientific Panel concludes that in practice this is unlikely to be achieved. Electrical stunning (with an electric field strength of 50 volts/m for 3 seconds) produces an average period of unconsciousness in Atlantic salmon of 4.8 minutes, although this can be as low as 44 seconds (Robb and Roth, 2003). Atlantic salmon killed by gill cutting take an average of 4.7 minutes to lose brain function (Robb and others, 2000). Accordingly, there is a real danger that the period of unconsciousness produced by stunning may be insufficient to prevent salmon from regaining consciousness before they die following gill-cutting. This is why it is essential that stun/kill systems are used.

#### **Pre-slaughter sedation with anaesthetics**

EU legislation prohibits the use of pre-slaughter anaesthetics for fish. However, an anaesthetic product called AQUI-S is used as a pre-slaughter sedative in salmon killing in Chile, Australia and New Zealand. Induction of sedation with AQUI-S does not appear to be stressful and sedated fish appear to suffer far less distress when removed from water for stunning (EFSA Report).

Sedation is not a stunning or killing method; once sedated, fish must be stunned, for example by accurate percussive stunning. ***CIWF believes that further consideration should be given to the use of pre-slaughter anaesthetics as these could considerably reduce the stress involved in pre-slaughter handling.***

#### **Emergency slaughter**

Emergency slaughter can involve the killing of large batches of fish for disease control purposes or the euthanasia of one or more individual injured, deformed, diseased or moribund fish. Emergency slaughter must be carried out in such a way as to minimise pain and suffering. Accordingly, a method should be used that either causes immediate death or immediate unconsciousness which lasts until the fish are dead. A stunning method that produces a gradual onset of unconsciousness may only be used if the process is completely non-aversive. ***CIWF believes that the following methods are acceptable in emergency slaughter provided that they are used properly:***

- A percussive blow followed by exsanguination provided that the blow is delivered with sufficient force and to the correct part of the head (this method is not suitable for small trout and small salmon).
- An overdose of a non-aversive fish anaesthetic; a lethal dose should be used with the fish being left in the solution for sufficiently long to kill them. If the concentration of anaesthetic agent is correct, surgical levels of anaesthesia are achieved in 1-2 minutes and the fish are dead in 5-10 minutes (EFSA Report)

- An electrical stun/kill system can be used for killing trout. The current magnitude, duration and frequency should be such as to produce immediate and irreversible unconsciousness followed by death.
- Mechanical spiking (also known as 'iki jime') can be used for large salmon. A spike is driven into the brain. The spike must be inserted very accurately; if it is, it causes immediate and irreversible unconsciousness.

Because they cause pain and/or suffering and entail prolonged delays until the onset of unconsciousness, the following methods should never be used in emergency slaughter: asphyxiation in air or on ice, gill-cutting without prior stunning and carbon dioxide stunning. Some argue that there may be circumstances when carbon dioxide may be the only appropriate method for emergency slaughter. However, in most cases where carbon dioxide could be used, fish could also be killed by an overdose of anaesthetic which is preferable from the welfare viewpoint (EFSA Report).

### **Conclusion**

***The following killing methods should be prohibited on welfare grounds: asphyxiation on ice or in air, carbon dioxide stunning, and gill-cutting without prior stunning. Live chilling should also be prohibited.***

### **Killing of fur animals**

Serious problems were revealed by the 2001 SCAHAW report on the *Welfare of Animals Kept for Fur Production*. In light of these and other problems, CIWF believes the Directive should be strengthened as suggested below. CIWF is of the view that insufficient research has been done to enable humane slaughter methods for fur animals to be established at present. Therefore, the suggestions that follow must be seen as interim solutions. We should also stress that it is clear from the SCAHAW report that the welfare problems inherent in fur farming are so severe that in our view this activity should be prohibited.

### **Supervision**

Unlike the main farmed animals, fur animals are slaughtered on-farm where supervision of the slaughter is rare. For example, in Ireland the Department of Agriculture observed slaughter of about 1,200 mink (0.37%) and 20 foxes (1.5%) during the last 2 killing seasons. This is a very low inspection rate. ***CIWF believes that all on-farm slaughter of fur animals should be supervised by the competent authority.***

### **Training**

***All operatives who carry out on-farm slaughter of fur animals should complete a formal training course recognised by the competent authority and should hold a certificate of competence.*** Training should cover pre-slaughter handling.

### **Equipment checking and approval**



***All on-farm slaughter equipment should be regularly checked by the competent authority, and should be approved for use.*** Use of non-approved equipment should not be allowed.

### **Pre-slaughter handling**

Mink and foxes are still essentially wild animals; they are not fully domesticated. This adds to the problems of handling during slaughter. For example, grabbing mink from their cage and placing them in a gassing box causes stress. Similarly, foxes have to be grabbed from their cage and held by a neck noose whilst undergoing electrocution. Killing in situ without removal from farm cages would be preferable but further research would be required before such a method could be established.

### **Carbon dioxide**

The SCAHAW reports states that mink find CO<sub>2</sub> “highly aversive” and concludes: “Certain killing methods, especially carbon dioxide and chloral hydrate can impair mink welfare.” Accordingly, the SCAHAW recommended: “Killing mink with CO<sub>2</sub> should be avoided, and humane methods developed.” SCAHAW points out that, because of animal welfare concerns, Dutch law forbids any use of CO<sub>2</sub>. ***CIWF believes that carbon dioxide should not be permitted for use in the slaughter of mink.***

The SCAHAW points out that “although 100% CO<sub>2</sub> induces unconsciousness rapidly, lower concentrations are far less effective; 70%, for example, fails to kill in less than 15 minutes. Long killing times would cause stress, especially in animals grouped together in a box.”

### **Carbon monoxide**

***The Directive should be amended to prohibit the use of carbon monoxide produced by an engine.*** Gas from an engine may contain pollutants and so the Directive requires it to be filtered. However, the SCAHAW report points out that filtered exhaust gases induce unconsciousness more slowly than pure carbon monoxide, and it is preceded by excitation and convulsions. In light of these problems, carbon monoxide should be supplied from a pure source to the gassing box. In addition, the concentration of carbon monoxide should be monitored, maintained and recorded continuously to ensure that it is, and remains, lethal. Verifiable records should be kept.

Hypoxia induced by carbon monoxide is aversive to mink (Raj, pers comm). The SCAHAW report says that mink differ from other farm animals in that they can detect anoxia and they find it aversive. The report suggests this is because they are diving animals. Moreover, the SCAHAW states that carbon monoxide can be slow to take effect. Carbon monoxide is better than CO<sub>2</sub> but CIWF believes that it cannot be classed as humane.

### **Need to develop better slaughter methods**

In light of the problems of carbon dioxide and carbon monoxide, research is needed into more humane methods of killing mink, including overdose of anaesthetic drugs and more suitable gases. Ideally, mink should be killed in their farm cages, with the minimum of handling and associated distress, using a non-aversive gas mixture. Such a gas mixture has not yet been identified for mink, but it is possible that inhalation anaesthetic gases such as halothane and isoflurane could be administered to anaesthetise them first; they then could be

killed using another method, e.g. carbon dioxide. ***The Directive should enable amendments to be easily made to permit the use of new slaughter methods that provide improved welfare for fur animals and to phase out the use of current methods once better methods have been developed.***

### **Gassing box batch size**

Mink are often placed in groups of 30-50 in a gassing box. The Irish Agriculture Minister has said that mink are gassed in batches of 50-70 per box. The SCAHAW report states that unless unconsciousness is instantaneous, it is likely that this causes stress. The SCAHAW report adds that "animals may pile up and be killed in part by suffocation. Thus the use of a gas apparatus in which each mink is individually placed in a tube is thought to be more acceptable". The piling up is due to the fear caused by handling and, when CO<sub>2</sub> is used, the distress caused by inhalation of the gas. An additional problem of batch gassing is that it is difficult to ensure the correct concentration of gas for all animals throughout the process.

Mink are not reared in family groups. Therefore, mixing them prior to introduction, regardless of group size, leads to compromises in welfare. Ideally, individual animals should be kept separate during gassing, or, if animals are reared in groups, they should be kept in their familiar groups during gassing. The equipment should be appropriately designed and constructed to achieve this.

***Mink should not be killed in batches. Gassing of mink in a gassing box should only be permitted for individual animals or possibly small batches.***

### **Penalties**

There should be penalties for compromises in welfare during the slaughter of fur animals. The premises should be issued with an improvement notice and shut down if necessary.

### **Fox slaughter**

Electrocution should never be used. Farmed foxes are fearful of people, and the handling required for restraint and insertion of a rectal electrode and mouth electrode can only be very distressing to the animals. All farmed foxes should be killed by lethal injection, or other humane means, administered by a veterinarian. The SCAHAW report notes that the use of electrocution to kill foxes is not permitted in the UK and when farmed foxes were bred there in the past, they were killed by lethal injection of a barbiturate.

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