ELSEVIER

Physiology & Behavior, Vol. 61, No. 5, pp. 693–699, 1997

0031-9384/97 $17.00 + .00

PII S0031-9384(96)00521-5

Behavioral, Cardiac and Cortisol Responses to Brief Peer Separation and Reunion in Cattle

ALAIN BOISSY [1] AND PIERRE LE NEINDRE

Adaptation des Herbivores aux Milieux, I.N.R.A. Centre de Theix-Clermont-Ferrand, F 63122 St-Genès-Champanelle, France

Received 19 December 1995; Accepted 7 October 1996

BOISSY, A. AND P. LE NEINDRE. *Behavioral, cardiac and cortisol responses to brief peer separation and reunion in cattle.* PHYSIOL BEHAV **61**(5) 693–699, 1997.—Behavioral, cardiac, and adrenal responses of heifers to short-term isolation and to subsequent reunion with familiar or nonfamiliar conspecifics were measured. Two groups of heifers were studied according to their different social reactivity: Aubrac heifers (n = 12) reared under suckler conditions and Friesian heifers (n = 12) reared under dairy management. Because these two groups could also react differently to human beings, testing social isolation was realized by removing pen mates without handling the subject. Moreover, heifers were tested in confinement to avoid an alteration of the cardiac response to isolation by an excessive motor activity. Although physical restraint can influence the reactions, this effect is assumed to be weak because heifers had been exposed to the experimental procedures, including confinement for 3 days before isolation test, in addition to brief periods of physical restraint occurring regularly according to rearing practices. Results show that social separation induced struggling and large increases in vocalization, heart rate, and plasma cortisol concentrations in all heifers. Except for vocalization, these effects were more severe in Aubrac than in Friesian heifers. For all heifers, isolation-induced distress was positively correlated with the duration of social contacts they engaged with the pen mates prior to separation. Behavioral responses, i.e., struggling and vocalization, decreased when conspecifics were brought back, independently of their familiarity to the subject. In contrast, the heart rate decline induced by the entrance of conspecifics was more pronounced in response to reintroduction of pen mates. These findings indicate that social isolation is a severe psychological stress in cattle and that the mere sight of conspecifics reduces behavioral distress regardless of peer identity. The isolation-induced distress depends on the genetic and rearing backgrounds of the heifers without allowing to differentiate their respective effects. © 1997 Elsevier Science Inc.

Cattle Social separation Reunion Heart rate Cortisol Attachment

SOCIAL attraction is thought to influence a number of behavioral patterns, such as spacing and feeding behaviors or parent–offspring interactions in gregarious species. Social attraction is revealed not only by cohesiveness of a social group but also by responses of animals to temporary interruption of social contact. Studies in young animals have shown that brief separation from mother or siblings results in an increase of vocalization and in behavioral arousal, suggesting psychological stress (18). Likewise, in adult animals, temporary isolation from social partners elicits an immediate increase in behavioral and physiological signs of arousal in rats (6,9) and monkeys (5,15,16). In domestic chickens, the progressive removal of group members induces behavioral and adrenocortical changes in the remaining animals (11).

In domestic ungulates, which are very gregarious, the presence or absence of the social group has a major impact on behavior. For example, fear-inducing stimuli evoke fewer behavioral signs of disturbance in heifers when conspecifics are present (4). Temporary removal of a sheep from its familiar group can produce behavioral agitation, such as increased vocalization and locomotion (22). Other studies on sheep have found that social isolation induced pronounced physiological stress responses including acceleration of the heart rate (25) and increase in plasma cortisol levels (19). Removal of a heifer from its group was also accompanied by an increase in plasma cortisol levels (1). However, several studies have demonstrated that handling and other types of contact with humans can alter the behavior and physiology of farm animals (2,8). Thus, some of the responses obtained in the previously mentioned studies, in which the animal was removed from its group, may be due to reactions of the animal to handling rather than to separation per se.

To our knowledge, only one study has assessed the effect of removal of the social group in cattle; Hopster and Blockhuis (10) found that removal of the herd increased heart rate in Friesian dairy cows. It can be expected that animals with different genetic and rearing backgrounds respond differently to social isolation. Social reactivity is under genetic control; Le Neindre et al. (14) found large differences in the responsiveness to separation from familiar partners between breeds of sheep, and Mills and Faure (17) showed that Japanese quails can be genetically selected for

[1] To whom requests for reprints should be addressed. E-mail: boissy@inra.clermont.fr