

LETTERS

The use of blood cortisol levels as a measure of short term stress

Sir, Despite interpretative difficulties in some situations, the use of blood corticosteroid levels as a measure of stress in animals is widely accepted. Circulating levels are thought to reflect the amount of adjustment an animal is required to make in order to maintain homeostasis and thus cope with its environment.

In a recent paper, Ewbank *et al* (*Animal Welfare* 1992, 1: 55-63) used blood cortisol levels as a measure of the distress caused to cattle by the use of head-restraint in a stunning pen. Mean cortisol levels in blood collected at sticking were 67.6 and 143.1 nmol/l, respectively, for free-standing and head-restrained animals. However, after introduction into the stunning pen 5.6 seconds was the mean time for free-standing animals compared with 34.2 seconds to stun for animals which could be persuaded into a head-restrainer. In their discussion they propose that the differences found in cortisol levels suggest that head-restrained animals were more distressed. Based on the descriptions of animal behaviour within the experiment we do not dispute their overall findings, but we do urge caution in the use of the blood cortisol levels in support of their conclusions.

The levels of cortisol found in the blood as a consequence of a stressor will depend upon both the magnitude of the stress and the time of sampling. The pattern of the response may also depend upon the type of stressor. Levels will increase with time until a peak level has been reached and thus the level of circulating cortisol will to some degree depend on how soon or late after the stimulus the sample is taken. The effect could be attributable to the different relative times of sampling. Ewbank *et al* do not

appear to have considered this possibility in the discussion of their results and it is possible that cortisol levels in the free-standing animals would have risen to the levels found in the head-restrained animals had they not been stunned so quickly.

*T G Knowles and P D Warriss
Department of Meat Animal Science
University of Bristol*

Authors' response

Sir, Thank you for raising the point about the time factor being critical to the blood cortisol levels. Whilst we agree with you, we would like to take it one step further: you say it is possible that cortisol levels in the free-standing animals would have risen to the levels found in the restrained animals had they - the free-standing animals - not been stunned so quickly. Surely the reason the restrained animals were held in the stunning box so long was because they had to have their heads held. Had this not been the case, they would have passed through the box at the same rate as the other animals. It was the necessity for head-restraint that was directly responsible for the amount of time taken from entry to stun.

In addition to this, might not the 'quality' of the time spent in the box have had a bearing on the blood cortisol levels? Almost all of the animals restrained had to be persuaded in some way to step forward and place their heads in the yoke; at best they were slapped and pushed, at worst they were goaded with an electric cattle prod. If the free-standing animals had been left in the box for times comparable to those endured by restrained animals, it is unlikely that their cortisol levels would have been as high, because they would not have undergone the same treatment once in the box.

*C W Mason, for Ewbank et al
Humane Slaughter Association*