Chronic Stress in Housed Dogs

By James Blackshaw

Introduction

Housing of production animals has long been considered an animal welfare issue. In the United Kingdom the concept of the 'Five Freedoms' has raised the standard of animal welfare for production animals. Has the time come to apply the same framework to companion animals?

Discussion

Most domestic dogs have opportunities for social behaviour, stimulation, exploration and exercise. Dogs housed in quarantine, boarding, breeding, working and laboratory kennels as well as strays in animal shelters may have compromised behavioural and physiological needs.

Assessing an animal's welfare can be achieved by two methods:

1. Studying the animal's physiology including; immune function, the activity of the sympathetic nervous system and the activity of the hypothalamo -pituitary - adrenocortical axis (HPA).
2. Studying the animal's behaviour and in particular the behavioural changes that occur when experimental conditions are varied.

The following three experiments where undertaken by Beerda et al and published in 1999 and 2000. All the experiments share two major goals:

1. The investigation of techniques to measure chronic stress in dogs.
2. Assessing social and spatial restriction and how it affects the behavioural, hormonal and immunological responses in dogs.

Experiment 1: Chronic Stress in Dogs Subjected to Social and Spatial Restriction -Behavioural Responses (1).

The aim of this experiment was to find behavioural measures of chronic stress and therefore poor welfare in dogs .This experiment involved fifteen Beagles divided into two groups. All the dogs came from a spacious group housing facility. The control was a period of seven weeks in outdoor group housing (GH), with each kennel measuring 36 square metres. The dogs were then moved to indoor kennels measuring 1.7 square metres where they were housed individually (IH). Behaviours were scored in terms of both frequency and duration of occurrence in both the enriched outdoor group and when the dogs were moved to indoor solitary housing. The study was complicated by the fact that each group experienced different weather conditions while housed outdoor, the first group enjoyed pleasant weather and were designated (PW), while the second group suffered bad weather and were designated (BW).

The authors noted both undisturbed behaviours and behavioural responses to eight different challenges. This assessed whether the dog's coping abilities were affected by IH. The dogs were challenged with open fields, escape, restraint, walking down a corridor, novelty presentation, noise administration, food presentation and confrontation with a conspecific. The behaviour parameters indicative of chronic stress included: vocalising, yawning, urinating, defecating, body shaking, circling, crouching, digging, autogrooming, drinking, coprophagy, changes from one posture to another, stretching, changes from one state of locomotion to another, floor licking, manipulations of the environment, tail wagging, nosing, open mouth, oral behaviours and paw lifting. The behaviour of dogs towards conspecifics was also recorded: submission, dominance, play eliciting behaviour and aggression.

The findings from this experiment were that dogs that were socially and spatially restricted (IH) showed increased frequency of behaviours considered to be those of dogs suffering chronic stress. When subjected to the various challenges IH dogs exhibited heightened aggression, excitement and uncertainty than during their group housing. Two other findings were that bitches when challenged, appear to respond more strongly to stressors than male dogs and secondly the group that experienced bad weather may have suffered some environmental stress that attenuated their behavioural changes when moved to solitary housing.

Experiment 2: Chronic Stress in Dogs Subjected to Social and Spatial Restriction - Hormonal and Immunological Responses (2).

The aim of this experiment was to find physiological measures of chronic stress and therefore of poor welfare in dogs .The sample used in this experiment was the same as that used above and the dogs were subjected to the same housing conditions ie: GH vs IH. The GH groups were divided into BW and PW depending on the weather conditions they experienced. Hormonal changes were assessed by measuring changes in the levels of creatinine, cortisol and catecholamines in naturally voided urine, changes in the cortisol levels in saliva and by the intravenous administration of corticotropin releasing hormone (CRH) and dexamethasone. The authors also exposed the IH dogs to noise in the form of a sudden sound blast and measured their hormonal responses. Immunological assessment was made by measuring blood samples for changes in peripheral leucocyte counts and lymphocyte proliferation.

The results of this experiment included the following:

1. That previous exposure to environmental stress, as experienced by the BW group, determined the magnitude of the physiological responses to chronic stress. In this case attenuating the response. The opposite was illustrated by the group which had experienced good weather while group housed, when these dogs were moved to the IH situation they showed (a) increased urinary and salivary cortisol concentrations, (b) diminished responsiveness of the HPA to sudden noise and CRH administration, (c) intact adrenocorticotropic hormone (ACTH) and cortisol suppression after dexamethasone administration and, (d) increased induced lymphocyte proliferations.
2. Bitches showed higher responses to both acute stress (sound blast) and chronic stress due to a housing change than male dogs. T
3. hat the use of urinary and salivary cortisol measurements are useful for assessing chronic stress in dogs.
4. The use of urinary catecholamine, lymphocyte proliferation and peripheral leucocyte measures for the assessment of chronic stress needs further investigation.

Experiment 3: Behavioural and Hormonal Indicators of Enduring Environmental Stress in Dogs (3).

The aim of this study was to determine whether there is a link between stress levels in dogs and the quality of their housing. This experiment used similar behavioural and physiological parameters for measuring chronic stress in dogs as those used in the above experiments. Four groups of dogs were studied:

Group I: were privately owned dogs, housed in outdoor kennels (4.3 square metres) from 8am to 5pm and were walked daily.

Group II: individually housed in indoor kennels (2.1 square metres) with access to an outside area (5.6 square metres) and were also regularly walked.

Group III: all females, housed in pairs in kennels (2.4 square metres) and given 6 hours a day in outside kennels (3.6 square metres).

Group IV: housed individually in kennels (1.7 square metres) and given 6 hours a day in outdoor kennels (3.6 square metres). This group was unique in that over the years these dogs had been subjected to various stressful experiments. This may represent a flaw in the experimental design.

The result of this experiment confirmed the authors' assumption that chronic stress levels as measured by hormone levels and behaviour patterns increased as the housing conditions became more austere. Basal urinary ratios of cortisol to creatinine, adrenaline to creatinine and noradrenaline to creatinine all rose from low in group I through to high in group IV. Behaviour parameters such as nosing, urinating, levels of locomotor activity and paw lifting were all increased in group IV, with animals in group I showing the lowest levels of such activity. When challenged by a slamming door or when approached by a researcher the group IV dogs showed signs associated with acute stress: ambivalent postures, body shaking, yawning and displacement behaviours. The authors concluded that behavioural measurements may not be accurate in assessing chronic stress and therefore should be used in association with physiological data.

Conclusions and recomendations

These studies validate the use of physiological measures especially cortisol to creatinine levels as a means of determining chronic stress in dogs. Certain behavioural parameters were also deemed to be of benefit in measuring the stress response in dogs enduring spatial and social restriction, however the authors believe that behavioural measures should be used in conjunction with hormonal measures for increased accuracy. All of the studies were based on the assumption that smaller, solitary housing is more stressful than spacious group housing. This too was validated. These findings are in keeping with two other studies: (Hubrecht 1993) (4) who investigated enrichment methods in dogs housed in laboratories and also (Hetts et al 1992) (5) who investigated the influences of housing on beagle behaviour. The only recommendation that I could suggest would be that noise levels in the kennels be measured and the impact assessed as one of the stressors. Finally, this is an area of animal welfare science that appears to have been neglected, in time I believe the "Five Freedoms" will be applied to companion animals and it will be important that housing guidelines be available and more importantly be based on sound scientific research.

References

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