

# Zoo animal welfare

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**Summary:** *The history of zoo animal welfare legislation extends back to 1876, and is often tied to general animal welfare regulations. As knowledge and societal values have changed, so have the focus of zoos and the regulations governing them. Today, the issues involved in zoo animal welfare are complex and broad-based. Building on the basic welfare tenets of adequate feed, water, shelter, sanitation and veterinary care, current issues include the following:*

- handling and training of captive animals
- psychological well-being and environmental enrichment
- enclosure design
- species preservation
- environmental and conservation issues
- captive-breeding programmes.

*Complicating the matter further, government regulations try to assimilate all aspects of zoo animal welfare into the laws to provide humane care and handling for all species concerned. Zoo animal welfare will remain a challenging area, as increasing demands are placed on zoos and regulatory agencies to manage this diminishing resource.*

KEYWORDS: Animal welfare – Husbandry – Regulations – Zoo.

## INTRODUCTION

Over the years, zoological parks have evolved from the original "menageries", assembled to stroke the vanity of the rich, to their present role as conservation/preservation and wildlife education centres. Similarly, during this time, society has attained a new interpretation of its role as stewardship of animals rather than simply observation. As the role of society has changed, so have the perceptions and laws concerning animal welfare. Legislation has been passed in many countries governing the humane care and use of animals (Table I). In many instances, most captive animals (including reptiles, fish, birds, and even invertebrates) fall under the protection of national animal welfare regulations (3, 4, 5, 6, 7, 17, 35, 37, 38, 45, 47). In other countries, such as the United States of America (USA), regulations cover only certain mammalian species (9). The objective of all basic animal protection regulation is to prevent cruelty to the animals and provide adequate care and living conditions. As times change, so do the number of species protected by the regulations of each country and the standards found therein. Amendments to animal welfare laws often reflect changing values in our society. Specific details of national and regional policies and regulations will not be enumerated here. The focus of this paper is on issues and upcoming concerns in zoo animal welfare.

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**TABLE I**  
***Animal welfare laws in various countries***

Country	Legislative acts
Australia	Prevention of Cruelty to Animals Act, 1936 [amended in 1986]; Wildlife Act, 1975; Animal Research Regulation, 1990
Austria	Provincial legislation
Belgium	Protection of Animals Act, 1929
Canada	(United Kingdom) Cruelty to Animals Act, 1876 [amended in 1970] (Chapter C34, Section 402 of Criminal Code of Canada)
Cyprus	Cruelty to Animals Law, 1910
Denmark	Protection of Animals Act, 1950
England/Wales	Cruelty to Animals Act, 1876; Protection of Animals Act, 1911; Performing Animals (Regulation) Act, 1925; Cinematographic Films (Animals) Act, 1937; Dangerous Wild Animals Act, 1976; Endangered Species (Import and Export) Act, 1976; Animal Health Act, 1981; Wildlife and Countryside Act, 1981; Zoo Licensing Act, 1981
France	Combination of Criminal Code and Rural Code
Germany	Animal Protection Act, 1972
India	Prevention of Cruelty to Animals Act, 1960 (Act 59, 1960) [amended on 30 July, 1982 (Act 26, 1982)]
Italy	Article 727 of the Penal Code deals with cruelty to animals
Japan	Law Concerning the Protection and Control of Animals, 1973 (Law No. 105); Standards relating to the Keeping and Custody of Animals for Exhibition, etc., Notification No. 7, 10 February 1976
Luxembourg	Animal Welfare Act, 1965
Northern Ireland	Animal Welfare Act (Northern Ireland), 1972
Norway	Welfare of Animals Act, 7 June 1935; Welfare of Animals Act, 20 December 1974, No. 73
Sweden	Animal Protection Act 1944:219 [amended in 1978:313, and 1988:534]; aided by detailed Government directives; 1959 – edict by King of Sweden regarding public exhibition of animals
Switzerland	Article 264 of Swiss Penal Code; Federal Road Traffic Act, 1958–Section 30(4); Article 74 of Road Traffic Regulations, 1962
United States of America	Animal Welfare Act, 1966 [amended in 1970 and 1976]; Marine Mammal Protection Act, 1972; Code of Federal Regulations, Part 9

## PERCEPTIONS AND VIEWPOINTS

Perceptions of zoo animal welfare – its purpose, goals, and methods – are as varied as the societies in which we live. In many instances, public access to most wild or exotic animals is limited to zoo and aquarium settings. Societies, as well as many humane

organizations, are divided on the basic issue of keeping animals in captivity. Many humane organizations share the position that no captive animal should be used to entertain the public (10, 39). However, in dealing with the reality of animals in captivity, many people and humane organizations have taken the stand that, if animals must be kept in captivity, society has a duty to provide the best possible care for each individual animal throughout its life (39). The focus is on the individual animal. In contrast, the zoological park and aquarium industry, while actively involved in the care and well-being of the individual animal, actively supports broader conservation and preservation goals, focussing on ecosystem and species survival (10, 14, 15, 26, 48). Where necessary, benefits to the species or community may take precedence over the benefits to the individual animal. In addition, zoos and aquariums strongly support education (2, 50) as a means of promoting knowledge not only of the animals in the collection, but also of ecosystem conservation and preservation. Species welfare versus individual animal welfare is a major point of contention between humane organizations and zoos (25), and this area will not be covered here.

The scientific community considers zoo animals as a research resource which can be used to facilitate species and habitat preservation. Knowledge gained through the observation and study of captive specimens can be used to promote conservation and aid reintroduction programmes for endangered species (14, 23, 24, 51). By identifying and understanding stereotyped behaviour patterns, social interactions, and other appropriate behaviour, ethological comparisons between captive and wild animals can aid in improving zoo environments, and therefore the overall well-being of the captive animal. Laws and regulations governing the research use of animals (7, 8, 11, 18, 35) also apply to zoo animals. On a cautionary note, zoological research in a captive setting and the implementation of knowledge gained may be hampered unless there is improved co-operation between outside research facilities and zoos (22), and with regulatory agencies (32). To fully utilize the available resources for the protection and well-being of zoo animal species, such co-operation is imperative.

Regulatory agencies have been given the task of protecting designated animals through the implementation of animal welfare regulations. While these agencies are committed to promoting the well-being of animals through humane care and handling, in many instances regulations take the form of minimum standards. Traditionally, most zoo animal welfare regulations focus on the individual animal care, and address the questions of nutrition, housing, sanitation, behaviour, and veterinary care. Advancing knowledge in animal sciences, increasing media attention, changing societal values and increasing public commitment to environmental issues have led many countries to amend and update specific animal welfare regulations. Basic animal welfare issues have been reviewed and revised, and other emerging issues, such as environmental enrichment, have begun to be addressed. The zoo industry itself has several national and international organizations, such as the American Association of Zoological Parks and Aquariums (AAZPA), the Association of British Wild Animal Keepers and the International Union for the Conservation of Nature (IUCN), which help to regulate segments of the industry internally through education, membership and written standards (2).

## BASIC WELFARE ISSUES

Historically, basic zoo animal welfare issues have included capture and handling techniques, housing conditions, husbandry and veterinary care. A more recent addition to the list of basic welfare concerns is psychological well-being and stress management.

In view of current global issues, zoo animal welfare has expanded to include environmental issues, such as habitat preservation, conservation and preservation of all species, and captive-breeding programmes.

Conservation and habitat preservation programmes have added to recently increasing pressure to stop the removal of animals from the wild. Captive breeding of many zoo animals has taken away some of the impetus to continue capturing wild specimens: by the mid-1980s, over 90% of mammals in zoos were born in captivity (12). As knowledge continues to improve with regard to non-mammalian species (gender identification, reproductive biology, and social structure and interactions), similar success rates for captive-born birds and reptiles should be possible. Self-sustaining, genetically-diverse captive populations are the goal; once this goal is achieved, the need for capture of wild-caught animals for zoos should fall to zero. Until that time, humane capture techniques are mandated, to minimize stress, trauma, and capture-related syndromes. Minimal impact on animals and the environment can be ensured through the use of modern capture techniques, such as efficient and non-traumatic darting and capture gun systems, chemical restraint agents which are appropriate, fast, short-acting and reversible (30), and ethological data to facilitate minimum disruption of the social unit during capture.

In the context of a zoological park, many diverse species are handled in a wide variety of situations. In general, handling can be considered in two broad categories: transportation (usually outside of the facility) and day-to-day contact. In many countries, animal transportation regulations are incorporated within animal welfare acts (9, 47), while in other countries separate acts have been passed to address the issues of humane transportation (17, 19). Most animal transportation regulations deal with designating adequate enclosures (strength, size, human access to the animal), bedding, attendants (number and training required), feed, water and rest periods. Specific forms of transportation, such as airlines, may have particular requirements. The International Air Transport Association (IATA) publishes its own guidelines (27), which include species-specific requirements for crate construction and size.

Day-to-day handling of zoo animals can involve feeding programmes and rituals, cleaning, general medical or behaviour observation, and animal training programmes. This may also include sedation and transport to facilitate veterinary and husbandry procedures. For procedures which require direct human/animal contact, many factors need to be considered. Although physical restraint of some animals by handlers and keepers is possible, these techniques can increase the risk of trauma, not only for the handler but also for the animal. The use of training to improve safe handling of animals while minimizing the need for physical and chemical restraint (i.e. training husbandry behaviour) has been advantageous to both animal and handler. The more safely a procedure can be performed, the more routine the practice is likely to become. Routine veterinary examinations and procedures directly benefit the health and well-being of the animal. Compliance with animal welfare regulations requires using the handling procedure which produces minimal distress for the animal. Effective handling protocols incorporate the procedure, the animal species and temperament, and the number, training and experience of the personnel involved. The key to any successful handling programme is appropriate training and experience of the staff. Regulations requiring specific levels of training for personnel are likely to be considered in the future.

Adequate training minimizes the potential dangers to the animal and the handlers. Public perception of handling techniques can have an important impact on the zoological park or aquarium. In the USA, one of the more controversial situations involves the

handling of marine mammals. Facilities which do not employ up-to-date training methods often come under public scrutiny. Public pressure to refrain from using captive animals solely for entertainment, together with the commitment of industry to education, has greatly altered public presentations at marine mammal facilities. Entertainment shows with gratuitous behavioural displays unrelated to free-ranging behaviour have been replaced (at many facilities) by educational presentations incorporating information on the environment and life history of the animals, displays of free-ranging behaviour and demonstrations of husbandry behaviour. Organizations such as the International Marine Animal Trainers Association (IMATA) serve as valuable resource tools in maintaining advanced training and knowledge in regulated facilities.

Issues of concern related to the housing of zoo animals are multi-faceted. Basic housing requirements – adequate space, shelter and protection from inclement weather, compatibility with natural habitat conditions, safety of the animal and the public – must now blend with environmental enrichment concerns to promote psychological well-being. In addition, changes may be needed in enclosure design to accommodate public pressure for the removal of any bar-like barriers (46). Major advances have been made in captive animal housing over the last few decades (30, 33). An unobstructed view of the animal by the public is no longer a top priority in recent trends in zoo designs (12, 33), which prefer to create more a naturalistic enclosure or area, thus providing the animals with a compatible, interesting and diverse environment (12, 33, 46). With many animals, this has been a challenging task. Use of vertical space, natural substrate composition and ground cover, appropriate flora, and feeding tactics which encourage foraging behaviour (where applicable), are all measures which have been used to develop enriched environments for captive animals (12, 13, 30, 33). While it may be impossible to duplicate the natural environment of a species (12), the trend is to get as close as possible to this natural state.

Space is always an important consideration. The limited area which is currently set aside for zoological parks cannot accommodate unlimited space for each captive animal (12). There will always be some people who argue that anything less than the space which an animal would find in its natural environment is inadequate, while some exhibitors will continue to attempt to house animals in cramped, substandard quarters. Animal welfare regulations try to specify minimum species-based space requirements, taking into account the size, social interactions, normal behavioural postures and, more recently, psychological well-being of the animals. These requirements are designed to provide adequate space to satisfy the health requirements of the animal, and they are being amended as the database of available information expands.

Animal husbandry is an area which should cause few problems in the present era. Advances in animal nutrition and the increasing number of adequate feed rations for a wide variety of species in zoos means that there should be no captive animals which suffer from under-nutrition or malnutrition (29). However, in some facilities, basic nutritional needs are still not being met. Lack of knowledge and lack of money can still result in maltreatment of captive animals, even when no cruelty is intended. To respond to severe cases, most animal welfare acts provide designated authorities to intervene and confiscate animals, if necessary.

Another component of husbandry which may cause future problems is sanitation. Sanitation standards were developed to maintain the health of animals by preventing disease transmission. With the advent of naturalistic displays, cleaning and sanitation regimes must be re-evaluated. Grass and trees cannot easily be disinfected; however, the benefits of the enriched environment may outweigh the decreased ability to sanitize the

enclosure. The public perception of sanitation is also of importance. Obvious filth and contamination, not to mention odour, can create a public outcry, regardless of the physical health of the animals. People react very strongly to offensive odours and apparently unsanitary conditions in display enclosures. Doubt is shed on the intentions of the owners if animals are kept in unsuitable conditions. Animal compatibility is another husbandry issue which may be explosive, particularly in the light of current trends for group/social housing. The fine art of establishing and maintaining a compatible social structure in captivity is precisely that: an art. Change of any kind within a group – through the birth, death, or temporary removal and subsequent reintroduction of a group member – can lead to social aggression and dangerous behaviour. In the future, all zoos may need to employ not only highly skilled handlers and veterinarians, but also an animal behaviourist.

Inseparable from good husbandry practices is the area of veterinary care and preventive medicine programmes. The expansion of veterinary knowledge in recent decades has been of immense benefit to zoo animal welfare. Many of the medical problems experienced by zoos in the past may be attributed not only to the lack of veterinary knowledge and training in wildlife species at that time, but also to the state of the art of veterinary medicine. For centuries, both veterinary and human medicine were practised primarily as emergency measures: an animal was treated when clinically ill, and was left alone when no health problems were apparent. For wildlife species, this practice has great potential for disastrous outcomes, as many wildlife species (due to adaptive survival needs) tend to exhibit no clinical signs of disease until the disease state is well advanced. By this stage, even major medical intervention would be unlikely to achieve success. The current emphasis in veterinary medicine is on preventive programmes. This philosophy serves the zoo community well: it is much more advantageous for the zoo and the individual animals to maintain good health through pro-active veterinary programmes (such as routine blood, urine and faecal testing, regular physical examinations, appropriate vaccinations, and thorough and accurate records of feeding, behaviour and medical treatment) than to wait and treat only sick animals. This active approach benefits the individual animal, the collection as a whole, and species survival. Although animal welfare legislation in most countries prescribes proper, adequate veterinary care for exhibition animals (3, 4, 5, 6, 9, 17), the specific requirements (8, 17; V. Manton, personal communication) can vary from country to country and from species to species. While proper veterinary care (with regard to medical/surgical treatments) may be defined in terms of "current accepted veterinary practices", thereby allowing for innovations and new techniques, certain aspects of veterinary care may be more precisely regulated. For example, in record-keeping, under current regulations in the USA, there are no specific requirements for the content of veterinary medical records (8), whereas in England the Zoo Licensing Act of 1981 set specific requirements for the content of medical records (V. Manton, personal communication). Under this law, for example, marine mammal veterinary records must include the correct scientific name and personal name of the animal, accurate identification of the animal and any distinctive markings, origin of the animal, estimated or known birth date, all acquisition and disposition information, and all clinical data (including routine health examinations, daily health reports, growth records, social behaviour records, training and feeding records, breeding history and details of any offspring, date of death and the post-mortem report). The need to regulate these aspects of veterinary care is becoming more important as the need to manage and conserve captive populations has increased. Accurate record-keeping is essential to these endeavours.

## EXTENDED WELFARE ISSUES

Many zoo animal welfare issues are united in the emerging field of psychological well-being in captive animals. This incorporates physical health, normal and captive behaviour, and interactions with the enclosure environment. Environmental enrichment is an important component of this issue. While much of the focus of environmental enrichment has been on non-human primates (13, 21, 31, 36, 46), these issues are being addressed for other species as well, such as polar bears, cetaceans and captive felids (36, 44). A balance must be kept between the provision of interesting and stimulating enclosures for the animals, and safeguards against health hazards. For example, providing "play objects" to some marine mammals can lead to serious medical hazards, such as intestinal ulceration or blockage due to swallowed objects (42). Innovations abound in the area of environmental enrichment, from the naturalistic display designs discussed above, to specially-developed moulded toys for otters (J. Robinett, personal communication) and puzzle feed boxes for primates (40, 41). The use of natural flora and naturalistic surroundings to provide visual and locomotor diversity has been developing for many years, leading towards displays which allow a larger repertoire of natural behaviour to be expressed by the exhibited animals. Housing facilities certainly influence the behaviours seen in captive animals (1, 34): the more naturalistic the display, the more natural the observed behaviour. Feed can be presented in various ways which enhance the environment of the animal: foraging behaviour in primates can be stimulated by mixing fruits, grains and other feedstuffs in ground cover, such as straw or wood chips (20, 41); and using a device to randomly throw fish into a polar bear enclosure can provide increased challenges in feed acquisition (36).

Training programmes for some species are utilized to minimize boredom (36). Stereotyped behaviour is believed to reflect boredom and lack of environmental stimulation (16, 43, 49). The field of animal training is changing as more is learned about captive and natural animal behaviour. Organizations of trainers and animal handlers, such as the IMATA, can be valuable resources to zoos when dealing with training issues. The correct use of valid training techniques and the training of appropriate behaviour can benefit the animal by providing enrichment and maintaining a better overall health status through routine veterinary procedures. Ethological considerations can improve the psychological well-being of the animal, as well as providing guidelines for effective training of more natural (ethologically normal) behaviour.

Corollary areas of zoo animal welfare issues include habitat preservation and other environmental concerns, conservation and preservation of a species, and captive-breeding programmes. As the focus in the zoo industry has changed from exhibition for entertainment to education and preservation, there has been increased concern to end the destruction of natural habitats. While neither zoos nor the general public can prevent habitat destruction completely, as areas are utilized for human occupation and industry, the role of zoos has never been more important in educating the more than 350 million people who visit the facilities each year (12). Zoos have directly played a part in discouraging habitat disruption and loss through the use of captive-bred animals to maintain current collections. Zoo philosophies are changing, from emphasizing the number of different species in a collection to limited species displays of select stable populations and ecosystem groupings (28, 46). As mentioned above (12), more than 90% of the mammals in zoos today are born in captivity. One can hope that decreased demand for rare, wild-caught animals has lowered the potential for ecosystem

imbalances due to indiscriminate hunting to fill collections. Not only does this benefit the environment, but it helps efforts to conserve and preserve threatened and endangered species. Education is still vital to meet these goals (50).

Along with the efforts of the zoo industry to confront environmental issues, captive-breeding programmes have been developed to further aid the preservation and potential restoration to the wild of certain endangered and threatened species. Scientifically-managed captive-breeding programmes include the following: the Species Survival Committee of Japan; the Australasian Species Management Plan; the Joint Management of Species Programme of the British Zoo Federation; the European Endangered Species Programme; and the Species Survival Plans and Taxon Advisory Groups of the AAZPA (51, 52). Captive-breeding programmes strive to maintain genetic diversity, and hope to reintroduce designated species into the wild at some future date (obviously this is dependent on restoring appropriate habitat areas). Active participation by zoos and aquariums is needed to develop and maintain maximum genetic diversity of captive populations. Record-keeping is extremely important, as animals of unknown origin are usually excluded to minimize potential inbreeding (52). These programmes are aided by the International Species Inventory System (ISIS) and other species stud books.

## CONCLUSION

Zoo animal welfare encompasses a broad spectrum of issues and concerns. The areas of ethology, display design, veterinary medicine, animal husbandry, environmental issues and education are a few of the elements which comprise zoo animal welfare. Societal values dealing with animal welfare issues are also a force to consider when regulating such an area. Changes are being made, and the challenge of zoo animal welfare is being met at the international level. Regulations do not usually respond rapidly to changing values and knowledge, although they move as fast as the regulatory process allows. In the USA, the marine mammal section of the animal welfare regulations is currently undergoing review and revision. During this process, concerns and issues which are important to a broad cross-section of the public are presented. These include housing and space requirements, arguments for and against captivity, human/cetacean interactive programmes, transportation issues, solitary animal displays and noise problems. At the same time, industry concerns are also reviewed, many of which deal with more specific issues such as record-keeping, water quality parameters, shelter requirements, and inspection and reporting systems. Expert scientific input also plays an important role in the writing of specific proposed regulations. In addition, public hearings can also be used as a forum for input into the rule-making process.

All animal welfare legislation strives to do what is best for the animal. If the process is to incorporate all aspects of concern, this can be expected to take considerable time. The complexity of zoo animal welfare requires such review processes. Ultimately, it is the animals which benefit.

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## BIEN-ÊTRE DES ANIMAUX DANS LES PARCS ZOOLOGIQUES. – B. Kohn.

**Résumé :** La législation portant sur le bien-être des animaux en captivité dans les parcs zoologiques remonte à 1876. Elle fait souvent partie des réglementations générales concernant le bien-être des animaux. Mais avec l'évolution des connaissances et des valeurs de la société, le point de vue sur les parcs zoologiques et les réglementations y afférentes ont changé. Aujourd'hui, les questions impliquées dans le cadre du bien-être des animaux en captivité sont plus complexes et étendues. Outre les principes de base du bien-être, à savoir de bonnes conditions d'alimentation, d'abreuvement, d'abri, d'hygiène et de soins vétérinaires, on prend actuellement en compte d'autres aspects tels que :

- la manipulation et l'entraînement des animaux en captivité ;
- l'équilibre psychique et l'enrichissement du milieu ;
- la conception des enclos ;
- la conservation des espèces ;
- les problèmes liés à la conservation de l'environnement ;
- les programmes de reproduction en captivité.

Pour compliquer les choses, les réglementations officielles tendent à inscrire tous les aspects du bien-être des animaux en captivité dans le cadre des lois sur le traitement humain à réservé à l'ensemble des espèces concernées. Le bien-être des animaux en captivité constituera donc un défi à relever, dans la mesure où les parcs zoologiques et les institutions responsables seront de plus en plus appelés à prendre en charge la gestion d'un patrimoine naturel en voie d'extinction.

MOTS-CLÉS : Bien-être des animaux – Elevage – Parc zoologique – Réglementations.

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## BIENESTAR DE LOS ANIMALES EN LOS JARDINES ZOOLÓGICOS. – B. Kohn.

**Resumen:** La legislación sobre el bienestar de los animales en cautiverio en jardines zoológicos vio la luz en 1876 y suele formar parte de las reglamentaciones generales sobre el bienestar de los animales. Pero la evolución de los conocimientos y de los valores vigentes en la sociedad ha hecho cambiar también los puntos de vista sobre los jardines zoológicos y las reglamentaciones respectivas. Los asuntos a tratar hoy en relación con el bienestar de los animales en cautiverio son vastos y complejos. Además de los principios básicos del bienestar de los animales, como ofrecer condiciones adecuadas de alimentación, bebida, abrigo, higiene y atención veterinaria, han de tenerse en cuenta aspectos tales como:

- manipulación y adiestramiento de estos animales;
- equilibrio psíquico y enriquecimiento del medio;
- concepción de los recintos ;
- preservación de las especies ;
- problemas vinculados con la preservación del medio ambiente;
- programas de reproducción en cautiverio.

Todo lo cual se complica aun más en la medida en que las reglamentaciones oficiales tienden a incluir estos aspectos del bienestar de los animales en cautiverio en las leyes sobre el tratamiento humanitario que ha de darse a las respectivas especies. El bienestar de los animales en cautiverio se trasforma así

*en un desafío de importancia, y los jardines zoológicos e instituciones responsables de las reglamentaciones serán cada vez más solicitados para hacerse cargo de la gestión de un patrimonio natural en vías de extinción.*

PALABRAS CLAVE: Bienestar de los animales – Cría – Jardín zoológico – Reglamentaciones.

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