EVALUATION OF RABBIT WELFARE AT STUNNING AND SLAUGHTERING IN A COMMERCIAL ABATTOIR

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ABSTRACT

A total of 1020 crossbreed rabbits were individually examined to evaluate their welfare at electric stunning and slaughtering in a commercial abattoir. Stunning (position of electrodes and repetition of current applications) and sticking (position, length and depth of the cut) procedures were checked. Rabbits were behaviourally monitored from current application to death. The stunning system was incorrectly applied one hundred and ten times (10.8%). Three rabbits failed to be stunned and were still conscious at sticking. Eighteen rabbits recovered before the onset of death, as evidenced by the corneal reflex, and in a few cases vocalization (n=3) and head righting (n=1) were observed. Corneal reflex seemed to be the best indicator of recovery at the abattoir.

Key words: Rabbit, Welfare, Electronarcosis, Stunning, Slaughter.

INTRODUCTION

Breeds and crossbreeds of the European rabbit (*Oryctolagus cuniculus L.*) are bred and slaughtered worldwide for meat production. Rabbit meat production is very heterogeneous in European countries and for most of EU member states, no information about rabbits' slaughter has been provided by EUROSTAT. In North Europe rabbit is mainly regarded as a laboratory and a pet animal, while in France, Italy, Spain, Portugal and Hungary rabbit meat is produced and consumed on a large scale (EFSA, 2006). Although in Italy rabbits are still traditionally raised and home slaughtered, 28.39 million of rabbits of 2.6 kg on average, reared in industrial farms, are slaughtered per year in authorized rabbits abattoirs (ISTAT, 2007).

According to the provisions of the Legislative Decree 333/1998 on the protection of animals at the time of slaughter or killing (put into effect by the Council Directive 93/119/EC of 22 December 1993), the allowed methods for stunning rabbits are: captive bolt pistol, concussion, electronarcosis and exposure to carbon dioxide. Captive bolt is considered a good method but only when few rabbits need to be slaughtered (EFSA, 2006), while electronarcosis is the most widely used stunning method in rabbit abattoirs when large stocks of animals are processed.

Few studies have investigated the physical activity and behaviour of rabbits stunned with electricity (Anil *et al*., 2000; Maria *et al*., 2001). Electrocochleography (EcoG) records of electronarcosis showed that bitemporal application of 100V of a 50Hz AC for 1 sec was able to induce the Grand Mal epileptic activity in rabbits. Two rabbits showed tonic/clonic seizures i.e. the typical clinical signs for epilepsy in other species, while other rabbits appeared simply exhausted after stunning (Anil *et al*., 1998). Electrical stunning can be achieved in rabbits using a minimum voltage of 100V that should provide currents in excess of 140 mA (Anil *et al*., 1996). A clinical scoring system to evaluate the welfare at slaughter and particularly at stunning for red meat species was elaborated by Temple Grandin in the '90s and it is currently successfully used in many abattoirs in the USA and Europe. On the contrary, very little has been investigated in rabbits and applied to the abattoirs to evaluate on a large scale the welfare of these animals at stunning and slaughtering.

Therefore, the objective of this study was to evaluate, by a clinical assessment, the effectiveness of electrical stunning in a commercial rabbit slaughterhouse.

MATERIALS AND METHODS

Animals and experimental design

A total of 1020 rabbits were individually examined by the same observer in order to evaluate the efficacy of the stunning. The trial was carried out during autumn (October and November) in a EU approved rabbit slaughterhouse in North Italy. The plant had a slaughter capacity of 1800 rabbits/day with a speed of 220 rabbits/hour. Rabbits were transported daily to the abattoir in cages 35 cm high at a density of 15 rabbits/480 cm^2. All the rabbits were purchased from industrial farms and were finishing crossbred animals of both sexes, 90 days old, weighting 2.5 kg on average. The slaughterhouse used to receive animals at 7.30 a.m. (1^{st} transport) or at 10.30 (2^{nd} transport). Each transport consisted of 1 to 3 different batches of rabbits and could last from 20 minutes to 3 hours. After transport animals were unloaded in cages and kept outdoors, sheltered under a roof till slaughter. Slaughtering was divided into two shifts: a day shift (from 8 a.m. to 12 a.m.) and an afternoon shift (from 1 p.m. to 4 p.m.). The slaughterer was the same for all the duration of the trial.

Procedure of stunning and killing and parameters recorded

The stunning was manually performed with a V-shaped device that had an electrode mounted on each arm. The slaughterer took a rabbit out of the cage and, keeping the animal on the top of the cage, positioned the two arms of the stunner between the eyes and the ears of the rabbit. The apparatus incorporated a device which measures the impedance of the load and prevents operation of the apparatus if there is not the minimum required current; it incorporated an audible device indicating the length of time of its application to an animal and was connected to a device indicating the voltage and the current under load. After the head of the rabbit touched both of the electrodes, a current of 117V and minimum 1.1A for 1.31 s ± 0.29 s (SD) (as measured on a sample of 50 rabbits) was used. After the stunning the rabbit was hanged upside down on a rail and jugulated. The time from stunning to sticking, measured on a sample of 50 rabbits, was 5.55 s ± 0.88 s (SD). Each rabbit was individually observed from the moment it was taken out of the cage till the onset of death. The parameters recorded are reported in Table 1. For statistical analysis a chi-square test was applied on selected parameters.

Table 1: Parameters recorded

Timing		
Temperature	Mild (>5°C)	Cold (<5°C)
Time of the day	Morning	Afternoon
Current application		
Position of the electrodes	Correct (between the outer corners of the eyes and the base of the ears)	Incorrect (any other position)
Number of current application	One	More than one
Vocalization at current application	Absent	Present
Flight at current application	Absent	Present
Sticking		
Application (position, length and depth of the cut)	Correct	Incorrect
Vocalization at sticking	Absent	Present
Stunning (variable measured from sticking to death)	Absent	Present
Corneal reflex (elicited by fingerprint contact of the eyeball)	Absent	Present
Gasping	Absent	Present
Blinking	Absent	Present
Vocalization	Absent	Present
Head righting	Absent	Present
Rhythmic breathing (more than 18 breaths per minute)	Absent	Present

RESULTS AND DISCUSSION

A total of 10 batches of rabbits, belonging to 8 different farms were observed. The results of the observations on 1020 rabbits are reported in Table 2.

Table 2: Parameters recorded in 1020 rabbits. Number of observations between brackets

Timing		
Temperature	Mild (480)	Cold (540)
Time of the day	Morning (870)	Afternoon (150)
Current application		
Position of the electrodes	Correct (910)	Incorrect (110)
Number of current application	One (909)	More than one (111)
Vocalization at current application	Absent (1019)	Present (1)
Flight at current application	Absent (1019)	Present (1)
Sticking		
Application (position, length and depth of the cut)	Correct (1020)	Incorrect (0)
Vocalization at sticking	Absent (1017)	Present (3)
Stunning (variables measured from sticking to death)		
Corneal reflex (elicited by finger contact on the eyeball)	Absent (1002)	Present (18)
Gasping	Absent (729)	Present (291)
Blinking	Absent (993)	Present (27)
Vocalization	Absent (1017)	Present (3)
Head righting	Absent (1019)	Present (1)
Rhythmic breathing (more than 18 breaths per minute)	Absent (1020)	Present (0)

The stunning system was incorrectly applied one hundred and ten times (10.8%). In most of these cases it was too close to the nose of the animal and in some cases (n=4) a forelimb of the rabbit was interposed between the arm of the stunning system and the head of the animal. Only one rabbit vocalized at stunning application, although the electrodes were correctly positioned in that case. It was supposed that tiredness and cold could negatively affect the slaughterer's performance in the afternoon shift but results were not significantly different. There was not, in fact, a significant difference (P=0.83) between the position of the electrodes in the morning shift (95 incorrect/870) and the afternoon shift (15 incorrect/150) nor between mild (55 incorrect/480) and cold weather (55 incorrect/540) (P=0.54).

Current application was repeated for 111 rabbits, 97 times in the morning and 14 times in the afternoon shift. Correct application of electrodes was observed 101 times and only in 10 times did incorrect applications occur. The slaughterer decided to repeat the application in case he thought the first application was not long enough. Thus, three rabbits received 4 current applications, seven rabbits 3, and 100 rabbits 2. Only 1 rabbit that received 2 current applications showed a flight reaction while the other 110 did not show any abnormal behaviour. Nevertheless, immobility is a common behaviour displayed by all prey species in case of danger, particularly in nervous rabbits, making it even more difficult to determine if pain is present or not (Mayer, 2007). As a consequence, we cannot exclude that rabbits that were immobile at stunning were showing a 'conservation-withdrawal' reflex that is more difficult to interpret than the 'fight or flight' reaction.

Sticking was correctly performed in all the observations but 3 rabbits squealed at sticking and 2 of them had a flight reaction. The position of the electrodes at stunning was not correct in these 2 rabbits. Because a loud, piercing scream is a sign of pain and fear, as when the rabbit is caught by a predator (Mayer, 2007) a squeal or a cry at time of sticking clearly indicates a state of consciousness.

Eighteen rabbits showed a return of reflexes after sticking. A summary of the behaviours recorded after sticking in relation to the position of the electrodes is presented in Table 3. A chi-square test was applied to each behaviour, in order to evaluate the effect of the electrodes' position on the onset of the behaviour. $P<0.05$ indicates a significant difference between correct and incorrect electrodes position and the presence or absence of the behaviour. Electrodes' position had no significant effect on the onset of the behaviours (Table 3).

Table 3: Behaviours recorded after sticking

Behaviour		Electrodes position			
		Correct	Incorrect	Total	P
Corneal reflex	Present	15	3	18	0.43
	Absent	895	107	1002	
Gasping	Present	260	31	291	1.0
	Absent	650	79	729	
Blinking	Present	25	2	27	0.76
	Absent	885	108	993	
Vocalization	Present	3	0	3	1.0
	Absent	1017	0	1017	
Head righting	Present	1	0	1	1.0
	Absent	1019	0	1019	

No rhythmic breathing was recorded after sticking in any rabbit, but 18 rabbits (1.76%) showed the corneal reflex and, among them, 3 rabbits squealed and 1 showed head righting.

Gasping appeared in 291 animals. This respiratory pattern, which is also called terminal breathing, is observed just before death, as a consequence of cerebral ischemia (Pluta and Romaniuk, 1990). It could be considered a positive sign, anticipating the onset of death. However, it was also observed in 15 out of the 18 rabbits showing a corneal reflex. Electrodes were incorrectly positioned only in 2 of the 18 rabbits showing a recovery. Therefore this can't be considered the sole cause of the recovery. Other reasons must be investigated in the stunning procedure. The specific parameters of the 18 rabbits that recovered before death are reported in Table 4.

In monitoring rabbit welfare at slaughter it is important to recognise a stunned state. In disagreement with Anil (2000), we believe that cessation of rhythmic breathing cannot be considered the best and most reliable indicator of recover at the abattoir. The fur of the animals and their upside down position hanging from the rail makes it difficult to evaluate the presence of a rhythmic breathing. In an experiment performed by Anil (2000), the return of the corneal reflex anticipated the return of breathing in 6 out of 10 stunned rabbits. Therefore, the onset of corneal reflex could be the most reliable and effective tool indicator to use at slaughter.

Table 4: Specific parameters of the rabbits that recovered before death

	Rabbit n.																	
Parameter	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Position of the electrodes incorrect								X					X					
Extra current applications			X															X
Vocalization at current application																		
Flight at current application																		
Vocalization at sticking																		
Corneal reflex	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Gasping	X	X		X	X	X	X	X	X	X		X	X	X	X	X		X
Blinking	X	X						X							X	X		
Vocalization				X		X									X			
Head righting					X													
Rhythmic breathing																		

CONCLUSIONS

Slaughter of rabbits on a commercial scale presents some critical points concerning animal welfare. This survey revealed that electrodes could be incorrectly positioned on many animals causing probably unnecessary suffering. The recovery before death, even if in few animals, indicates that the

duration of stunning is not sufficient in some cases. Further studies are necessary to understand why electric stunning doesn't provide a sufficient duration of insensibility in some rabbits.

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