BIOETHICS ARTICLE

Animal ethics in biology teaching and research in selected Asian countries

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Abstract: Governance and regulation of the use of live animals in research and teaching is examined in Australia, Malaysia, Indonesia, the Philippines, Singapore, Thailand, China, Japan and India. A comparison of the systems in different countries will enable the determination of best practice and fit-for-purpose regulation. The most comprehensive government regulation of animal welfare in institutions covers a broad range of animals and institutions are required to have an Institutional Animal Care and Use Committee, whose membership is specified in guidelines or regulations. The work of the Committees is rigorously overseen by government and facilities that use live animals are audited externally. All countries examined have legislation governing the use of live animals in research, although only Australia and Malaysia have a fully equivalent mandated oversight of teaching. Teaching that uses live animals is partly covered in the Philippines, Japan, Singapore and Thailand This paper thus aims to review the regulation of animal use in different Asian jurisdictions in order to determine best practices that are appropriate to those settings. The most comprehensive oversight is provided in Australia and Malaysia that essentially use the same regulatory framework.

Keywords: animal ethics; Asia; live animals; research

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Introduction

There has been global growing awareness of the need for humane treatment of animals used in biological research as well as in the classroom. Historically, there was little regulation of treatment of animals, whether they were hunted, used for labour or farmed and killed for food. While some (e.g., 17th Century philosopher Descartes) argued animals could not reason and therefore could not suffer, other philosophers such as Bentham in 1789 believed while animals might be incapable of reason and speech, they could certainly suffer pain (Bishop & Nolen, 2001). However, it was not until 1876 that the first animal cruelty legislation was passed in the UK. Since then, there have been moves to protect animals from ill-treatment, including in many countries in research and teaching establishments.

A system of governance and regulation has evolved worldwide that aims to improve the welfare of animals used in research and teaching. This system has involved a set of principles, most known as the 3Rs (replace, reduce and refine) and institutional governance arrangements that have oversight of these practices (Anh & Rho, 2022; Turner & Barbee, 2020).

In this paper I survey the regulation of use of live animals in biology teaching and research in a number of Asian countries. This work follows on from recent work that compared the systems in Japan and Australia (Wallis & Katayama, 2022). The aim is to select countries in which the regulation and governance has been described and is publicly available. By comparing the different systems of regulation, the similarities and dissimilarities will be highlighted. This should demonstrate in which jurisdictions best practice is followed. It should also reveal where there are regulatory gaps and what might need to be implemented to achieve a fit-for-purpose and effective oversight of animal welfare.

The challenge is whether the systems in place are effective – are institutions fully compliant or do they merely pay lip-service to the regulations? Only in-depth analyses of in-country practices will reveal if there are problems in compliance (Anh & Rho, 2022).

Method

The publicly available literature was searched for details on the governance and regulation of animal welfare in research and teaching. Only Asian countries were considered to provide a geographic contextuality. Institutional web sites and the grey literature were also accessed. Information was sought relating to these questions: what animals are considered in the legislation and regulation? Are institutional committees that have oversight of animal use mandated and is their membership specified? Are the 3Rs specifically addressed? Is the system of oversight audited externally? Is teaching that uses animals covered or is only research that uses animals considered?

Results and Discussion

Malaysia and Australia

Malaysia and Australia both have a comprehensive Code for the care and use of animals in research and, importantly, teaching (Animal Welfare Board, 2020; NHMRC, 2013). As with all other Asian countries that have defined what animals are covered in research and teaching, the Code only refers to the use of live vertebrates. Importantly, wild animals in Malaysia are excluded, being considered under a different Act. Many institutions have adopted the Code as part of their operating procedures for using live animals in teaching and research – for example, Universiti Malaysia Sabah (2015).

The constitution of IACUCs is stipulated by the Code (and thus by national legislation) and application for research and teaching that use live animals must consider the 3Rs – Replacement and Reduction in the use of animals and Refinement of procedures used to reduce animal suffering.

Institutions are inspected regularly for compliance, and this is enforced by the Department of Veterinary Services in Malaysia (Gettayacamin et al., 2018) and the relevant State government agency in Australia (Wallis & Katayama, 2022).

Breaches of compliance can be reported by observers and the Australian Code has clear mechanisms institutions must have to deal with any breaches. Breaches are most likely to be reported within an institution, but the public should also have the opportunity to report concerns. This might be encouraged if there was greater transparency in the use of animals.

A recent move in Australia has been to increase the openness and transparency of use of live animals in research and teaching (ANZCAART, 2023). This follows similar moves in the United Kingdom and New Zealand that were launched in 2014 and 2021 respectively (Understanding Animal Research, 2023; ANZCAART, 2022). Institutions that sign up to the Australian Openness Concord, agree to four commitments: (1) Openness about their involvement in the use of animals; (2) Enhancement in communications with the media and the public about their use of animals; (3) Proactivity in providing opportunities for the public to find out about research or teaching involving the use of animals, and (4) Reporting annually on their efforts to improve openness in their use of animals.

Indonesia

The relevant legislation concerning animals in research are covered under those laws that deal with animal cruelty and health research, especially Law No. 18 (2009) that covers veterinary health and animal welfare. Law No. 5 (1990) deals with handling animals that have been wild caught. While IAUACs are not mandatory, a growing number of universities and research organisations have established their own committees and determined their operating procedures and memberships (Guillén, 2018).

While the 3Rs are discussed in two important documents established by the National Health Research Ethics Committee in the Ministry of Health (Guidelines and Teaching Guidebook), they are not mentioned in Law No, 18 which instead, emphasises the importance of users following the 5Fs: freedom from (1) Thirst, Discomfort, (2) Pain, Injury or Disease, (3) Fear and Distress, and (3) Prevention of Expressing Normal Behaviour.

As with other Asian countries, the regulations apply to use and care of live vertebrates, but also includes invertebrates such as crabs that feel pain (Guillén, 2018).

Retnam et al. (2017) note that while enforcement of animal welfare legislation in Indonesia has been weak in the past, there is growing commitment to ensure high standards of quality animal care and use of live animals. The use of live animals in teaching is not formally regulated.

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Philippines

The amended Animal Welfare Act 1998 has a Revised Implementing Rules and Regulations (IRR) that deal with animal welfare in research and teaching establishments. These regulations stress the 5Fs along with the 3Rs, as well as stipulating the establishment of IACUCs and licencing of research facilities.

Secondary schools that use animals in research projects must also be licenced and comply with the rules and regulations (Gettayacamin et al., 2018). Facilities are inspected twice a year.

What animals are covered in the revised Act? Animals covered are all "sentient creatures other than humans which shall include but not be limited to terrestrial, aquatic and marine animals" (PAWS, 2023, p.1). However, a category of Aquatic Animals includes "all life stages of fish, mollusks, crustaceans and amphibians originating from aquaculture establishments or removed from the wild, for farming purposes, for release into the environment, for human consumption or for ornamental purposes (PAWS, 2023, p. 2). A separate definition of Marine Mammals is also included in the Act.

The purpose of the Act states

> "SECTION 1. It is the purpose of this Act to protect and promote the welfare of all animals in the Philippines by supervising and regulating the establishment and operation of all facilities utilized for breeding, maintaining, keeping, treating or training of all animals either as objects of trade or as household pets. For the purpose of this Act, pets shall include birds." (PAWS, 2023, p. 3).

So, it is somewhat ambiguous – the Act's purpose clearly refers to all mammals and pet birds, but since aquaculture is also discussed in the regulations, the Act includes animals commonly farmed in aquatic systems. The issue is further complicated by crocodiles being included in a list of animals that when killed, must be done so using approved human procedures that are scientifically based.

Training of staff who care for animals is also specified.

Singapore

In 2004 the Singapore government published its *Guidelines on the Care and Use of Animals for Scientific Purposes* (NACLAR, 2004), a comprehensive set of requirements for institutions that use live animals in research. The document was based on similar ones in Australia, New Zealand and Canada and covers such areas as animal care, housing, procurement and transport as well as institutions' responsibilities. Each organisation that uses live animals in its research must establish an IACUC and the membership is specified. A veterinarian must be appointed by the institution and is a member of the Committee. Research facilities that house and use animals are licenced by the Agri Food and Veterinary Authority. The IACUC must conduct internal audits and visit sites where animal research is carried out and the IACUC operations are themselves externally audited.

Teaching that uses live animals also requires approval from the organisation's IACUC (for example, see Nanyang Technological University, 2023). Animals covered by the Guidelines are all live vertebrates.

Thailand

The National Research Council of Thailand requires institutions that use live animals in research and teaching to establish IACUCs. Membership, obligations and the records required are all mandated. The relevant Act is the Animals for Scientific Purposes Act 2015 that applies to animal breeders and anyone involved with animal procedures for scientific purposes, including teaching, and Retnam et al. (2017) believed back then that Thailand was in the early stage of the Acts' enforcement. Animals covered by the Act are vertebrates plus any animals deemed to suffer pain. Gettayacamin et al. (2018) note this includes some specific invertebrate groups – decapods, arthropods and cephalopods. A Committee for Supervision and Promotion of Procedures on Animals for Scientific Purposes oversees implementation of the Act.

The Government has also published a set of ethical guidelines that state several principles. Importantly these include a note that if wild-caught animals are used, then the laws and policies relating to wildlife conservation must be followed. In line with Buddhist philosophy, animals are also placed on the same level of respect as humans and must be afforded all care for their welfare. Interestingly, these same guidelines also urge editors of scientific journals to require evidence that proper animal welfare protocols have been carried out in papers submitted. In particular, editorial boards should

> "request the author(s) of the submitted research paper to provide detailed information concerning the genetic background and the number of animals used, animal care provided, and experimental protocols including the certificate of approval for the research project issued by the authorized Institutional Committee. The manuscript should be rejected unless all the above requirements are fulfilled." Gettayacamin et al. (2018, p. 362).

Institutions must appoint an IACUC, and its membership is specified by the Act mentioned above. Facilities and researchers are licenced. Students undertaking classes that use live animals are not required to be licenced. A "competent person" as declared under the Act can enter a licenced premises at any time to inspect and audit its relevant operations (Bhumibol, 2015).

While the 3Rs are used as the basis for animal welfare considerations, there are another 5Rs also that researchers need to consider: Reason, Responsibility, Reliability, Reproducibility and Recorded.

China

China has a National Standard that regulates laboratory animal use, care and welfare, review of animal

welfare, personnel qualifications, facilities standards, reporting requirements and OHS (Bayne *et al.*, 2018). However, whilst this Standard specifies many aspects of laboratory animal use, it does not cover non-laboratory animal use and actual classes of experimental animals. Instead, there are various provincial and local regulations that describe conditions for use of fish, for example and what alternatives there might be to using mammals in research (Bayne et al., 2018; Cvek et al., 2017). There is thus much variation across the nation in terms of regulation and oversight. Furthermore, China has less publicly available information on and more secrecy about animal welfare of animals used in research (Cao, 2018). Research facilities (and researchers) are licenced and conditions for obtaining the licences are documented. Research facilities are audited and the 3 R's are stressed – as well as Rehoming for primates (as in India).

The emphasis of the literature on China's use of live animals is very much focussed on use of laboratory animals in experimental research. Laboratory animals are those that are bred and fed for the purposes of research or teaching (Cao, 2018).

Kang et al. (2022) have produced an important document that examines the use of the 3 Rs (with an additional one – Responsibility) in teaching functional experimentation to university students. They note some 40 million laboratory animals are used each year in Chinese teaching and research establishments and describe the many problems inherent in using animals in teaching. These include a general lack of animal ethics education, great variation in the standards of training of lab animal practitioners, the poor experience many students have in using lab animals because of low standards in experimental design and animal welfare and that animal feeding regimes are not standardized leading to some animals being poorly maintained. The paper also describes a common set of experiments in university biology classes – use of toads to develop an understanding of nervous, muscular and circulatory systems and how alternative uses of simulations and videos can replace the use of live animals. Interestingly, the use of toads in Australia for the same experiments have long been abolished in Australian universities. Cao (2018)'s earlier study estimated fewer live animals being used, but still the figure of 20 million laboratory animals is high. Of these, Cao believes ¾ are used for medical purposes, of which 8 million endure pain during the experiments.

Cao (2018) believes that while there are regulatory rules and guidelines for the humane treatment of such animals in China, they are not as rigidly enforced as in Western nations. This leads to much research (especially on non-human primates) being conducted by Western scientists in China in conjunction with Chinese colleagues instead of in their own countries. As well, Cao (2018) notes large numbers of animals are exported from China for animal research.

Japan

IACUCs in Japan are established under the guidelines for Proper Conduct of Animal Experiments by the Japan Science Council and animal experimentation is subject to sets of standards developed by the Ministry of Environment and Ministry of Education, Culture, Sports, Science and Technology (MEXT) (Wallis & Katayama, 2022). As well, a non-government organisation, the Japanese Association for Laboratory Animal Science, a nongovernment organization of researchers, published the *Guidelines for Animal Experimentation.* Japanese institutions that have set up IACUCs are self-regulated and there are no formal government audits of their operations and research facilities.

Live animals have been used in Japanese elementary schools for many years. MEXT has produced a set of guidelines for schools using live animals (but only reptiles, birds and mammals are covered) that advise on animal housing, care and use. Importantly, schools must seek the advice of a veterinarian in caring for animals held in the classroom (Hakui, 2010). Japanese secondary schools are unlikely to use live animals in experiments that would require approval from an IACUC (Wallis & Katayama, 2022).

India

Relevant Indian legislation only covers live mammals and is overseen by a national Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA). Institutions must establish their own Institutional Animal Ethics Committee (IAEC) which must have a veterinarian appointed. The membership categories of the IAEC are also mandated. The Committee can approve projects that use rodents and rabbits, but research using all other mammal species are only approved by the CPCSEA on the recommendation from the IAEC. IAECs are expected to encourage researchers to use animals that are lower on the phylogenetic scale (Retnam et al., 2017). Research facilities are licenced after inspection by a nominee of the CPCSEA.

So, who is on this powerful CPCSEA? It comprises 23 members, 10 of whom are government representatives and 11 are researchers in the biological sciences. The other two members are one veterinarian and one person who represents the animal welfare lobby. Qadri and Ramachandra (2017) note that other important groups that perhaps should be represented are missing – for example, breeders of research animals, representatives of the pharmaceutical and biotechnology industries and contract research organisations.

The IAEC must report annually its findings and inspection reports to the CPCSEA; meeting minutes must

be submitted within 15 days of a meeting. In this sense audits are conducted – if not actually in person by the CPCSEA, then by the analysis of reports that in the case of assessment of the animal housing, include photographs.
An interesting additional "R" is Rehabilitation for large animals. This especially applies to animals such as horses.
Training is strongly encouraged for all participants in the scheme, and this must be reported annually – as must the curricula vitae of IAEC members.
Schools and undergraduate teaching using animals is also considered in the guidelines for use of live animals. In general, only animals lower on the phylogenetic tree can be used with the exception of frogs (many of which are of conservation significance in India) and oddly, earthworms (Qadri & Ramachandra, 2017). Teachers are expected to abide by guidelines for the housing, care and experimental use of animals that apply to research use of live animals specified by legislation. In 2012 the Indian Government's Ministry of Environment & Forests directed the Medical Council of India, the University Grants Commission and the Pharmacy Guild of India not to use live animals in experiments and to use alternative methods to dissections in universities. Previously in 2001, animal dissection had been removed from senior high school biology curricula.

Table 1 summarises the governance arrangement for animal welfare in the use of live animals in teaching and research in the Asian countries considered in this paper. The strictest regulation of using live animals specifies a broad range of animals, is covered by specific legislation and usually a set of guidelines or regulations, has a mandatory Institutional Animal Care and Use Committee whose membership is specified and in which facilities are licenced and inspected. Training of those involved in the care and use of live animals is also specified.

Table 1. Comparison of governance requirements for use of live animal in teaching and research in selected Asian countries.

	MAL	INDON'	P'PNE	SING	T'LAND	AUST.	JAPN	INDIA	CHINA
WHAT ANIMALS ARE COVERED?	Verts	Verts - Some inverts e.g. decapods	Mammals, pet birds, fauna from aquacult	Verts	Vert. Some inverts — decapods arthropod, cephalopods	Verts. Some inverts: e.g. decapods, cephalopods,	Verts minus fish	Mammals	*Lab animals: nationally. Other classes in some provinces
SPECIFIC LEGISLATION?	√	Partly	√	√	√	√	√	√	√
IACUC — MANDATORY & REGULATED?	√	x	√	√	√	√	x	√	√
IACUC — SELF-REGULATED AND/OR VOLUNTARY	x	√	x	√	x	x	√	x	x
IACUC MEMBERSHIP SPECIFIED?	√	x	√	√	√	√	x	√	√
LICENCED ESTABLISHMENT?	√	x	√	√	√	√	x	√	√
GOVT AUDIT OF PREMISES AND/OR IACUC	√	x	√	√	√	√	x	Remotely	√
3R'S STIPULATED	√	5Fs. 3Rs in ethics teaching guidelines	5Fs and 3Rs	√	√	√	√	√ (4Rs to include rehabilitation)	√
APPROVAL NEEDED FOR TEACHING PURPOSES	√	x	√	√	?	√	Some	Some	x
TRAINING OPPS SPECIFIED?	√					Some	x		

The countries selected in this study are in a geographically defined setting, allowing for comparability in context. Of these countries, the oversight of use of live animals in research appears to be strongest in Australia and Malaysia. These two countries use the same regulatory framework in that IAECs are legislated and mandatory, their membership categories are specified and the Committees as well as facilities are audited externally.

Arguments against strict regulation cite delays in urgent research, too much red tape and unnecessary oversight. Others have argued strict regulation is unnecessary; for example, in Japan the Buddhist belief of the sanctity of life means animal cruelty is rare (Wallis & Katayama, 2022).

Such arguments are countered by a groundswell of public opinion that abhors animal cruelty (Morton et al., 2022).

The regulation of teaching that uses live animals is less uniform across Asia. It is strictest in Australia and Malaysia where teachers must seek approval through an appropriate IACUC, while in other jurisdictions it is not regulated apart from the need to observe prevention of animal cruelty legislation.

The real test is the effectiveness of the regulation and whether research and teaching institutions are fully compliant with the meaning and intent of the prescriptions. It is all very well to have legislation and policies in place, but if breaches are frequent and undetected, then animal welfare is compromised (Koplin, 2022). Moves to improve the openness and transparency such as those seen in the UK and New Zealand are thus to be welcomed.

Conclusion

Asian countries typically have some legislative oversight of animal welfare. At one extreme, there might be laws that forbid animal cruelty. Most institutions that use live animals for research have committees that regulate the use of animals. However, only some classes of vertebrates might be considered, for example, mammals and birds. The strictest regulation considers the widest range of animals that includes all vertebrate classes and even some invertebrates such as cephalopods. In these jurisdictions institutional committees are mandated by law, their membership categories are clearly specified, the committee operations and the institutions' facilities are audited, and the policies are also applied to teaching programs.

It is to be hoped that all countries will move towards greater oversight of animal welfare in research and teaching.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

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