

Caring for Wildlife - The World Zoo and Aquarium Animal Welfare Strategy

Chapter 7: Animal Welfare Research

Our commitment is to adopt a scientific, evidence-based approach to animal welfare and when conducting research

Editors' Note

WAZA's Animal welfare strategy is a much needed and timely milestone. It provides approach for assessing and managing animal welfare and thus responds to concerns over welfare of zoo and aquarium animals. It also provides approaches for conservation activities of zoos and aquariums. We have the permission from WAZA to serialise Caring for Wildlife: The World Zoo and Aquarium Animal Welfare Strategy. There should be something for everyone to do to make the zoos and the animals in their locality better. Happy reading! - Editor

RECOMMENDATIONS

To realise our commitment to high animal welfare standards, the *World Zoo and Aquarium Animal Welfare Strategy* calls on member organisations to:

1. Prioritise animal welfare and welfare monitoring as areas for research in collaboration with universities, research bodies and other zoological institutions.
2. Continue to use and apply findings based on sound scientific research to support good animal welfare in zoo and aquarium management.
3. Use an animal ethics, welfare and research committee, or similar entity, with external representation to consider and oversee research activities and foster increased scientific rigour across your operations.
4. Develop a research policy and research protocols to ensure that in all research involving animals, any potential animal welfare concerns are clearly identified and any compromise is minimised, transient and justified in terms of the objectives of the research.



Case study 7.1: Research that enhances animal welfare and provides an innovative visitor experience

The aim of this study at Yorkshire Wildlife Park was to determine whether there were any behavioural differences displayed in Guinea baboons (*Papio papio*) with and without the use of interactive food devices. Three types of devices were available to the baboons, with three of each type bordering the glass wall where visitors were able to view the baboons. Correspondingly, there were three levels of complexity. The simplest required the human to drop the food down a shoot for the baboon to spin a plate and retrieve the food. With the second type, the baboon and human had to sit or stand on a lever platform simultaneously in order for the food to be released. And the final type required the baboon and human to pull on a rope lever synchronously to release the food. Before public interactions occurred, different foods were loaded into the three devices of each type. The results demonstrated that the devices increased the natural foraging behaviour of baboons and increased animal activity, while also providing an innovative visitor experience.

- Yorkshire Wildlife Park, UK, Guinea baboon

5. Actively work to assist research partners to promote positive animal welfare states.
6. Encourage conservation medicine as a research-based area of activity within your organisation to enhance animal welfare generally and conservation welfare in particular.

INTRODUCTION

Zoos and aquariums offer opportunities for scientists and academic researchers to conduct investigations aimed at increasing understanding of the natural world. Of particular relevance here is research designed to further develop scientifically validated, evidence-based approaches to improve animal welfare and conservation; however, a research focus can and should apply across the spectrum of zoo and aquarium operations. Research collaborations between zoos or aquariums and academic institutions can have the strong advantage of furthering understanding and knowledge in many areas of zoo and aquarium operations. The sharing of knowledge and expertise can also greatly extend the scope and value of investigations, and may result in investigations being undertaken that would otherwise not be possible.

The 2011 edition of the *International Zoo Yearbook* contains examples of successful partnerships between zoos and aquariums and the academic community, meeting the



Case study 7.2:
Validating non-invasive techniques to assess animal welfare

Physiological states are increasingly recognised as essential indicators of 'stress' by revealing the 'reactive scope' of organisms to environmental challenges. This is partly because behavioural responses can be an unreliable guide unless evaluated carefully or analysed with sophisticated techniques. Non-invasive methods have revolutionised the assessment of physiological states because they can provide data to answer questions for which traditional invasive techniques are unsuitable. Non-invasive techniques include the measurement of glucocorticoid or catecholamine metabolite levels in urine, faeces, saliva or—most recently— hair, or minimally invasive procedures to obtain blood samples by using blood-sucking bugs. These methods should be validated for each species with appropriate experiments. Zoo and aquarium animals have been used with stellar success to conduct validation experiments across many wildlife species and therefore advanced the study of wildlife welfare substantially. The identification of physiological states is well-recognised as an essential building block in a comprehensive, evidence-based approach to the assessment of animal welfare.

- Sorocaba Zoo, Brazil, Hippo

interests of both groups. Such research has the potential to enrich the lives of study animals (see case study 7.1).

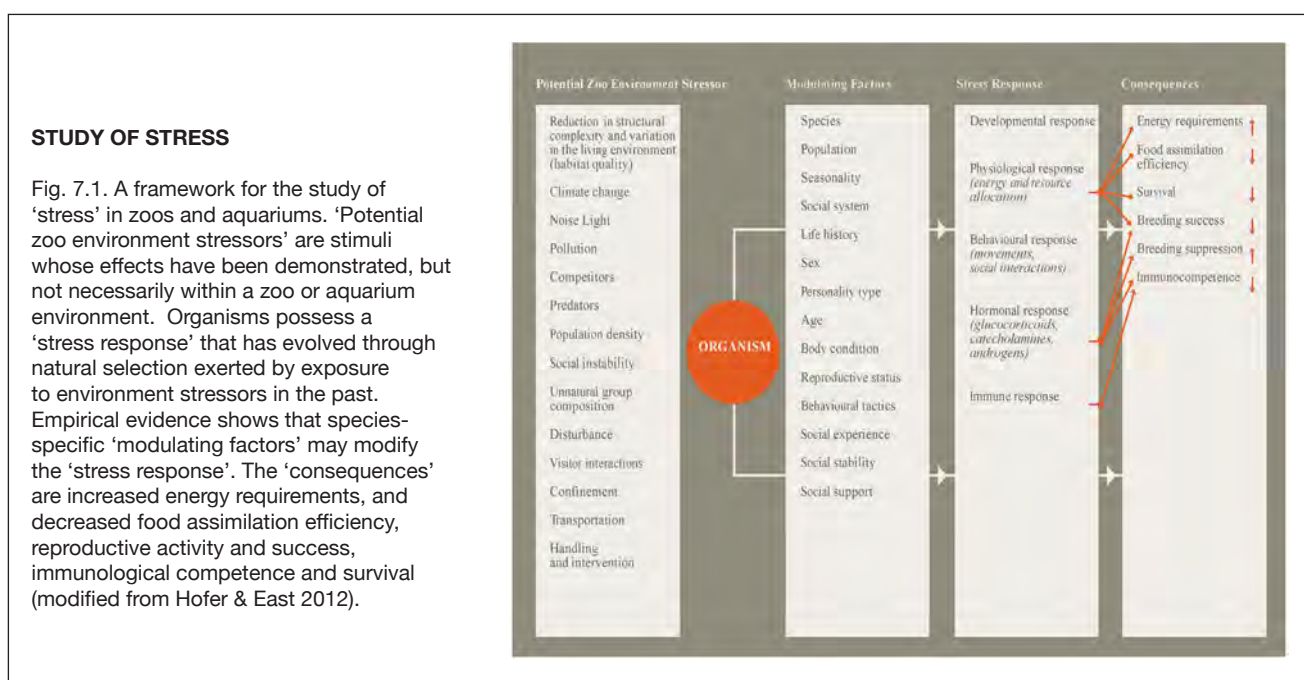
ZOO AND AQUARIUM USE OF ANIMALS IN RESEARCH

Not all research questions are directed at clarifying different facets of animal welfare and its management in zoos and aquariums. However, the welfare impacts of undertaking any research investigation must be evaluated beforehand, especially any negative impacts.

It is important to consider the regulatory context of undertaking scientific investigations on animals, which are legally mandated activities in many countries. The details of laws and regulations may vary but the key principles are often common. The 180 member countries of the World Organisation for Animal Health (OIE) unanimously accepted OIE standards for the 'Use of Animals in Research and Education'. These standards are not intended to supersede existing statutes, which may include more detailed and exacting requirements; rather, they provide guidance to those countries seeking to update old statutes or to introduce them for the first time.

Outlined here are some of the key OIE guiding principles:

- The scientific use of animals must comply with the requirements of existing
- national, provincial and/or state laws and related regulations.
- The institutions concerned should have policies and procedures that accord with
- such statutory requirements, whether or not such statutes are in place, and these



policies and procedures should specifically address the scientific use of animals.

- There should be external oversight of animal use in the form of a centralised statutory body, or animal ethics, use and/or care committee, or other such entity that includes some members who are independent of the institution.
- The anticipated benefits of the proposed animal use must be weighed against its anticipated negative welfare impacts, and the balance be towards the benefits for the proposed use to be justified.
- Steps must be taken to minimise any negative welfare impacts.

These principles are a useful guide for zoos and aquariums and their research partners. Invasive research involving significant surgical interference to an animal is predominantly unacceptable to zoos and aquariums. There are some research projects where such approaches may be acceptable, perhaps involving cases of animals of outstanding conservation value in highly threatened species that are part of an integrated species conservation and management plan and where such research is of immediate benefit to the individual concerned; validation or calibration experiments that benefit an outstanding scientific research or conservation programme in which the institution is engaged or participates; and veterinary medical experiments that use incidental opportunities as and when they arise to test and refine medical treatment and care procedures. Decisions about such research requires careful balancing of management, conservation, scientific and ethical perspectives, and will have the best support if they are taken within the context of a formal consultation and decision framework.

Observational research within a zoo or aquarium setting faces many similar challenges to those of field studies of free-ranging populations. Insufficient sample sizes can be overcome by conducting studies in several zoos or aquariums, using the variation in holding and care conditions as a source of biological variation, or by asking a clear question and conducting a simple experiment in one zoo or aquarium and publishing it as a case study. In combination with simple experimental setups based on positive reward systems, observational studies have a substantial potential to contribute to improvements in animal welfare.

Rapid scientific advances in recent years have created many new techniques to assess animal welfare and 'stress load' (see *case study 7.2*), individual health and reproductive status, paternity and maternity, and the presence of pathogens in a minimally or non-

invasive manner. These techniques and theoretical developments advance an evidence-based approach to animal welfare in zoos and aquariums and should be applied.

A research focus in zoos and aquariums requires a long-term commitment to closer cooperation with the academic community. A decision-making process on academic partnerships and research at both policy and operational level can be developed to ensure improved animal welfare; encourage high-quality scientific research; facilitate research to answer questions of great relevance to improving animal welfare; and strengthen a zoo's or aquarium's scientific credibility.

FOCUS OF ZOO AND AQUARIUM RESEARCH

Conducting such research in a zoo or aquarium setting is not always straightforward. Sample sizes are small, individuals often have vastly different life experiences, and housing and husbandry conditions vary between exhibits, institutions and over time. However, it is possible to conduct quality scientific research and one strategy for doing so, to maximise the power and wider applicability of findings, is to encompass as many zoos and aquariums as possible. For these reasons, multi-institutional research studies are strongly encouraged. Such research can reveal associations between welfare measures and housing and husbandry that can then be practically applied.

Many aspects of zoo and aquarium management pose research questions of great interest and may result in potential benefit to the zoo and aquarium community. It is apparent that well-established animal welfare knowledge and management practices in non-wildlife species provide a good starting point for investigating their extension to wildlife in zoos and aquariums.

Of the numerous research questions available for study, examples include extending species-specific understanding of indices of negative and positive animal welfare states, including stereotypies and other behaviours; innovative environmental enrichment approaches; detection of infertility; development and application of assisted reproduction techniques; contraceptive control of reproduction; protocols to improve the management of parturition in mammals; optimisation of nutrition; assessment of health status; detection of pathogens, including zoonotic microorganisms; the development of prophylactic protocols in wildlife health; and the facilitation of conservation breeding or reintroduction programmes.

The emphasis on minimising negative welfare impacts has direct relevance to any research undertaken in zoos and aquariums, whether or not that research has a specific animal welfare focus. The Five Domains model (*Chapter 1*), details of which were first published in 1994, was in fact developed specifically to facilitate minimising harm caused by research, teaching and testing procedures applied to sentient animals. In 1997, its use was introduced as a regulatory requirement for all such procedures proposed to be conducted on animals in New Zealand, a requirement that continues to this day. Its wider use for assessing welfare compromise, and the enhancement of welfare, as described above, were later developments.

In terms of animal welfare research, a specific example is a framework for evaluating negative welfare states and their minimisation, which focuses on physiological ‘stress’ responses and their consequences, as depicted in *Fig. 7.1*.

UNDERTAKING RESEARCH IN ZOOS AND AQUARIUMS

The full potential of zoos and aquariums to undertake research to enhance animal welfare and conservation outcomes is currently unfulfilled. Instead of an opportunity, research may be viewed as an additional cost factor or as being in conflict with operational procedures. With careful planning and willingness on all sides, these hurdles can be overcome, as some innovative forms of successful partnerships between zoos and aquariums and academic institutions have demonstrated.

Conservation medicine combines aspects of the routine veterinary care of wildlife, to improve and maintain their health and welfare, with significant elements of health monitoring and research. Zoos and aquariums are excellent locations where veterinary and other biological perspectives on research questions can be fruitfully combined.

Dedicated zoo or aquarium research staff can support management in developing a research policy, proposing research priorities and evaluating proposed research projects regarding their suitability, feasibility, impact on routines and implications for animal welfare. Even without staff specifically dedicated to research, zoo- and aquarium-based research can occur through an organisational culture of research and enquiry and the input of curators and animal keepers to improve management routines and optimise the care and welfare of animals. With a modest amount of structured planning, such approaches can

take the form of scientific case studies and be published in accessible peer-reviewed, scientific journals, providing other zoos or aquariums with the opportunity to run similar trials and report on their outcomes.

CONCLUSION

Zoos and aquariums can provide excellent opportunities for high-quality scientific research, with minimal or no compromise to animal welfare. A strategic approach and relatively modest additional efforts can contribute significantly to scientific progress and enhance zoo and aquarium knowledge, performance and also credibility in science-based animal welfare and conservation arenas. This often requires partnerships with the academic community and these can be actively managed for mutual advantage.

Observational studies combined with simple experimental approaches can advance scientific research and improve animal welfare. Recent scientific advances provide theoretical frameworks and practical techniques to comprehensively assess animal welfare, including the animals' health, in minimally or non-invasive ways. Zoos and aquariums have the potential to advance an evidence-based approach to their operations and to animal welfare, if they decide to employ these approaches.

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