

Fear and Anger: Protection of the welfare of non-stunned animals at slaughter afforded by Council Regulation (EC) No. 1099/2009

John J Cranley¹

Biographical note

As a child I watched the shooting of frightened neighing racehorses, with fractured long bones, to prevent further suffering. Then as a veterinary student, I was acquainted with a colonial veterinarian, who declined on principle, to accept his official role in non-stunned slaughter of mature cattle because of the pain he witnessed whilst the animals died. I spent 25 years in medical research covering a wide spectrum from neural science/ foetal sheep research, equine parasitic diseases, transplant surgery models in pigs, animal models of vision research, applied physiology/ traumatology, anaesthetics and many other areas of science relating to man and other animals. Five years ago I was

confronted by calves undergoing slaughter without stunning, I had not fully appreciated the prolongation of consciousness or the ordeal that calves had to endure. I contacted Professor Neville Gregory Royal Veterinary College, who is the major expert in welfare of animals during killing, he encouraged my work into welfare at slaughter. While stunned slaughter was well researched, there were and are gaps in the research of religious non-stunned slaughter, because of the reluctance of the religious authorities to accept scientific method to assess the welfare of animals undergoing this process. I have endeavoured to record what I have witnessed over decades, as an official veterinarian, particularly over the past five years, to ascertain the degree and nature of the ordeal that farm animals experience during non-stunned slaughter.

Animal welfare at the time of slaughter

Animal welfare is described as a community value². Stunning is the main means of protecting animal welfare at slaughter by rendering each animal unconscious, thereby removing their fear, pain and anger

prior to death. Council Regulation (EC) 1099/2009 on the protection of animals at the time of killing (“PATOK”) has been operational from 1st of January 2013. PATOK has been binding in its entirety and directly applicable in all Member States.³ Under Article 3(1)⁴ animals shall be spared any avoidable pain, distress or suffering. Article 4(1)⁵ requires that all animals killed in slaughterhouses are stunned before bleeding so as to die without recovering consciousness or sensibility.

An exemption to the requirement to stun is granted for slaughter by a religious rite in abattoirs under Article 4(4) of PATOK. The right to practice non-stunned religious slaughter is mainly exercised in the context of Judaism and Islam guided by their respective religious authorities⁶. The Halal Food Authority prefer non-stunning, whereas Jewish Law requires non-stunning for meat to be deemed kosher, however both will only accept death by bleeding.⁷ A stun to kill using a captive bolt or a percussive stun or lethal electric stun, is rejected as the animal will have been killed by the stunning method. Where Muslim

“
Stunning is the main means of protecting animal welfare at slaughter by rendering each animal unconscious
”

¹ MVB, MSc, MA, OV, MRCVS

² Protocols annexed to the Treaty establishing the European Community – Protocol (No. 33) on protection and welfare of animals (1997) accessed at <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:12006E/PRO/33> August 2015

³ Council Regulation (EC) No. 1099/2009 Article 30

⁴ Council Regulation (EC) No. 1099/2009

⁵ Council Regulation (EC) No. 1099/2009 (PATOK). Article 4(1) Animals shall only be killed after stunning in accordance with the methods set out in Annex L

⁶ Muslim religious authorities e.g. Halal Food Authority and Jewish Religious Authorities Rabbinical London Board (Beth Din).

⁷ Deuteronomy 14:21 “You shall not eat anything, which dies of itself”

“
**increasing numbers of
 the Muslim community
 are rejecting non-lethal
 electric stunning
 preferring non-stunned
 slaughter**
 ”

religious authorities have agreed with pre-incision stunning, they require all stunned animals to be rendered unconscious but capable of full recovery meaning a non-lethal stun.

Non-lethal stunning using higher frequencies up to twenty times higher than most lethal stunning (1,000 Hertz, 220 Volts, and 200 milliamps) in broiler chickens, is proposed by Wotton et al,⁸ as a method of stunning acceptable to some Muslim religious authorities and also which comes within the stunning parameters set down in PATOK. The animal welfare advantage of non-lethal stunning, is that it creates a full epileptiform⁹ seizure, which releases aspartate¹⁰ and glutamate¹¹ within the brain, with altered brain waves, disrupting the processing of fear and pain, in effect producing electrical narcosis (absence of consciousness) and insensibility.

However, increasing numbers of the Muslim community are rejecting non-lethal electric stunning preferring non-stunned slaughter¹². Some Jewish religious authorities¹³ tolerate stunning of cattle by captive bolt after the throat incision is made (“post cut stun”). This avoids having to wait for each bovine to die from bleeding, thus allowing greater throughput. This has welfare benefits for the conscious dying cattle, as their ordeal is terminated once the captive bolt shot obliterates the cortex of the brain. In religious slaughter the religious authorities from both Judaism and Islam insist that each animal dies by loss of blood (exsanguination) due to the severing the carotid arteries and adjacent vessels, nerve and muscles

of the neck whilst leaving the spinal column intact.

While PATOK does not set boundaries to the suffering which non-stunned animals may endure, however it allows each country to apply stricter national animal welfare rules, if they so wish. This may be a pragmatic compromise to obtain the agreement of 28 countries, however it justifies the non-stunned position, allowing non-stunned advocates to claim discrimination, where any additional national rules are enforced by citing the basic default position.

Article 26¹⁴ does not prevent Member States from maintaining or introducing, any national rules to give greater protection than PATOK. Member states were required, before 1st of January 2013, to inform the Commission about which national rules they wished to apply under Article 26 (c) regarding the slaughtering and related operations under the non-stunned exemption in Article 4(4) to ameliorate or even ban it. The proposed new Welfare at time of killing regulation (WATOK 2014) for England was withdrawn prior to implementation by the Government on 19th May 2014. The Animal Welfare Act 2006 is applicable, but has limited application to non-stunned slaughter, as it authorised by the HRA 1998 as a religious entitlement.

Stunning

An explanation of types of stunning to insensibility used during slaughter, may illustrate the depth of the welfare deficit witnessed when the animal remains conscious and sensible whilst dying.

Killing by destroying the frontal cortex of the brain, using a captive bolt or a free bullet, produces death within milliseconds. On the other hand electrical stunning using electrical tongs applied across the cranium in cattle, sheep, turkeys and chickens produce a stun compliant with PATOK *minima*, producing unconsciousness which must be followed rapidly by bleeding to avoid any return of conscious awareness. At significantly higher amperages, a stun to kill may be achieved producing instantaneous death by electrocution.

Electrical stunning is similar in many ways to anaesthesia, producing a disruption of higher brain processing with the interruption of consciousness. Assessment of the efficacy and duration of electrical narcosis or absence of consciousness requires clinical experience. In non-stunned slaughter the animals are required to be fully conscious when the incision is made to the neck until loss of consciousness and finally death as a result of exsanguination. Killing by the use of electric stunning would not be acceptable, as each animal must die from exsanguination. Some Muslims may accept a reversible (non-lethal stun) but ultimately death must be due to blood loss.

The Effect of the Incision in Non-Stunned and Stunned Animals

The awareness of the immediate differences between stunned and non-

⁸ Wooton S B, Zhang X, McKinsty J, Velarde A and Knowles T G (2014) The effect of the required current/frequency combinations (EC 1099/2009) on the incidence of cardiac arrest in boilers stunned for the halal market. Peer J. Pre Prints 1-10 24th February 2014 accessed at doi,irg,/10,10.7287/peerj,preprints25 sy 1.

⁹ Epileptic seizure type reaction.

¹⁰ Aspartate is a neurotransmitter which increases within the brain during an epileptic seizure.

¹¹ Glutamate is a neurotransmitter which increases within the brain during an epileptic seizure.

¹² Shebana Mahmood M.P. Birmingham Ladywood (Lab) 2015 House of Commons, BVA sponsored

debate on Non-stunned Slaughter 23 February 2015 – Hansard.

¹³ UK Rabbinical Commission

¹⁴ Article 26 Council Regulation (EC)1099/2009

stunned slaughter particularly in birds, such as aversive or fear type behaviour starting 8 to 10 seconds post incision, is unlike any response of a stunned or anaesthetised animal. Aversive behaviour and the aggressive behaviour, which follows require processing within the limbic system, the location of emotion within the brain, indicating a high risk of consciousness or sensibility.

The cone¹⁵ is a traditional method of restraining non-stunned poultry. The birds are protected from external damage from protruding corners encountered on some moving lines where the birds are suspended by foot shackles which can be uncomfortable or even painful. Where their heads were visible, birds exhibited fear or anger type behaviour¹⁶. This commenced after a 5 second lapse post incision, with an aversive reaction to any threat such as a hand in its sightline. After 15 seconds this had altered to a pecking behaviour attacking objects. This subsided by 50 seconds before death in all but 10% of birds, after 60 seconds, angry behaviour was still obvious. At 90 seconds the intermittent remnants of anger was present in 5% of birds.

Angry bird behaviour was reported by Lehrman¹⁷ discussing earlier studies of fear in birds. Goodson et al¹⁸ proved that anger in birds was mediated by Vasoactive Intestinal Poly Peptide (VIP) from the Anterior

Hypothalamus, and Adrenal Axis¹⁹. This anger may be similar to human emotions processed in the Amygdala within the Limbic system, equivalent to the Arcopallium of bird. Much brain processing involves reacting to perceived threat.

The cutting of the throat structures including the carotids, the trachea, jugulars and, the vagus nerve in non-stunned animals on occasions was followed by nystagmus, at 5 seconds post incision in sheep, but rarely seen in cattle.²⁰ Nystagmus is a quivering of the eyeball which may indicate an epileptiform incident induced by the incision, this may be the equivalent of a Petit Mal²¹ or transient episode unlike a full epileptiform seizure or Grand Mal²² with large glutamate and aspartate surges within the brain, which one sees in electrical narcosis which is similar to a tonic²³ epileptic seizure attack where the sufferer remembers little, with complete disruption of normal brain waves and processing.

“
Where bleeding is slow or blocked there is a risk of resurgence of consciousness and sensibility
”

In non-stunned sheep, either where nystagmus was observed or not, a partial traverse of the eyeball by the third eyelid²⁴ occurred, indicating possible epileptiform activity, less intense than the full traverse described above, which accompanied electrical narcosis. The duration of the epileptiform activity was 15 seconds, after which there was a strong resurgence of CNS reflex activity with or without sensibility or consciousness²⁵.

Possible Reasons for the Resurgence of Consciousness and Sensibility

Where bleeding is slow or blocked there is a risk of resurgence of consciousness and sensibility. In non-stunned calves, the severed carotids elastically retract and frequently seal, stopping blood loss allowing survival for over 6 minutes. I have witnessed a non-stunned calf standing for over 5 minutes after its throat had been severed²⁶. This indicated hypo-thalamic activity, whereby the brain co-ordinates posture, with a marked risk of sensibility.

Hoisting or hanging animals upside down by a hind leg, a practice favoured by religious authorities as a method of removing all blood from a carcase rapidly,²⁷ poses a risk for resurgence of CNS (brain stem) reflexes and consciousness. Gregory et al²⁸ found that cattle undergoing non-stunned slaughter collapsed (due to insufficient blood supply and

¹⁵A cone is a tapering cone shaped metal device through which the head of the bird protrude in over 85% of cases.

¹⁶Cranley J and Butterworth A (2015) Bird behaviour intrinsic to non-stunned versus stunned killing systems. New paper drafted pre submitted

¹⁷Lehrman DS (1953) Konrad Lorenz's Theory of Instinctive Behaviours, The Quarterly Review of Biology, Vol. 20 No. 4 (Dec 1953)pp 337-363 University of Chicago Press

¹⁸Goodson JL, Kelly AM, Kingsbury MA and Thompson RR (2012) A aggression specific cell type in the anterior hypothalamus of finch's. Proceedings of the Natural Academy of Sciences; 109 No 34 13847-13852 2, doi: 10.1073/pnas.1207995109

¹⁹Vasoactive Intestinal polypeptide (VIP) is a chemical messenger which was originally discovered in the intestine of animals, however it was subsequently discovered that it conveyed messages from the Anterior Hypothalamus of the brain to the Adrenal Gland.(Axis).VIP was recently proved to be the means by which anger was transmitted from the Anterior Hypothalamus in the limbic system (emotional seat of a birds brain called the Arcopallium. This is similar to the Amygdala of humans where fear and anger are processed (see Goodson et al 2012).

²⁰Cranley 2014 Onset of Death after non-stun slaughter Veterinary Record 2014,175:357-358 doi:10.1136/vr.g6115

²¹Petit Mal is a transient mild CNS episode unlike a

²²Grand Mal which is a full epileptiform seizure similar to seizure seen during tonic phase of electric narcosis.

²³Tonic epileptic type seizure following electrical stunning which lasts for less than 20 seconds, where the throat is severed within the first six seconds of the tonic seizure, an additional seizure will ensue which allows blood loss to kill the animal before the epileptic fit wears off,risking recovery.

²⁴The Third eyelid is very prominent in birds, for example, where it wipes the eye of dust continually, during stunned slaughter it vibrates rapidly when checked for the presence of a corneal reflex, it can be felt.

“
**The fear response was
 seen frequently in cattle
 slaughter with rage
 against restraint in
 aroused animals awaiting
 stunning**
 ”

blood pressure in the brain) to the floor. On reaching the floor they frequently had an increase of blood pressure sufficient to allow the animals to wake up and stand up. Where the head was below the heart, with or without inversion, blood supply of brain is restored. This risk occurred either in inverted hoisted animals stunned awaiting an incision or non-stunned animals incised, bleeding, considered to be unconscious prior to hoisting.

In Article 15(2)²⁹ hind limb hoisting or inverted restraint of bovines is prohibited by PATOK, except in the case of non-stunned cattle killed under Article 4(4)³⁰, providing head movements are restricted. The inverted restraint of a conscious bovine lying on its back, while its throat is cut, places it at risk of asphyxiation (choking) from blood entering its open trachea and lungs.³¹

Such an animal welfare debacle, may be avoided when or if England re-adopts specific national rules to reassert the use of the upright restraint system. Currently, we are in the default position with EC Regulation 1099/2009 (PATOK), which permits the use of inverted restraint, without the additional animal welfare protections contained in Welfare At Slaughter and Killing Regulations (WASK 1995), which only

permitted upright slaughter of non-stunned cattle.

The EFSA³² Toolbox from EC Regulation 1099/2009 (PATOK) Guidance (2013)³³, on the assessment of animals in restraint using clinical CNS (brain stem) reflex testing. Restraint is a requirement of EC Regulation 1099/2009 (PATOK). It is for the protection of the slaughterers in the presence of unrestrained cattle, who may attack the slaughterer whilst they are being killed.³⁴ It is important to have an animal restrained to avoid poor cutting. It is harder to justify the fear and terror, which one has witnessed, induced in bulls whilst fighting restraint. The fear response was seen frequently in cattle slaughter with rage against restraint in aroused animals awaiting stunning.

The EFSA Toolbox is essential for testing levels of stunning at key stage 1 and defining death at key stage 2. The systematic checking of reflexes (corneal, palpebral or pupillary), as required by Article 5(2)³⁵, in conscious restrained animals whilst dying, may trigger resurgence of

consciousness, fear, pain and anger because of stimulation and arousal.³⁶ Animal welfare may be protected by non-intrusive surveillance of the restrained animals, until it is completely limp within restraint.

Significance of Behaviours

The evidence for the consciousness and sensibility during non-stunned slaughter, comes from the behaviours displayed by dying animals after the religious incision. In particular, where, these behaviours are not elicited in response to a CNS reflex test, but appear as spontaneous prolonged higher brain coordinated activity. Behaviours are very complicated neural processes much more so than CNS reflexes which do not impinge on consciousness. Behaviours are controlled from the higher conscious brain. The angry bird behaviour is seated in the arcopallium of the chicken's brain. The rising of the recumbent calf, and postural activity to stand, require involvement of thalamic processing³⁷ the raising of the head of non-stunned bleeding calves, sheep and birds in a righting movement may also involve a postural drive. Drifting in and out of the remnants of angry bird type behaviour, without provocation may indicate a flight response³⁸.

On the other hand, CNS reflexes are indicative of brain stem activity,

²⁵Clonic phase is a recovery period where the animal's legs paddle after the Tonic spasm. Clonic moving coincides with depolarising of the brain wave activity. The depolarisation period is a time of depression of brain activity where animals do not show a righting reflex or postural struggle to stand up right. Hypothalamic processing is disrupted as indicated by the altered brain waves. Where a delayed severing of the throat is carried out during the clonic phase i.e. before 20 seconds post electric stun, there appears to be an additional epileptiform seizure, indicated by a tonic stiffening of the body followed within 5 seconds by a traverse of the third eyelid of the eyeball which lasts 15 seconds.

²⁶Cranley, J.(2011) Sensibility during slaughter without stunning in cattle. 168- 437-438. Veterinary Record.

²⁷Cranley, J.(2014) Onset of death after non-stun slaughter 175(14):357- Veterinary Record

²⁸Gregory .N.G.(2011) Plenary Address. Humane Slaughter Association Centenary International Symposium. Portsmouth, 1st July 2011.

²⁹Article 15.2 EC Regulation 1099/2009 Protection of animals at time of killing (PATOK).

³⁰Article 4.4 EC Regulation 1099/2009 Protection of animals at time of killing (PATOK).

³¹The problems of inverted hoisting resurgence have been ignored. I raised the issue during the Public Consultation September 2013 and again at the AHAW 78th Plenary Meeting 22-23rd October 2013. In addition I published this work Cranley J. Slaughtering lambs without stunning (2012) doi:10.1136/vr.e 1703 Veterinary Record Google Scholar. It was submitted it to EFSA Technical Report Supporting Publication 2013; EN-530 Public Consultation (September 2013)Report on the Draft Guidance on Stunning Studies Assessment Criteria. Private Institute 2. 3.2.3. pages 19-20.

³²European Food Safety Authority (EFSA) Parma, Italy. Directorate General SANCO to the EU Commission.

³³Article 27.3. EC Regulation 1099/2009 No later than 8 December 2013, the Commission shall submit to the European Parliament and to the Council a report on animal welfare aspects of water bath stunning of birds. This coincided with EFSA Guidance on Poultry Slaughter Welfare.

³⁴In the preamble, to EC Regulation 1099/2009, "whereas" Section 13, discusses the risk of danger to human beings from injury or death from dying animals being reduced by the use of restraint.

³⁵Article 5(2) EC Regulation 1099/2009 (PATOK) states persons responsible for non-stunned slaughter shall carry out systematic checks to ensure animals are unconscious before release from restraint, and no signs of life prior to processing. Such checks may trigger fear or anger behaviour in conscious or resurgent animals.

which is proof of life but not consciousness. They are important because their absence is the legal criteria³⁹ laid down for defining death. The presence of CNS reflexes in animals, before consciousness reappears, may be the first warning of malfunction in a stunning system.

Welfare implications

The protection of animal welfare under PATOK, is at risk when an animal undergoing non-lethal stunned slaughter is exposed to the resurgence of consciousness and sensibility in the following ways: by delay in incising its carotids, failing to cut both carotids, by cutting the jugulars only (using faulty technique), incorrect electrical stunning parameters, short or incorrect application of the tongs to the cranium, and by increasing the brain's blood supply by inverted hoisting of the animal, all render the protection of animal welfare to be less than adequate. These risks, which are witnessed continually would be better assessed by neural scientific analysis, where practicable.

The welfare of a conscious animal in non stunned slaughter, from incision to death, is reduced to dependence upon the sharpness of the knife, the accuracy of incision, cutting both carotids and the skill of the slaughterer to avoid prolongation of consciousness and protection from intrusion whilst dying.

The most proficient slaughterers working on slow lines, take care to inspect the animals before they slaughter, if they are worried about a bird in terms of suitability i.e. if it

has any black feathers it will be rejected. This should be handed over to a secular slaughterer who must stun it and then slaughter it. The problem comes where a religious incision is made during which the knife touches bone or is blunted or the throat cut uncovers a feather in the windpipe, this means the animal is rejected. The slaughterer by his training, is concerned about his knife being damaged,⁴⁰ also about preventing the rejected animal being passed as kosher. His rejections have to be observed, in order that a conscious bleeding religiously rejected animal is stunned, and not left to die un-stunned which would breach PATOK in relation to cattle, birds and sheep.⁴¹

Rejections are part of religious slaughter. Whole or part of consignments may be rejected on certain occasions, such as in birds where there is a problem of tendon snapping or in cattle where only the forequarters are accepted and the remainder has to be sold to a secular market. The animal welfare implication of a high percentage of rejections, is that replacement animals may have to experience the non-stunned ordeal to fulfil the order.

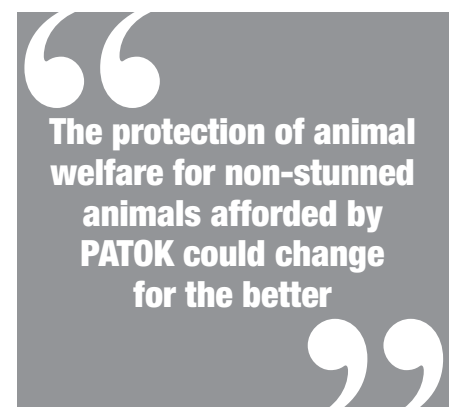
The severing of the throat including the trachea and vagus⁴² nerve may prevent vocalisation. One contemplates, if non-stunned animals were able to vocalise, their plight would be difficult to ignore. One considers a theoretical possibility that pain, fear, anger and frustration can engender an autonomic storm⁴³ type response involving the adrenal

chemical messengers relayed to the hypothalamus and heart and target organs.

If Electro-Encephalographic (EEG) studies of non-stunned slaughter were allowed⁴⁴ in order to establish the precise risk to animal welfare and to compare it with slaughter following stunning, much objective comparative information might ensue. Whilst EEG studies may be less informative than one would like, nonetheless it may provide data about the type, size and quality of the brain waves. In the case of non-stunned cattle dying at bottom of a restraint pen, the animals could be assessed for the absence of brain waves using an electrical cap type instrument, thereby protecting the animal from arousal and reducing the danger to the Animal Welfare Officer carrying out these procedures.

What can be done?

The protection of animal welfare for non-stunned animals afforded by PATOK could change for the better, if pressure is brought to bear on how it is performed. The greater the scientific analysis brought to bear on the risks of consciousness the better the evidence for adjustments, to be



³⁶Adams DB and Sheridan AD (2008) Specifying the risks to animal welfare associated with livestock slaughter without induce insensibility. Animal Welfare Branch, Product Integrity, Animal and Plant Health Division, Australian Department of Agriculture, Fisheries and Forestry. 1-100

³⁷Gregory N.G.(1998) Animal Welfare CABI Wallingford Oxon. 65-85. Physiology of Fear and

Anger at Slaughter Hypothalamic Activity in the Higher Centers of the Brain and Consciousness.

³⁸Gregory N.G. (1998). Animal Welfare CABI Wallingford Oxon. 65-85. Physiology of Fear and Anger at Slaughter. The intermittent un-provoked wing flapping during non-stunned slaughter may indicate fear followed by a flight behaviour.

³⁹EC Regulation 1099/2009 (PATOK) animals must be restrained until all signs of consciousness disappear.

⁴⁰Article 7(2)(f) EC Regulation 1099/2009 Bleeding of live animals.

⁴¹Article 4(1). All animals will be stunned and remain stunned until death ensues.



put in place in order to ameliorate suffering. The period of consciousness, the number of animals, which experience prolonged consciousness, the awareness of fear waxing and waning, the struggle against restraint, the arousal of consciousness by intrusive assessments, the speed of killing, the total numbers of animals being processed, all add to the sum total of animal suffering to be endured.

The labelling of non-stunned meat will allow the consumer to make an informed choice of the welfare at slaughter of their meat source. There is a probability that some Halal customers will demand more non-stunned meat. This has already happened, as the number of non-stunned sheep slaughtered in the UK has increased from 1.6 million sheep in 2011 to 2.5 million sheep in 2013 reported by the FSA⁴⁵. The total of the additional non-stunned slaughter of UK sheep, with the extra intrinsic suffering entailed, is an animal welfare issue to be addressed by all who care about such matters.

Increased cattle and poultry suffering, entailed by similar non-stunned percentage increases, within the UK are an inevitable price to be paid by the animals, for the rights of religious consumers to utilise their right to consume animals slaughtered without stunning guaranteed by the Human Rights Act (1998). Supporters of non-stunning may ignore the cost to the animals concerned. Others who care about the suffering of farm animals, may

point out, that in Germany the exemption from stunning, is based on the needs of the religious communities who have to obtain an official licence for a specific number of animals to undergo non-stunned slaughter. Licensing may avoid persons taking advantage of the religious non-stunning exemption from the requirement to stun for pecuniary reasons alone.

Accurate scientific assessment of the degree of “necessary suffering” and its physiology⁴⁶ may re-define what constitutes “unnecessary suffering” in the context of non-stunned slaughter. The fear and anger responses shown by conscious animals, if fully understood, may redefine the conscious ordeal of the non-stunned animals, as torment rather than necessary suffering. The current risk from the intrinsic inefficiency of exsanguination by carotid severance, bleeding from jugulars rather than the carotids, coupled with poor technique, exacerbated by prolongation of sensibility, may combine to produce a risk of lamentable welfare.

The precautionary principle should be respected, as we are currently unable to fully quantify the suffering of non-stunned animals at slaughter. Prolonged sensibility has been found, in what were considered to be

vegetative states in human beings, who upon awakening from their catatonic state remember/ recall the pain and fear. We should treat all sentient creatures with true respect, to avoid such risks to their welfare.

The clinical observations one has made in relation to non stunned slaughter over many years have lead to a better appreciation of true risk of sensibility and poor animal welfare. While it is not difficult to see the welfare problems with non-stunned slaughter, it must be acknowledged that there are problems with inadequate stunning, hoisting and resurgence which also produce poor welfare. Candour is essential for meaningful dialogue, to avoid discrediting each other in the stunning versus non-stunning debate. If the dialogue could reach a point where both sides agreed on the extent of the problems, then we may be in a better position to obtain agreement on how to improve welfare at slaughter in general.

One hopes, EU legislators, in the future will be more aware of the risks to animal welfare at slaughter, before the killing becomes so rapid, resulting in suffering being sanitised in a blurred dash for ever faster killing, both stunned and non-stunned. The evidence of the risk to the welfare of animals at slaughter, may come from the clinical observations of the ordeal of stunned and non-stunned slaughter by official veterinarians, trying to unravel the significance of their findings, in terms of the risk of each animal’s suffering.

⁴²Shair H.N, Smith J.A.& Welch . Marta.G. Cutting the vagus nerve below the diaphragm prevents maternal, potentiation of infant rat vocalization, *Developmental Psychobiology* Volume 54, Issue 1, pages 70-76. January 2012.

⁴³Adams D.B. & Sheridan A.D.(2008) Specifying the risks to animal welfare associated livestock slaughter without induced insensibility. *Animal Welfare*, brand, product integrity Animals and Plant Division, . Australian Government Department of Agriculture, Fisheries and Forestry Australia. Autonomic storm.in excited animals.

⁴⁴The collection of data by application of a device would not be acceptable, as it may be considered to damage the religious purity of the meticulous act of religious worship, much as when the supervised trainees incise any animal it is always rejected.as being unfit.

⁴⁵Times Newspaper 30th January 2015 Headline and Editorial concerning the percentage increase of non stunned slaughter in numbers of Cattle Sheep and Poultry between two surveys by the FSA (UK) in 2011 and 2013 non-stunned slaughter reported 2015.

⁴⁶Baldwin BA and Bell ER (1963) Blood flow in the carotid and vertebral arteries of the sheep and calf. *Journal of Physiology* 167 448-462