LACK OF EVIDENCE FOR STRESS BEING CAUSED TO PIGS BY WITNESSING THE SLAUGHTER OF CONSPECIFICS

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The effects of witnessing the slaughter of conspecifics on the stress responses of pigs were investigated. Previously catheterized pigs were allowed to see the stunning and sticking (exsanguination) of pigs in a nearby pen. Heart rate was monitored and serial blood samples were taken to assess stress responses. Packed cell volume (PCV), cortisol and β-endorphin were determined in the samples. In addition, behavioural observations and subjective assessments of animals' responses were made. Although the levels of hormones, PCV and heart rate tended to be generally high due to handling, there were no specific increases in response to witnessing stunning and slaughter. These results suggest that witnessing the slaughter act does not distress pigs.

Keywords: *animal welfare, pigs, slaughter, stress*

Introduction

The question of whether slaughter by exsanguination (sticking) or killing within sight causes stress in conspecific animals is a controversial issue. We have already attempted to address this question with regard to sheep witnessing slaughter. This work produced no evidence to suggest that the animals were distressed (Anil *et al* 1991). The effects of killing by mechanical means, or shooting animals, on conspecifics witnessing this act have been studied by other researchers, the most relevant being Bracke (1993). He made behavioural observations in mice, hens and farmed deer and also concluded that no evidence of distress was apparent. Because there could still be species differences it was decided to extend the investigations to pigs. A preliminary report of the findings has been published (Anil *et al* 1995).

Materials and methods

After obtaining a special Home Office licence and permission to carry out the procedures, 15 pigs (Duroc x Large White) of mixed sex, weighing between 35 and 65kg, were selected. These were destined to be witness pigs that would view the slaughter of conspecifics. Each pig was surgically prepared with two indwelling jugular vein catheters. General anaesthesia was induced with thiopentone (5%) and maintained using halothane (1 to 1.5%) and a nitrous oxide/oxygen (3:1) mixture. Animals were allowed to recover for at least three days and to become accustomed to handling and blood sampling. Catheters were maintained patent by daily flushing with heparinized saline (5iu ml^{-1}).

On the day of the experiments each pig was blood sampled in the resting pen on the farm first, and then transported a short distance to the laboratory. Following a 30-minute rest the witnessing pig was placed in a specially designed hammock which allowed it to lie sternally recumbent (as described in the previous paper Anil *et al* 1996). This gave the witnessing pig full view of a nearby pen which was to be used for the slaughter of other pigs. The pig was allowed to settle in the hammock for ten minutes. Then two intact pigs (slaughter pigs 1 and 2) were put into the slaughter pen. Pig 1 was electrically stunned (150 volts, 50 hertz ac for seven seconds). This animal was then hoisted and stuck. Exsanguinated blood was collected into a trough and the behavioural reactions of the pen mate (slaughter pig 2) were subjectively observed. Each witnessing pig had serial blood samples taken before and after stunning and slaughter of pig 1. The sampling protocol is shown in Table 1. After the sampling protocol had been completed the second slaughter pig in the pen was stunned and slaughtered in the same manner. Blood samples were taken from all the witnessing pigs in the hammock to assess the response to only the first slaughter process.

Table 1 Blood sampling protocol.

Sample No	Function	Time (min)
1	Farm pen	Before short transport
2	Resting pen in the laboratory	- 30
3	In hammock	Start = 0
4	Pre-stun (first slaughter pig)	+10
5	Stun	+11
6	Stick	+12
7	Post-stick	+17
8	Post-stick	+27

Simultaneously with the blood sampling protocol heart rate was monitored in the witnessing pig using a Polar Sport Tester (Polar Electro OY, SF-90440, Kemple, Finland), and the behaviour and vocalizations of the witness pig and slaughter pig 2 were recorded on video for later analysis. Unlike the system employed in sheep (Anil *et al* 1996) this method allowed heart rate to be monitored without the use of long cables. A sensor/transmitter was attached to a set of electrodes incorporated into an elasticated chest band. The band was then placed around the pig's chest. Electrodes were covered with electrode cream to improve conductivity. The transmitted heart rate signal was received by a wrist monitor stored in a plastic box attached to the chest band on the animal's back. The monitor averaged the heart rate signal every 5 seconds for the duration of the experiment and stored the data internally. Once.the experiment was completed, the averaged heart rate data was downloaded on to an Apple Macintosh computer using a Polar Interface and a computer program (Polar Electro OY, Finland) for further analysis. Blood samples were analysed for packed cell volume (PCV), cortisol and ß-endorphin. PCV was determined using a microhaematocrit centrifuge. Cortisol levels were measured in plasma with an ENDAB Cortisol Enzyme Immunoassay Kit

(Immunotech Corporation, Boston, MA 02134). Plasma ß-endorphin was determined by a radioimmunoassay technique described by Fordham *et al* (1989).

The pre-stun values (sample 4) were taken as the control and compared against subsequent samples in paired t tests.

Results

The heart rates, monitored in each witnessing pig, did not rise significantly in response to witnessing stunning and slaughter. There were numerous surges in the heart trace associated with the physical activity some pigs exhibited in the hammock. Figure 1 illustrates a typical heart rate pattern from a pig. Likewise, PCV (Figure 2) and circulating levels of plasma cortisol (Figure 3) and ß-endorphin (Figure 4) were not affected significantly by watching the slaughter act.

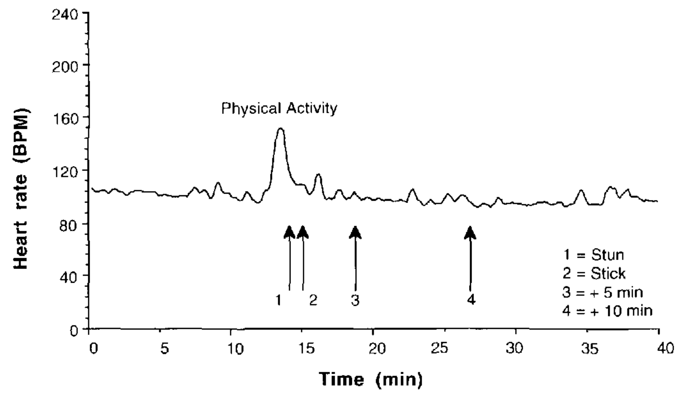

Figure 1 Heart rate of a pig witnessing stunning and slaughter.

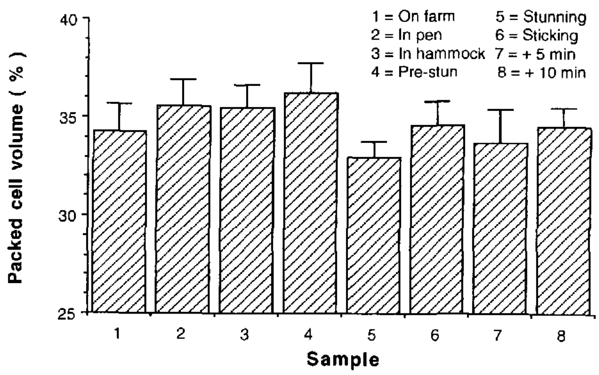

Figure 2 Packed cell volume in pigs witnessing stunning and slaughter (mean ± SEM, n = 12).

Cortisol levels had already started to rise before observing the slaughter of pig 1 as Figure 3 shows. However, a response characteristic of an acute stressor was not evident at any stage following witnessing both stunning and slaughter.

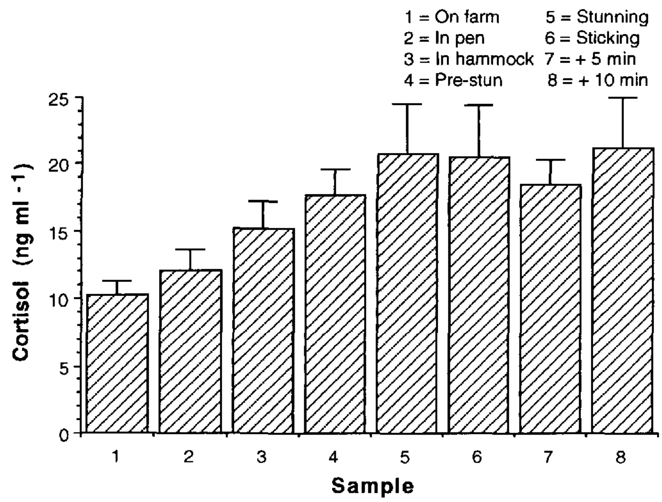

Figure 3 **Cortisol levels in pigs witnessing stunning and slaughter (mean ± SEM, n = 12).**

Similar to the picture seen for cortisol, ß-endorphin levels were moderately elevated by handling and moving the witnessing pigs (Figure 4). There were no significant increases following stunning and slaughter.

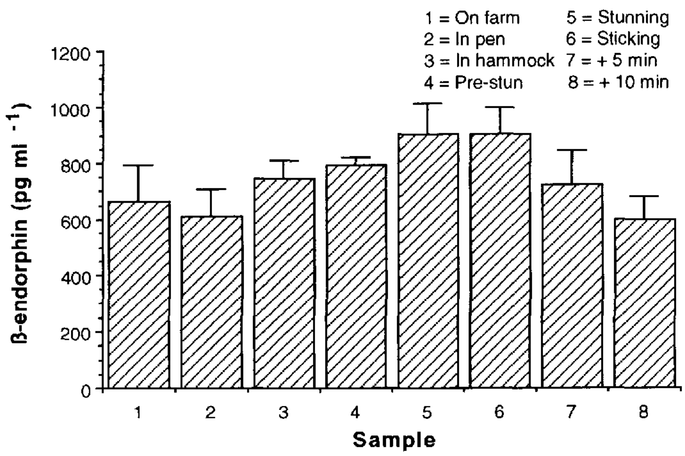

Figure 4 **ß-endorphin levels in pigs witnessing stunning and slaughter (mean ± SEM, n = 12).**

Behaviour as assessed from the video recordings revealed no evidence of distress. This conclusion was based on observing the behaviour of both the witness pigs and the second slaughter pigs. The frequencies of the following behaviours were recorded in relation to stunning and sticking: squealing (a long expiratory sound), snorting (a short inspiratory sound) and struggling. The incidence of these behaviours in the witnessing pigs in the hammock did not show any particular trend when analysed. During the 5 minutes before and 5 minutes after sticking, the total number of squealing bouts (lasting less than 20s) was 30 and 20 respectively. Table 2 shows the snorting frequency during the 10s following stunning and sticking.

Table 2 **Total number of snorts by witnessing pigs at each second interval during the 10s following stunning and sticking (n = 14).**

	Time (s)										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Total**
Stunning	8	5	1	2	1	2	3	4	1	4	(31)
Sticking	3	0	0	1	4	1	2	1	0	1	(13)

The accompanying pig in the pen (slaughter pig 2) did not seem to be disturbed by the slaughter of its pen mate. In fact, two pigs licked at the sticking wound and eight pigs ingested some of the coagulated blood in the trough.

Discussion

The existing legislation in England and Wales (Ministry of Agriculture, Fisheries and Food 1995) prohibits sticking of red meat animals within sight of others. Although this prohibition is intended to protect the welfare of animals, a recent survey (Anil & McKinstry 1993) showed that trying to get stunned animals out of sight can often result in delays in exsanguination. This may lead to signs of recovery being shown prior to, during and following sticking in commercial situations. The problem relates solely to head-only electrical stunning when carried out in traditional stunning pens, where the stun is reversible if prompt sticking is not carried out. The survey also reported unduly long stunning-to-sticking intervals with an average time of 31s and a maximum recorded time of 120s.

Heart rate monitoring is a method that can be used for assessing stress in pigs (Van Putten & Elshof 1978). Although the heart rates measured in this study were already moderately high due to handling the witnessing pigs, one would have expected sudden surges similar to those observed during struggling (Figure 1) had there been acute distress at witnessing the slaughter of the conspecific.

PCV did not show any significant increase in the witnessing pig (Figure 2). Likewise, cortisol levels (Figure 3), although tending to increase in response to the coercion used, did not indicate significant acute stress responses. The variation in the response pattern of the ß-endorphin concentration (Figure 4) seemed similar to that of cortisol in that there was an initial tendency to rise. However, the endorphin levels seemed to fall following stunning and slaughter which may indicate that the animals were beginning to recover from the earlier handling stress.

Behaviour assessments did not reveal any indication of specific stress to witnessing slaughter. The most interesting behavioural observation was that the second slaughter pigs on two occasions licked at the blood lost from the sticking wounds of the first slaughter pigs and on eight occasions also ingested the coagulated blood lost at exsanguination.

Based on the evidence from this experiment it is concluded that witnessing slaughter does not appear to distress pigs, probably because they have no knowledge to associate the act with stress and death. In regard to the problem of unduly long stunning-to-sticking intervals leading to poor welfare, three potential solutions could be envisaged. First, the law should be changed to allow sticking within sight of others. Second, the law should specify maximum stunning-to-sticking intervals, and third, cardiac arrest stunning, which prevents recovery, should be made compulsory if animals are stunned in a pen. The maximum desirable stunning-to-sticking interval would be 15s for pigs (Anil 1991) .

Animal welfare implications

In the authors' view the assumption that the slaughter of pigs within sight of others can be distressing to the witnessing animals may be groundless. The lack of evidence indicated by this investigation can be used to gain animal welfare advantages at stunning and slaughter. If the above suggestions made at the end of the discussion were put into practice, not only could the slaughtering process be speeded up, but the number of animals potentially recovering during exsanguination would be minimized. Considering the high percentage of pigs showing signs of recovery during exsanguination (Anil & McKinstry 1993), improvements to pig welfare could be significant.

Acknowledgements

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References

Anil M H 1991 Reflexes and loss of sensibility following electrical stunning in pigs. *Meat Science 30:* 13

Anil M H and McKinstry J L 1993 *Results of a Survey of Pig Abattoirs in England and Wales.* Meat Hygiene Division, Ministry of Agriculture, Fisheries and Food: London, UK

Anil M H, McKinstry J L, Field M, Bracke M and Rodway R G 1995 Assessment of distress experienced by witnessing slaughter in pigs. *Animal Science 60 (Abstract):* 563

Anil M H, Preston J, McKinstry J L, Rodway R G and Brown S N 1996 An assessment of stress in sheep caused by watching slaughter of other sheep. *Animal Welfare 5:* 435-441

Anil M H, Preston J, Warriss P D and Rodway R G 1991 An assessment of the stress associated with slaughter in sheep. *Animal Production 52:* 579-580

Bracke M 1993 *Can Animals Have a Preference Not to Be Killed?* MSc Thesis, University of Edinburgh, Scotland

Fordham D P, Lincoln G A, Ssewenyana E and Rodway R G 1989 Plasma ß-endorphin and cortisol concentrations in lambs after handling, transport and slaughter. *Animal Production 49:* 103-107

Ministry of Agriculture, Fisheries and Food 1995 *The Slaughter of Animals (Slaughter or Killing) Regulations* No 731. HMSO: London, UK

Van Putten G and Elshof W J 1978 Observations on the effect of transport on the well-being and lean quality of slaughter pigs. *Animal Regulation Studies 1:* 247