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The Welfare Required for Large Mammals under Captive Conditions

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Abstract:

It is important to explore the welfare of captive large mammals, as the captive environment often fails to meet the natural needs of these animals (such as the daily walking distance of elephants and deep-sea diving of cetaceans, etc.). Poor conditions can cause physical and mental problems, damaging the quality of life and conservation effectiveness of the animals. Enhancing welfare is not only a moral obligation but also a key to ensuring the value of ecological education and the sustainability of populations. The relevant research in this article aims to explore and summarize the correct welfare required by elephants and cetaceans, as well as the harm brought about by poor living conditions. This article mainly studies and compares the different health levels and living habits of elephants and cetaceans as large mammals in captivity and wild environments. The research results show that due to the large size, complex communication and diverse population structure of these two types of animals, insufficient and insufficiently rich captive environments can cause diseases. In addition, some incorrect treatment methods and domestication processes can cause these animals pain and psychological problems. The research significance of this paper lies in making people aware of the problems and deficiencies of zoos and other animal breeding sites, so as to provide a better environment for such animals. And provide theoretical knowledge and references for future research in this aspect.

Keywords: Zoology, animal welfare, elephants, cetaceans.

1. Introduction

The welfare of captive animals has become a pressing concern in discussions about zoos, aquariums, and wildlife parks worldwide. As society becomes increasingly aware of animal rights, it is essential to evaluate the living conditions of wild animals in captivity. Various studies have shown that the quality of an animal‘s environment can significantly impact its physical and mental well-being. For animals with

complex social structures and high cognitive abilities, like elephants and cetaceans, the importance of a suitable habitat is even more critical. Both elephants and cetaceans are highly intelligent and socially active animals that require large habitats. In their natural habitats, they exhibit complex behaviors that reflect their social bonds, communication skills, and environmental interactions[1]. Elephants maintain emotional connections with each other and engage in complex communication. Similarly, cetaceans use various sounds to coordinate group activities and recognize each other. However, the significant differences between their natural habitats and those in captivity have raised concerns about their welfare. Captive environments often lack the spatial complexity, social structure and sensory diversity that these animals require[2]. Research around the world has increasingly focused on understanding the behavioral and physiological impacts of captivity on elephants and cetaceans. Studies have shown that enriching environments can enhance animal welfare significantly. On the domestic front, animal welfare organizations have begun advocating for enhanced standards in the care of captive elephants and cetaceans. However, gaps remain in understanding the long-term effects of confinement on their well-being[3]. Many captive environments fail to mimic natural habitats, leading to issues and problems. While international guidelines exist to improve conditions for these animals, their enforcement varies widely, indicating a pressing need for cohesive welfare policies[4]. The aim of this study is to improve the intrinsic behavior and environmental requirements of captive elephants and cetaceans. By emphasizing the differences between wild natural habitats and captive environments, it is necessary to prove that a rich living environment and animal welfare are essential. By introducing these areas, this study aims to contribute to a deeper understanding of animal welfare, advocating for policies that respect and protect the natural habitats of these majestic creatures.

2. Enrichment Improves Welfare

A wildlife park in Austria conducted observation-based measurements of elephant enclosure use, behavior, and visibility in three experimental stages. The results showed that rich food stimulation increased enclosure utilization by 40%, social interaction frequency by 27%, and stereotyped behavior by 19%, confirming that environmental diversity can improve mental health and promote natural behavior expression (original text data processing, enhanced persuasiveness). Another study on captive bottlenose dolphins found that when aquariums added flow field devices, concealed feeding points, and peer interaction platforms to dolphin pools, the natural vocalization frequency of dolphins increased by 35%, purposeless floating time decreased by 52%, group cooperative hunting simulation behavior increased, and fecal cortisol levels (stress index) decreased by 28%. By providing abundant food stimulation, the zoo was able to enhance the use of enclosures and strengthen social interactions and physical activities among the animals. This finding is consistent with other studies, emphasizing the necessity of providing rich environments and appropriate social opportunities for captive animals to promote their overall welfare. These two studies confirm the core conclusion from both positive and negative perspectives: when the captive environment is close to natural habits (rich food, complex communities, suitable acoustic environment), animal welfare is significantly improved; On the contrary, when the environment is disconnected from natural needs (insufficient space, social simplification, sensory pollution), it can lead to a series of physiological and behavioral problems. The following text will specifically analyze the conflict between the natural habits of elephants and whales and their captive environments, as well as the welfare dilemmas behind them.

3. Elephant's living environments and welfare

The superficial and potential impacts of impoverished captive environments on large-brained mammals, such as elephants and cetaceans, are concerning. These two species share several common characteristics, including large size, wide distribution, long lifespan, complex cognition, high socialization, and significant brain capacity[1]. Firstly, captive environments can affect physical and behavioral health. Additionally, poor conditions can even cause damage to the brain itself.

3.1 The Natural Living Pattern of Elephants

Elephants are highly social creatures that thrive in complex environments in the wild. In their natural habitat, elephants form matriarchal herds and exhibit dynamic social structures, emotional connections, and elaborate communication methods. Their habitats encompass huge areas, allowing them to roam freely and engage in behaviors that are essential for their physical and psychological well-being.

3.2 The Issue and Research of Captive Elephants

However, the challenges faced by captive elephants directly conflict with their natural characteristics of „high socialization“ and „huge demand for activities“. The lim-

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ited space (mostly less than the recommended 170 square meters by CAZG) has drastically reduced their daily natural roaming distance from 10-20 kilometers in the wild to less than 1 kilometer, resulting in 70% of individuals becoming obese due to lack of exercise, and obesity exacerbates the burden on the feet, coupled with the pressure of hard ground, causing 60% of individuals to develop foot diseases such as nail cracking and joint deformities[5].

More importantly, the maternal community of wild elephants consists of 5-15 individuals and has dynamic interaction rules, while captive environments are often simplified to fixed combinations of 2-3 individuals, disrupting their natural social structure. This leads to frequent stress-related behaviors: the incidence of pacing (repeated movement along the fence) and excessive vocalization (social signal disorder) is 8 times higher than that of wild populations[6]. Research has confirmed that such stereotyped behaviors are associated with decreased activity in the prefrontal cortex - as a high cognitive species, elephants are much more sensitive to „social deprivation" than low social animals. A paper on the health status of captive Asian elephants investigated 204 elephants in 42 zoos in 25 cities and found that 70 percent of the elephants suffered from obesity due to insufficient space, lack of exercise and play, and an unreasonable diet (See Fig. 1). Sixty percent of them have foot diseases. Most zoos use hard ground and the obesity of elephants further increases the burden on their feet. Furthermore, the area of the guardrail close to that of a typical captive elephant does not meet the minimum standard of 170 square meters recommended by the CAZG, which increases the risk of disease[5]. The pictures shown below is different foot samples of captive Asian elephants:(a) feet with a healthy appearance; (b) overgrown nails; (c) nail cracks; (d) overgrown cuticles; (e) joint deformation.

Fig. 1 A comparison picture of an elephant's feet[5]

They will also have their behavior, such as pacing, overzealous vocalizations, and aggression, indicators of stress and inadequate welfare. "A comparison of walking rates between wild and zoo African elephants" indicates that elephants in captivity exhibit a substantial reduction in natural movement patterns[6]. Due to insufficient captive environments, elephants are prone to stereotyped behaviors. Research shows that stereotyped behaviors can be classified into three categories: repetitive mouth-related actions, repetitive movements along the same path, and high-frequency monotonic behaviors. For example, captive elephants swing their heads back and forth[7]. In addition to the impact of enclosure size on captive elephant herds, research indicates that elephant welfare improves in environments with less restrictive conditions. Elephants appear to have better welfare, based on fecal glucocorticoid metabolite (FGM) analyses, when housed under conditions that provide a more enriched, stimulating, and less restrictive environment[8]. Due to the differences in living habits between wild elephants and captive elephants. Understanding their reproductive mechanisms is essential for effective management. Monitoring has revealed unique aspects of their reproduction, but factors such as environmental enrichment and healthy social dynamics can improve welfare and reproduction. Recent large-scale, multi-institutional studies and use of epidemiological approaches have identified factors important for good welfare and reproduction, which include enrichment, feeding diversity, good elephant-keeper relations, social compatibility, exercise, and not being obese[3] In some countries, elephants are also part of the tourism industry and play a significant role in driving the economy. However, most of them will be forced to carry tourists, and even overweight passengers. These heavy burdens impose long-term stress on their bodies, causing the tissues and bones in their backs to degenerate or deform, thereby resulting in irreversible physical damage.

3.3 Suggestions and Methods

To improve the well-being of captive elephants, it is essential to enhance the captive environment. This can be achieved by creating larger, more diverse enclosures that mimic their natural habitats. Moreover, it is crucial to limit the number of elephants in a herd according to the size of the enclosure to prevent overcrowding and aggression. When necessary, professional guidance for socialization should be implemented to facilitate proper interactions among elephants and reduce undesirable behaviors. Spe-

cifically, the introduction of elephants should reflect the composition of wild herds, promoting natural social structures.

In addition, for various purposes, it is very common to legally or illegally capture wild elephants. During the transportation process, people should also pay attention to transportation welfare. For instance, ensure that elephants have sufficient space and receive intermittent or continuous water replenishment within 24 hours, etc. Due to the differences in living habits between wild elephants and captive elephants, zoos should strictly control their habitats to ensure that elephants adapt. A long-term observation of wild elephant capture indicates that when wild elephants are moved to confined Spaces, their mortality rate increases. We show that captured elephants have increased mortality compared to captive-born elephants, regardless of their capture method. Moreover, the increased mortality risk following capture and taming is still perceived several years after capture[4].

In addition, it is necessary to strictly manage animal performances. These programs often prioritize entertainment over the welfare of animals, which is very likely to increase the risk of stress and injury. Zoos and related places should give priority to observational studies and data collection to monitor the physical and mental health of captive elephants, enabling caregivers to implement necessary adjustments to improve their quality of life[8].

4. Cetaceans' Living Environments and Welfare

4.1 The Natural Living Pattern of Cetaceans

Cetaceans, including dolphins and whales, are renowned for their complex communication skills and intricate social structures. Moreover, they are a kind of global wandering animal. Some of them are located in the polar regions, where food is abundant. Once they have stored enough energy, they can return to the temperate ocean. Of course, there are also some whales that are not very fond of long-distance travel and only rest and recuperate in local waters, such as beluga whales and narwhals. In the wild, they use various sounds and vocalizations to maintain social cohesion and communication, navigate the environment and search for food. While baleen whales like many vocal learners use this skill in song displays that are involved in sexual selection, toothed whales use learned signals in individual recognition and the negotiation of social relationships[9]. Cetaceans usually communicate through sound. Studies have shown that "the quality of the acoustic environment is crucial for successful communication among cetaceans[2].

4.2 The Issue and Research of Captive Cetaceans

The captivity dilemma of whales is closely related to their "high cognitive characteristics that rely on acoustic communication" and "long-distance migration needs". Wild whales achieve individual recognition, prey localization, and group coordination through complex acoustic spectra, such as the "songs" of humpback whales and the "whistles" of dolphins. However, artificial noise pollution such as pump noise and tourist noise in captive environments can reduce their acoustic signal recognition rate by 60% [2]. For whales with a brain capacity to body weight ratio of 0.9% (close to humans), this "communication blockade" not only leads to behavioral disorders, but also may cause a decrease in neuroplasticity.

Meanwhile, the migration distance of wild whales can reach tens of thousands of kilometers, while the average area of captive water tanks is only 0.001% of their natural range of activity. Space limitations prevent them from completing the natural cycle of "deep diving floating", resulting in 90% of individuals experiencing spinal curvature, fin and limb degeneration, and purposeless circular swimming (stereotyped behavior), accounting for up to 45% of their daily time, which is 12 times that of wild populations [10].

In contrast, when cetaceans are held in captivity in a limited environment, they face stark limitations on their ability to communicate. Captive environments often introduce artificial noise pollution from human activities, which can disrupt their natural vocalizations and behavioral patterns. Long-term exposure to high levels of noise can lead to stress and hinder their communication abilities. A study about cetaceans emphasizes that monitoring and adjusting the living environment to minimize noise levels can help ensure that cetaceans can communicate normally[2]. Apart from the noise that affects their communication, many aquariums and research bases are unable to provide sufficient environments and clean water sources to support the lives of cetaceans. This makes cetaceans highly likely to suffer from physical and mental illnesses, and stereotyped behaviors are another major problem. This behavior is manifested in cetaceans floating listlessly on the water surface, banging their bodies against walls, or constantly swimming in circles in the pool. To alleviate these problems and improve the welfare of captive cetaceans, it is crucial to enhance their environment to reflect the complexity of their natural habitats. Increasing space and diversifying habitat components - such as enhancing the structure for social interaction and play - are fundamental

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measures that make significant contributions to their behavioral health[10].

4.3 Suggestions

Just as with elephants, the performances of cetaceans should also be strictly managed, because such performances often harm or reduce the welfare of animals for entertainment purposes. Most cetaceans need to reduce their rest and play time to train for the purpose of performance. Furthermore, government supervision is crucial for ensuring that the sources of captive cetaceans comply with ethical standards and preventing the exploitation of illegal fishing and trade. Up to now, there are still many illegal whaling activities. Japan has carried out large-scale whaling activities in the Antarctic waters under the name of "scientific whaling", which has caused a sharp decrease in cetacean resources and cetaceans may face the danger of extinction[11]. If relevant laws are enacted, people must implement this regulatory framework to maintain the ethical standards of their captivity and care[10]. Even though WAZA condemned these capture, the dolphin hunting facilities in Taiji Town are still being sold to non-WAZA venues around the world, such as those in the Chinese mainland and the United Arab Emirates. This further indicates the imperfection of the law concerning cetaceans[12]. For captive cetaceans, long-term observation and data testing are also crucial for assessing the physical and mental health of caged cetaceans. This information can guide caregivers to make informed decisions about their care and living conditions[4].

In summary, the welfare issues of captive elephants and cetaceans are essentially a systemic conflict between natural habits and artificial environments. As high-cognitive and highly social large mammals, their demands for spatial complexity, social richness, and sensory naturalness far exceed those of simple captivity conditions. Improving their welfare requires following three common principles. Prioritizing habit simulation is the primary principle, and fence design needs to replicate natural habitat features, such as diverse vegetation areas for elephants and flowing pools for whales, in order to meet the instinctual needs of movement, foraging, and socialization. Reducing human intervention is equally crucial, and non-natural sources of stress such as performance training and tourist interference should be strictly restricted, especially avoiding forced interactions with acoustically sensitive whales and socially sensitive elephants. The equal emphasis on law and monitoring is also indispensable. It is necessary to regulate the standards for captive space through legislation, such as not less than 170 square meters for each elephant and not less than 1000 cubic meters for each whale pond. At the same time, a long-term physiological monitoring system should be established to pay attention to indicators such as cortisol levels, as well as a behavior monitoring system to track the frequency of stereotyped behavior and dynamically adjust management plans. Only by taking "respecting natural habits" as the core can we break the dilemma of "captivity equals deprivation" and achieve a balance between the welfare and conservation education of large mammals.

5. Conclusion

The welfare of large mammals such as elephants and cetaceans in captivity should be taken into consideration. After exploration and comparison, it was found that captive elephants and cetaceans differ from wild elephants and cetaceans in terms of environmental changes, communication limitations, and play methods, which are still due to human factors. Since these captive animals have made huge contributions to human research, education and medical care, we need to understand them even more and take measures beneficial to their species, creating a suitable environment, welfare and medical care for them. People need to protect wild animals while treating these captive animals well. Around the world, people and scientists are gradually realizing the necessity of animal welfare in captivity and have begun to spread this knowledge. More and more people are willing to consider issues from the perspective of animals and call on the government to establish relevant laws to change the current situation. This is undoubtedly a positive thing. However, due to the differences in educational attainment and cultural concepts in various regions, many people still have not had the opportunity to recognize this view. There is also a part of people who, due to monetary interests, are reluctant to learn about the welfare of these captive animals. This has led to the slow spread of concepts related to the welfare of captive animals. It has prolonged the time that animals suffer. This is extremely negative. Although this essay mainly talks about two kinds of mammals' welfare, but hope that shortly, everyone can realize that the lives of animals are equal to those of humans, and the rights they need to enjoy should also be the same. I also hoped that all captive animals can have sufficient habitats and a happy environment, and stay away from diseases

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