

**IMPORTANCE OF ETHOLOGY APPLIED BY VETERINARIANS FOR ADAPTATION SYNDROME IN ZOO ANIMALS**

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Abstract

Animal rearing regimes in zoos can be strongly altered according to the adaptation of animals to the captive environment. These changes can modulate animal well-being. In this review, we approach studies of ethological action and its impacts on the adaptation syndrome of captive animals. Zoos offer multiple ways of making adaptations of animals more difficult, strongly favoring the appearance of this syndrome. Animal organisms have their own characteristics, which allow us to identify their state of adaptation to the environment. This fact facilitates significant progress in our general understanding of the genotype-phenotype relationships of animals. The action of the veterinarian in zoos is thus favored. Knowledge of the basic characteristics of animals provides basic behavioral insights and enhances our understanding of the ways in which adaptation can modulate the lives of animals in suitable environments. There are also several and important applications, such as increasing well-being, preventing pathologies and promoting the advancement of scientific knowledge.

Keywords: Behavior. Zoos. Ethological studies.

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1 Introduction

Behavioral observations (ethology) are an important tool that is widely used in scientific research, such as the case when the aim is to detect behavioral changes in a systematic way and to understand their origin. For veterinarians working in zoos, behavioral monitoring is essential for understanding behavior and for evaluating the health and well-being of animals in the zoo.

Veterinarians may use behavioral observation in order to increase the well-being of animals (KLEIMAN, 1992). Behavioral research has been used to evaluate the efficiency of applied techniques. Results are promising, contributions to increase knowledge on animal behavior, of their health, and of their welfare (MAPLE, 1986; STOINSKI et al., 1998).

Monitoring animals under the care of veterinarians permits the recording of their normal behavior, considering the reality of each individual. This generates results that go beyond mere conjectures. It becomes possible to record the individual and group behavior for the entire community living in a zoo. Such recording makes it possible to detect problems and to anticipate actions directed to the management of each species.

2 Material and Methods

An extensive literature review was made on factors involved in the adaptation syndrome encountered in animals under captivity. We included the interpretations furnished by professional biologists and veterinarians on this theme. This activity was made by students in class P8 at the University UNINASSAU, João Pessoa, Paraíba.

This article represents a study based on the review of the specific literature that deals with ethology, animal psychiatry and behaviorism. It synthesizes information available in electronic databases such as GOOGLE and GOOGLE SCHOLAR, using keywords such as Behavior. Zoos. Ethological studies, veterinary medicine. The relevant literature was critically read to extract the most important issues (BARDIN, 1977; DIAS et al., 2011; GIL, 2011).

3 Results and Discussion

Behavioral monitoring has a significant role in animal well-being. It reveals if animals are housed in an appropriate social environment, if their health is adequate, if feeding is appropriate, and provides important information on reproductive conditions, indicating hormone problems (CROCKETT, 1996).

Because physical, psychological and social problems are frequently associated with changes in behavior, a behavioral inspection aims to transmit much information relating to each animal (CROCKETT, 1996).

According to a paper produced at PRODEMA - UFPB, the behavior of felines is much affected by the presence of visitors, leading to a certain amount of discomfort and, consequently, to stress of these animals (COSTA et al., 2017). The authors indicate the necessity of larger premises for the observed animals, which included a jaguar, a lion, and a cougar (COSTA et al., 2017). These authors also note that the large number of visitors (school groups, local residents, researchers, among others) alter their behaviors (COSTA et al., 2017).

Another paper by students at PRODEMA - UFPB, now focused on the anteater, confirms the importance of observing animal behavior. It indicates the stress of animals with visitors, and serves to monitor the well-being of these animals within their enclosures (BATISTA et al., 2018).

Ethological activities and behavioral observations by trained professionals prove fundamental for the monitoring of animal trajectories in their living enclosures. The obtained information contributes to the maintenance and improvement of animal health and well-being (FURTADO et al., 2018a; FURTADO et al., 2018b; ENEDINO et al., 2018).

The adaptation syndrome of animals in captivity, as presented by animals living in zoos, usually affects those individuals captured more recently. They may be allocated to environments with inadequate temperature and inadequate diet. Maladaptive animals may become overweight and subject to stress (KREBS e DAVIES, 1996). Clinical symptoms present in such animals may be observed and identified as: anorexia, rostral erosion, lesions caused by their enclosures (CAMPOS & CAMPOS, 2009; CASTAÑO, 2001).

For treatment, the animal environment may be improved, with as little manipulation of individuals as possible, Carnivorous animals should receive living food. Lesions are treated with fluid antiseptics and with the administration of antimicrobial drugs in the case of infections (CASTAÑO, 2001).

One study reports the occurrence of adaptation syndrome in a captive *Caiman latirostris* (Daudin, 1801). Symptoms included exaggerated thermic oscillations and inadequate covering (MENEZES et al., 2017). The unfolding of the syndrome resulted in the exhaustion of the individual, leading to loss of weight, development of rostral ulcerated lesions, necrotic dermatitis, apathy, anorexia, dehydration, conducive to possible death (MENEZES et al., 2017).

Prognosis was reserved and the treatment of anorexia was difficult, because these animals had problems in eating by themselves. A case in March 2017, involving a female *C. latirostris*, measuring 45 cm in total length, aimed to promote behaviors typical of the species. Clinical evaluations and complementary exams, such as xrays and endoscopies were made, in order to evaluate the animal as a whole. The specimen was isolated for two weeks, placed in an enriched container, subject to minimal restraints, and observed by a professional. As a result of these actions, weight was gained, activity was increased, and the animal began to feed in captivity on its own (MENEZES et al., 2017).

The enclosure in a zoo, as a rule, is a highly limiting factor for the animal. Some species are unable to adapt to live in captivity, developing the adaptive syndrome. According to several research, an excess of sounds in zoos (for example) influences the reproduction of some animals negatively. This is the case for the giant panda, *Ailuropoda melanoleuca* (David, 1869). The use of behavioral studies of giant pandas elevated the reproductive rates three times in seven years. Such results were possible evaluating behavioral traits, enriching the environment, familiarizing animal couples with estrus signals, and stimulating them by visual and olfactory signs to choose the best time for reproduction. Ethological actions in zoos with captive pandas are effective means of promoting the well-being of these animals, to amplify their reproductive rates, and to minimize stress in their captive enclosures in zoos (HARRIS e EDWARDS, 2004).

It has also been observed that felines are affected by situations such as transport among enclosures in zoos, that promote stress in captive tigers - *Panthera tigris* (Linnaeus, 1758). In captive elephants, stress leads to repetitive behaviors such as rocking the head constantly, as may be commonly seen in circuses. It is also reported that primates present stereotyped behaviors and auto-mutilation in less attractive environments (HARRIS e EDWARDS, 2004 & MOTA-ROJAS, 2022).

In free-living animals, social hierarchy and dominance may lead to constant sources of stress. In wolves (*Canis lupus* Linnaeus, 1758), high levels of cortisol were associated with dominant animals; the cost of maintaining dominance was high, due to chronic stress.

4 Conclusions

The adaptive syndrome of animals under captivity is a reality affecting many zoos. The veterinarian must be prepared to prevent, detect, and provide the best method for rehabilitating such animals that have spent most of their lives enclosed as captives in zoos.

CREDIT AUTHORSHIP CONTRIBUTION STATEMENT

GDF: Conceptualization, Practice, and Writing of the article. SAPB, GDD: Participated in the Methodology and Writing. FESS: Writing review and Supervision. MLC: Translation and Proofreading.

DECLARATION OF INTEREST

The authors declare no conflict of interest with the participants or collaborators of this article, either directly or indirectly.

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