Applied Animal Behaviour Science 148 (2013) 218–231

Contents lists available at ScienceDirect

Applied Animal Behaviour Science

journal homepage: www.elsevier.com/locate/applanim

Behavioural testing to determine differences between coping styles in Grey parrots (*Psittacus erithacus erithacus*) with and without feather damaging behaviour

Yvonne R.A. van Zeeland[a,*], Marleen M.J.A. van der Aa[a,b], Claudia M. Vinke[b], Johannes T. Lumeij[a], Nico J. Schoemaker[a]

[a] *Division of Zoological Medicine, Department of Clinical Sciences of Companion Animals, Faculty of Veterinary Medicine, Utrecht University, Yalelaan 108, 3584 CM Utrecht, The Netherlands*
[b] *Department of Animals in Science and Society, Faculty of Veterinary Medicine, Utrecht University, Yalelaan 2, 3584 CM Utrecht, The Netherlands*

ARTICLE INFO

Article history:
Accepted 22 August 2013
Available online 1 September 2013

Keywords:
Manual restraint test
Novel object test
Open field test
Psittacine
Feather plucking
Feather picking

ABSTRACT

In various animal species, a correlation has been found between the individual's response to 'stressing' stimuli (coping style) in behaviour tests and the susceptibility to develop behavioural disorders. Based on analogies with feather pecking in laying hens, a similar correlation might be present in parrots with feather damaging behaviour. To investigate whether this correlation is present in parrots, 22 Grey parrots (*Psittacus erithacus erithacus*) with and without feather damaging behaviour were subjected to (1) a manual restraint test, (2) novel object test and (3) open field test. All tests were performed in a standardized setting, with a one-week interval between the tests. Recordings were made of the parrots' responses, which were subsequently analysed to determine latency times, intensity, frequency and/or duration of specific behaviours. In addition, blood was collected to assess the birds' neurophysiologic responses (corticosterone, norepinephrine) during manual restraint. Significant differences were found between the groups of birds with and without feather damaging behaviour with regard to the birds' reactions in all the behaviour tests. Particularly the response during the open field test was found to correlate well with the presence of feather damaging behaviour: birds with feather damaging behaviour showed higher open field activity indicative of a proactive coping style. Additionally, feather damaging birds displayed proactive behaviour in the novel object test, as expressed by their initial reaction to a novel object. A manual restraint test did not reveal distinct differences in the amount of resistance displayed by the parrots with and without feather damaging behaviour. Struggling frequencies and neurophysiologic responses, however, tended to be different, with a higher number of struggling attempts and a more prominent rise in plasma corticosterone concentrations in birds without feather damaging behaviour. Aforementioned results suggest that parrots with feather damaging behaviour display a proactive coping style, which is similar to the findings in feather pecking laying hens. These findings provide further insight into the aetiology of feather damaging behaviour, and suggest a potential role for behavioural testing in establishing whether a parrot is at risk for developing this behavioural disorder. Further (prospective) studies with larger groups of parrots are, however, needed to confirm a correlation between coping style and the display of feather damaging behaviour throughout the parrot population and to determine whether and which behaviour tests have (the highest) predictive value.

* Corresponding author. Tel.: +31 30 253 4542; fax: +31 30 251 8126.
E-mail addresses: Y.R.A.vanZeeland@uu.nl, y_van_zeeland@hotmail.com (Y.R.A. van Zeeland).

0168-1591/$ – see front matter © 2013 Elsevier B.V. All rights reserved.
http://dx.doi.org/10.1016/j.applanim.2013.08.004

1. Introduction

Feather damaging behaviour (FDB, also referred to as feather plucking or feather picking) is a common problem in captive parrots, particularly in species such as Grey parrots (*Psittacus erithacus erithacus*) and cockatoos (*Cacatua* spp.) (Briscoe et al., 2001; Seibert, 2006). Its prevalence has been estimated at approximately 10–15% throughout the captive parrot population (Grindlinger, 1991; Gaskins and Bergman, 2011). FDB generally applies to all mutilation of the feathers on areas accessible to the bird's beak (Harisson, 1986) and is usually considered to be a multifactorial disease in which socio-environmental, neurobiologic, genetic and/or medical factors may play a role (Van Zeeland et al., 2009).

It has been suggested that FDB could be a coping strategy for negative affective states (e.g. 'stress', 'boredom') and/or living in a suboptimal, unpredictable or uncontrollable environment (Rosskopf and Woerpel, 1996; Levine, 1987). Findings in support of this hypothesis are the influence of room positioning on the prevalence of FDB (Garner et al., 2006), and the frequent mentioning of sudden changes preceding the onset of FDB (Westerhof and Lumeij, 1987; Rosenthal and Allyon, 1993).

The impact of aversive stimuli or stressors, however, differs among individuals and is determined by the ability of the individual to cope with its situation (Ursin and Olff, 1995; Ursin, 1998). It may therefore be important to assess the individual's capacity to cope with stressful situations. For this purpose, researchers have attempted to classify coping responses into distinct coping styles (or strategies), which can be defined as a coherent set of behavioural and physiological stress responses which are consistent over time and characteristic for a certain group of individuals (Koolhaas et al., 1999). The concept of coping styles has been adopted in a wide variety of animal species (e.g., mice: Benus et al., 1991, rats: Bohus et al., 1987, pigs: Hessing et al., 1993; Ruis et al., 2000); tits: Verbeek et al., 1994; Verbeek, 1998; Carere et al., 2005; and chicken: Blokhuis and Metz, 1992).

In general, two types of coping styles (or stress response patterns) may be distinguished (Henry and Stephens, 1977; Koolhaas et al., 1999, 2010; Korte et al., 2009). The 'proactive', 'bold', or 'hawk-type' individuals display an active, fight–flight behavioural response, which is characterized by higher levels of aggression and territorial control, fast and superficial exploration of the environment and an overall rigid and routine-like behaviour (i.e. less influenced by external stimuli; Cannon, 1915; Koolhaas et al., 1999; Korte et al., 2005, 2009). 'Reactive', 'shy' or 'dove-type' individuals, on the other hand, show a conservation-withdrawal response pattern (also called 'freeze-hide'). This pattern is characterized behaviourally by high levels of immobility, low levels of aggression, cautious and thorough exploration and an overall high level of behavioural flexibility, which is tailored to the changing stimuli or situation that the individual is presented with (Engel and Schmale, 1972; Koolhaas et al., 1999; Korte et al., 2005, 2009). Besides differences in behavioural patterns, differences have also been found in the neurophysiological responses (e.g. reactivity of the [para]sympathetic system, hypothalamic-pituitary-adrenal and hypothalamic-pituitary-gonadal axis) of individuals with a proactive and reactive coping style (Bohus et al., 1987; Ruis et al., 2000; Compaan et al., 1994; Koolhaas et al., 1999, 2010; Korte, 2001; Korte et al., 2005, 2009).

In both humans and animals, proactive coping styles have been associated with an increased vulnerability for (stress-related) health (e.g. gastric ulcers, increased susceptibility to infections) or behavioural problems (e.g. stereotypies such as tail biting, tongue-playing and feather pecking; Olff et al., 1993; Koolhaas et al., 1999; Van Hierden et al., 2004; Korte et al., 2005, 2007, 2009). Particularly in laying hens the correlation between coping styles has been investigated extensively by determining the responses of individuals from high and low feather pecking lines during a series of behaviour tests, including a manual restraint test (MRT), novel object test (NOT) and open field test (OFT). Results indicated that hens from high feather pecking lines exhibited higher levels of activity in the open field and were less hesitant to approach a novel object (Jones and Faure, 1981; Rodenburg et al., 2002, 2004; Albentosa et al., 2003; UitdeHaag et al., 2008a). In addition, hens from a high feather pecking line showed a significantly lower corticosterone and higher norepinephrine response prior to and after manual restraint (Korte et al., 1997, 1999; Van Hierden et al., 2002).

Based on the analogies between feather pecking in laying hens and FDB in parrots (Van Zeeland et al., 2009), a correlation may also be present between coping style and (increased risk for developing) FDB in parrots. The current, explorative study was designed to identify whether this correlation indeed is present. It was hypothesized that (1) parrots with FDB display higher activity (fight–flight response with shorter latency times, longer exploration and more resistance to restraint) compared to parrots without FDB during a variety of behaviour tests (i.e., a MRT, NOT and OFT), reflecting a proactive coping style and (2) a correlation exists between FDB and coping style, i.e. the prevalence of FDB is higher in individuals displaying a proactive coping style. Results of this study will help to identify whether (and which) behaviour tests may be used as a tool to identify differences in response patterns of birds with and without FDB.

2. Materials and methods

2.1. Ethical approval

The study was approved by the Institutional Animal Care and Use Committee of Utrecht University (DEC 2009.I.09.073).

2.2. Animals

Twenty-two Grey parrots (*P. erithacus erithacus*) which were permanently housed in a parrot sanctuary (Nederlands Opvangcentrum voor Papegaaien [NOP], Veldhoven, The Netherlands) were used for this study. Eleven of these parrots displayed FDB resulting in obvious alopecia of areas accessible to the beak (chest, neck, back, wings, legs, tail). The other 11 parrots were fully feathered. All parrots were