

EMOTION AND SUCCESSFUL LEARNING IN CATTLE

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It has been suggested that, during instrumental learning, animals are likely to react emotionally to the reinforcer. However, they may in addition react emotionally to their own achievements. Such reactions would be of interest in the context of the animal's capacity for self-awareness. We therefore devised a learning experiment to disentangle emotional reactions to a food reward and to own learning in young cattle.

Twelve Holstein-Friesian heifers aged 7–12 months were divided into two groups with a matched-pairs design. Heifers in the experimental group were conditioned over a 14-day period to press a panel in order to open a gate for access to a food reward. For heifers in the control group, the gate opened after a delay equal to their matched partner's latency to open it (yoked control design). There was a 15m distance from the gate to the food trough to allow for observation of the heifers' movements after the gate had opened. The movements were scored on a scale ranging from walk (1) to gallop and buck (12). As an additional indicator of emotional reactions, the heifers' heart rates were recorded in 5s intervals and expressed as deviations from the modal heart rate of each individual. These deviations were averaged over functional phases of the experiment: i) up to 15s before the gate opened; ii) 15s before the gate opened until it opened; iii) the first 10s after the gate had opened; iv) 10–20 s after the gate had opened; v) while the heifer was eating her reward; and vi) while she came back to the experimenter.

Each trial was classified according to whether or not the learning performance of the experimental heifer increased. This learning index was analysed for its effect on differences between the experimental heifers' and their controls' scores for movements and heart rate. In a logistic regression model, we found that experimental heifers were 14 times more likely to show more agitated locomotion than their controls (eg gallop vs trot) on days on which learning performance increased, than when learning had not yet occurred or performance had stabilized. On days with increased learning, experimental heifers also had higher heart rates than their controls. The heart rate increase occurred in the phase just before the gate opened and was 19 per cent more in experimental than in control heifers. In other phases, the heart rate deviations from the mode did not differ between groups.

It is concluded that a yoked control design can be used to separate effects of reward and effects of the learning process on the expressive behaviour and heart rate of the cattle, and that cattle can react emotionally both to the anticipation of a new achievement and to their own learning improvement.