Submission No 248

INQUIRY INTO USE OF PRIMATES AND OTHER ANIMALS IN MEDICAL RESEARCH IN NEW SOUTH WALES

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The effectiveness of external monitoring of institutions conducting animal research – A review of outcomes over 20 years and thoughts on the future of regulation.

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Introduction

In 2014 myself and colleagues from the Department of Primary Industries Animal Welfare Unit, the NSW Animal Research Review Panel (ARRP) and NSW Health, reviewed the process of monitored self-regulation by regular inspection of animal research establishments that occurred in NSW over a period of 20 years between 1992 and 2012. We found that the inspection process developed and refined over that time progressively reduced the need to impose conditions and recommendations to achieve compliance with legislation and maintain best practice. The inspection process provided an external review of the research establishments with the objectives of applying conditions and recommendations to redress areas of non-compliance, supporting strategies for continual improvement and recognising actions and processes that improved the wellbeing of research animals. From the beginning in 1992, *Housing, husbandry and physical environment* and *Operations* categories of conditions and recommendations were more frequently applied than *Ethics and reporting* and *Compliance and training* categories. All categories exhibited a declining trend in frequency of application between 2001 and 2012 as research establishments improved facilities; adopted evidence-based husbandry and housing guidelines; revised operating procedures including training for researchers and members of Animal Ethics Committees and adopted strategies for monitoring experimental animals. There were small increases in the application of *Compliance and Training* conditions in 2001-2003, in *Housing, Husbandry and Physical Environment* conditions in 2004-2006, in *Operations* conditions and *Ethics and reporting* conditions and recommendations in 2007-2009, as evidence based guidelines on husbandry and housing and new studies on monitoring, assessment and alleviation of pain were published and the adoption of these was encouraged via routine inspection and reporting back to the research establishments.

Over a period of 20 years between 1992 and 2012, the number and types of conditions and recommendations included in site inspection reports on animal research establishments was noticed to have changed, particularly with respect to those that needed to be applied to maintain compliance with legislation. The implications for animal welfare and the ethics of animal research derived from incremental improvements achieved by institutions, their Animal Ethics Committees (AECs) and researchers, responding to conditions and recommendations arising from monitoring site inspections, are discussed below.

The state of New South Wales (NSW), introduced legislation regulating the use of animals in scientific research and teaching in 1985, requiring that all institutions conducting such research and, or teaching, must be accredited as Animal Research Establishments. The NSW Animal Research Act, 1985, nominated what was then known as the *Australian Code of Practice for the Care and Use of Animals for Scientific Purposes* (subsequently the *Australian Code for the Care and Use of Animals for Scientific Purposes*) as the Code that researchers, institutions and their AECs were required to follow in conducting the business of animal research. Commencing in the early 1990s, self-regulation by institutions under the Code was augmented with site inspections by external Government inspectors and members of a statutory body, the NSW Animal Research Review Panel (ARRP), appointed to monitor the application of the legislation and provide independent advice to Government and report annually to the NSW Parliament. Inspectors were experienced veterinary graduates recruited from private practice, Government research or field veterinary services. Inspections took from half a day up to a week depending on the size of the establishment number of sites where research and teaching was done and the type of research. Most inspections included ARRP members who are appointed from the fields of animal welfare, education, health, national parks and wildlife, pharmaceutical industry, primary industries and university research. Panel members are recognised authorities in their respective fields and have full-time responsibilities additional to their ARRP membership. Routine inspections were carried out at intervals of approximately 3 to 4 years. Where there were problems identified or particular issues needed further attention, more frequent inspections were made.

Inspection procedure

Inspections consisted of 3 stages. Initially information was obtained from the institution on its operations relevant to animal research and teaching, secondly the institution was visited and finally a report was written for the institution. To maintain consistency between inspections and assist the inspection teams, a standard checklist of items to be assessed was developed.

Prior to visiting each institution, a range of information was requested from the establishment. Information was examined usually for a period dating back 12 to 18 months prior to the inspection. Included were minutes of AEC meetings, records of inspections conducted by the AEC, the annual report of the committee to the institution, a sample of applications to conduct research that had been considered by the AEC and a sample of reports from researchers to the committee. Additional background information including number and location of sites and species of animals was also obtained in association with the institution's accreditation as an Animal Research Establishment.

On the day (or days) of the site visit, the inspection team first viewed facilities and animals. Records and documented procedures related to animal care, health and management were also examined. If researchers and animal care staff were available, the team took the opportunity to hear from them about their research and animal husbandry work. Occasionally, research procedures were also observed.

The inspection team then attended a scheduled meeting of the AEC. The purpose of this was to view normal operating procedures of the AEC. At the end of the AEC meeting, time was taken to discuss issues arising from the inspection with the committee and to solicit feedback from members.

The information obtained prior to and during the inspection allowed various aspects of the operation of the establishment to be assessed, typically:

* The constitution and operation of the AEC,
* The level of support provided to the AEC by the institution,
* The standard of research applications submitted by researchers and the consideration of these applications by the AEC,

* The well-being of animals at the institution,
* The standards of animal care and monitoring,
* The condition of facilities for housing and using animals and,
* The standards of record keeping.

Whenever possible the inspection team met with the head of the institution or the executive responsible for research governance, to explain the inspection process and to discuss any issues identified during the inspection.

Following each site inspection, a report was written by the inspection team and referred to the full Panel for approval of any conditions and recommendations. The inspection report was then sent to the chief executive of the institution for a response. After 1997, standard conditions were applied that required the institutional AEC to be involved in developing the response of the institution to the inspection report and setting a time frame in which the institution was required to respond.

The Australian Code of Practice was an initiative of the medical research community first published by the National Health and Medical Research Council in 1969. It has been incorporated into the legislation governing the use of animals in scientific research and teaching in all Australian States and Territories. Periodic revisions of the Code (1979, 1982, 1985, 1997, 2004 and 2013), provided an evolving framework for the application of conditions and recommendations arising from the external site inspections, with the majority of the conditions and recommendations linked to a specific section (or sections) of the Code, which expressed the underlying principle in each case. Conditions were applied to correct instances of non-compliance with the legislation or Code. Implementation of the conditions placed on the institution was mandatory. The institution was required to respond within three months as to how the conditions had been met. Assessment of the adequacy of these responses was made by the ARRP which then advised the Government on further action, as needed. Recommendations were applied with the objective of enhancing animal welfare through changes in existing procedures and where applicable, to encourage the raising of benchmarks. Implementation was not mandatory, but the institution was required to advise within three months as to how it had responded to the recommendations. If the recommendations were not implemented, then the institution was required to explain

its reasons. The regulatory framework in NSW included the establishment of institutional AECs, as required under the Code. In accord with the provisions of the Code, AECs consider research and teaching protocols and reports involving animals - Routinely monitoring and regulating their husbandry, care and use through regular inspections of the animals, housing facilities and records - They consider, review and approve operating procedures involving animals within the institutions. Consequently, they are a critically important component of the monitoring and regulatory framework.

The ARRP in NSW is responsible for the development of policies and guidelines designed to assist researchers, institutions and AECs in managing the welfare, ethical and legislative aspects of animal research and for producing evidence-based housing and husbandry guidelines for particular species of animals used in research and teaching. Staff of the Animal Welfare Unit and external appointees with relevant expertise in the field of interest have assisted the Panel in this work.

Method of Assessment of Efficacy of the Regulatory Process

Available data was examined for 242 site inspections on 46 institutions conducting animal research in the period from 1992 to 2012. Note that this did not represent all of the inspections undertaken by the regulatory authority during this period. The criterion for inclusion in this review was that the institution had been visited on at least 3 occasions over a minimum of 5 years and there was a complete set of archived inspection files available documenting all inspections conducted on the institution and all conditions and recommendations applied. The average number of inspections per institution was 5 (range 3 -14). The latter case was an institution that has multiple AECs supervising several geographically separate sites. The average interval between consecutive inspections was 4 years (range 1 – 6y). There were 28 institutions where inspections were conducted regularly over 16 to 20y and 18 where inspections were conducted regularly over 5 to 15y. The definition of animal research under the Act includes the activities of all establishments using animals for scientific purposes, including pure and applied research and development, product testing, manufacturing of biologicals, field studies and teaching.

The types of conditions and recommendations applied were initially classified as: Housing and Husbandry - including cages and other enclosures, provision of appropriate flooring, bedding and substrates, provision of appropriate food, water and conduct of routine management and husbandry procedures e.g. *Boxes for rats housed in the animal house must have low top lids replaced with high tops as a priority. The adoption of modified lids providing an opportunity for rats to climb and perch should be encouraged.*

Buildings and Facilities - including infrastructure, building construction and utilities such as air conditioning, ventilation, power, lighting and water supply, security and access e.g. *That construction of a new sheep housing facility to replace the existing sheep unit commence within the next twelve months.*

Environmental Enrichment - including provision of shelters, objects for animals to manipulate and presentation of dietary items that encourage animals to engage in normal behaviours e.g. *Hiding areas and soft resting material, sufficient for the number of cats (at least one soft resting item per cat), must be provided to ensure that the cats lower in the social hierarchy can retreat and rest if desired*.

Monitoring and Records - including routine daily checking of animals and protocol specific monitoring and record keeping and health records e.g. *Where knockout or transgenic animals develop visible abnormalities as a result of their phenotype, the appearance and severity of these must be routinely noted in daily observations.*

Breeding and Holding - includes breeding records and procedures for breeding, maintaining and supplying animals into research protocols, numbers of animals bred, numbers kept, numbers culled and length of time for which animals are held e.g. *Collection of a random sample of weaning weights on a regular basis together with a 3 to 6 monthly review of breeding data should be undertaken as an adjunct to the breeding records being maintained for the animals.*

Operating Procedures - includes development of operating procedures by institutions and their animal ethics committees and standard operating procedures related to

animals used in research e.g. *Proposals must be considered and approved only at meetings of the AEC at which there is a quorum.*

Anaesthesia, Analgesia and Treatments - includes use of appropriate anaesthetics, analgesics, fluid replacement, surgical and other procedures including specimen collection related to experimental methods and methods for euthanasia e.g. *For closely related studies a standard surgical procedure should be developed and submitted for the consideration of the AEC. The use of inhalation anaesthetics based on current best practice should be considered for all procedures and particularly where recovery is required. For lengthy procedures appropriate fluid replacement should be included. Where recovery surgery is to be undertaken a standard procedure for post operative pain management based on current best practice should be submitted for the consideration of the AEC. The paper by Roughan and Flecknell (2006) would provide a useful reference in the development of these procedures*.

Protocols and Reports - includes layout and content of application forms to the AEC and accompanying protocol specific monitoring sheets, annual progress reports and final reports on completed projects e.g. *Monitoring sheets and other relevant documentation should be routinely attached to applications for approval by the AEC. This will assist the AEC in its deliberations by indicating how the investigator intends to assess the likely impact on the animals involved of the proposed protocol and how endpoints will be set and monitored*.

Adverse Event Response - includes responses to adverse events specifically related to experimental procedures and responses to animal health and other emergencies unrelated to experimental procedures e.g. *Investigators must promptly notify the AEC of any adverse or unexpected effects that impact on animal wellbeing, detailing the nature of the event, the action taken by the company and the outcomes for the animals*.

Legislation and Code of Practice - includes procedures necessary to comply with specific provisions of the legislation governing animal research in NSW and the Australian Code for the Care and Use of Animals for Scientific Purposes (the Code) e.g. *Cats must be examined by a veterinarian within 3 days of entry into the Supply*

Unit. Animal supply records must include details of these examinations (Animal Research Regulation Schedule 1, Part 2 Clause 7(3); Clause 8).
Note that after 1997, all establishments undergoing routine inspection normally had two standard conditions applied which required the Animal Ethics Committee to be involved in drafting the institutional response to the site inspection report and each research establishment was given a due date by which responses were required.

Animal Identification - Includes methods of identifying individual animals and groups and identification of boxes, cages and pens e.g. *The AEC must review the justification for combined use of toe clipping and ear punching, with a view to encouraging the least invasive method of identification and tissue typing.*

Training and Resources - includes provision of appropriate training for researchers, animal care staff and members of AECs, provision of resources to facilitate communication between the AEC and researchers and institutional support for the operation of the AEC e.g. *The AEC should consider the desirability of extending the availability of the animal ethics courses to all staff involved in animal use, not just post-graduate students*.

For the purposes of analysis to determine trends (figures 1 to 4 below), these classifications were grouped into the following categories:
Housing & Husbandry, Buildings & Facilities and Environmental Enrichment were grouped as ***1 - Housing, Husbandry and Physical Environment***.
Monitoring & Records, Breeding & Holding and Operating Procedures were grouped as ***2 - Operations***.
Anaesthesia, Analgesia & Treatments, Protocols & Reports and Adverse Event Response were grouped as ***3- Ethics and Reporting***.
Legislation and Code of Practice , Animal Identification and Training & Resources were grouped as ***4- Compliance and Training***.
The numbers of conditions and recommendations in each of the categories was averaged over successive 3 year periods commencing with 1991 through 1994 and ending with 2009 through 2012.

Over the 20 year period, the average number of inspections performed each year was 11.5. However fewer inspections were performed before 1995 (only three or four inspections with archived files available were performed in each of these three years). Using single year data would mean that years with few inspections would result in volatility which could obscure underlying trends that may be in the data. Aggregating inspection data to three year time periods means that the time period with the least inspections now includes more than ten inspections, which minimises volatility due to small numbers.

As each time period includes a different number of inspections, comparisons of the number of conditions and recommendations would reflect changes in the number of inspections carried out rather than a change in the number of conditions or recommendations for each inspection. The average number of conditions and recommendations per inspection was calculated to allow comparison between different time periods, and to more easily see trends over time.

Results

The numbers and types of conditions and recommendations applied to 46 accredited animal research establishments between 1992 and 2012 are shown in tables 1 and 2 respectively. The key to the types of conditions and recommendations reported in the tables is:

HH = Housing & Husbandry: includes cages and other enclosures, provision of appropriate flooring, bedding and substrates, provision of appropriate food, water and conduct of routine management and husbandry procedures.

BF = Buildings & Facilities: includes infrastructure, building construction and utilities such as air conditioning, ventilation, power, lighting and water supply, security and access.

EE = Environmental Enrichment: includes provision of shelters, objects for animals to manipulate and presentation of dietary items that encourage animals to engage in normal behaviours.

MR = Monitoring & Records: includes routine daily checking of animals and protocol specific monitoring and record keeping and health records.

BH = Breeding & Holding: includes breeding records and procedures for breeding, maintaining and supplying animals into research protocols, numbers of animals bred, numbers kept, numbers culled and length of time for which animals are held.

OP = Operating Procedures: includes development of operating procedures by institutions and their animal ethics committees and standard operating procedures related to animals used in research.

AAT = Anaesthesia, Analgesia & Treatments: includes use of appropriate anaesthetics, analgesics, fluid replacement, surgical and other procedures including specimen collection related to experimental methods and methods for euthanasia.

PR = Protocols & Reports: includes layout and content of application forms to the AEC and accompanying protocol specific monitoring sheets, annual progress reports and final reports on completed projects.

AER = Adverse Event Response: includes responses to adverse events specifically related to experimental procedures and responses to animal health and other emergencies unrelated to experimental procedures.

LC = Legislation & Code of Practice: includes procedures necessary to comply with specific provisions of the legislation governing animal research in NSW and the Australian Code of Practice for the Care and Use of Animals for Scientific Purposes.

AI = Animal Identification: Includes methods of identifying individual animals and groups and identification of boxes, cages and pens.

TR = Training & Resources: includes provision of appropriate training for researchers, animal care staff and members of AECs; provision of resources to facilitate communication between the AEC and researchers and institutional support for the operation of the AEC.

Considering conditions and recommendations together, the most frequently applied (>300) were *Operating Procedures*; *Buildings & Facilities* and *Husbandry & Housing* respectively, with *Monitoring & Records* and *Protocols & Reports* being the next most frequent (262 and 207 applications, respectively). *Legislative & Compliance*, *Training & Resources*; *Environmental Enrichment* and *Analgesia, Anaesthesia & Treatments* were applied 187, 153, 137 and 124 times, respectively (Tables 1 and 2).

Table 1: Numbers and Types of Conditions Applied to 46 Accredited Animal Research Establishments Over 20 Years from 1992 to 2012

Year	HH	BF	EE	MR	BH	OP	AAT	PR	AER	LC	AI	TR	Total by Year
1992	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1993	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1994	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1995	2	3	0	8	3	4	3	2	2	4	0	2	**33**
1996	0	0	0	2	0	2	1	0	0	0	0	0	**5**
1997	6	4	2	10	1	12	4	6	1	7	0	4	**57**
1998	1	2	2	7	0	5	2	1	0	10	0	0	**30**
1999	6	8	4	6	2	23	8	12	2	13	1	2	**87**
2000	4	4	3	4	5	20	1	6	0	13	0	1	**61**
2001	6	11	0	7	0	12	1	0	1	14	0	7	**59**
2002	9	7	0	8	0	8	2	6	2	15	0	9	**66**
2003	1	1	0	5	0	8	1	8	0	14	0	7	**45**
2004	7	9	3	1	3	6	1	1	0	7	1	4	**43**
2005	6	5	0	0	0	3	0	1	0	0	0	1	**16**
2006	3	8	5	3	0	0	0	1	0	4	0	0	**24**
2007	1	2	2	6	4	10	0	4	1	7	0	1	**38**
2008	1	7	0	5	0	7	0	2	1	6	0	2	**31**
2009	1	4	0	4	0	1	0	7	1	1	1	1	**21**
2010	0	2	1	3	0	2	0	0	0	0	0	0	**8**
2011	0	0	0	2	0	2	1	4	2	6	1	1	**19**
2012	0	2	0	1	0	1	0	3	0	1	0	5	**13**
Total by Type	**54**	**79**	**22**	**82**	**18**	**126**	**25**	**64**	**13**	**122**	**4**	**47**	**656**

Considering the conditions only, the most frequently applied (>100) were those relating to *Operating Procedures* and *Legislative & Compliance*. The next most frequent (>50) applications were *Monitoring & Records* (82); *Buildings & Facilities* (79); *Protocols & Reports* (64) and *Housing& Husbandry* (54), (Table 1, above).

Of the recommendations, the most frequently made (>200) related to *Housing & Husbandry*; *Buildings & Facilities* and *Operating Procedures*. Next most frequent (>95) were *Monitoring & Records* (180); *Protocols & Reports* (143); *Environmental Enrichment* (115); *Training and Resources* (106) and *Anaesthesia, Analgesia & Treatments* (99) (Table 2, below).

Table 2: Numbers and Types of Recommendations Applied to 46 Accredited Animal Research Establishments Over 20 Years from 1992 to 2012

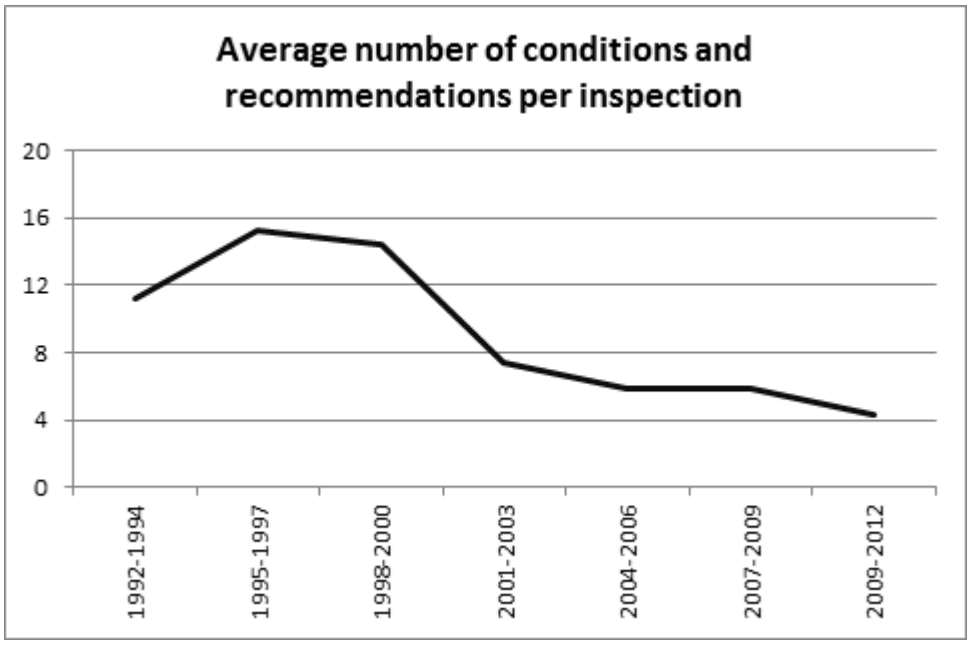
Year	HH	BF	EE	MR	BH	OP	AAT	PR	AER	LC	AI	TR	Total by Year
1992	10	22	8	3	3	2	11	4	1	0	0	2	**66**
1993	4	5	0	2	0	4	0	0	2	0	0	1	**18**
1994	4	8	0	2	1	5	4	6	2	1	1	5	**39**
1995	38	33	12	29	13	20	20	27	9	13	9	8	**231**
1996	7	3	3	7	0	7	0	8	1	1	3	5	**45**
1997	31	27	7	10	13	22	8	11	3	1	6	9	**148**
1998	13	13	8	18	4	19	8	13	3	4	0	7	**110**
1999	35	34	16	32	8	33	20	19	5	15	4	12	**233**
2000	26	6	5	8	7	23	4	12	1	10	2	15	**119**
2001	12	17	11	13	4	11	8	6	0	2	7	2	**93**
2002	13	11	3	7	1	12	1	3	2	3	0	7	**63**
2003	9	7	3	11	0	8	2	5	0	8	1	4	**58**
2004	8	3	1	8	2	6	1	3	0	2	3	7	**44**
2005	5	11	5	1	1	4	0	2	0	1	0	4	**34**
2006	2	8	2	1	0	5	0	0	0	1	0	1	**20**
2007	14	13	7	3	4	15	1	12	0	1	2	5	**77**
2008	6	2	15	5	2	1	1	2	0	2	2	5	**43**
2009	9	2	4	5	2	2	7	4	0	0	1	3	**39**
2010	3	8	0	5	0	6	0	2	0	0	1	2	**27**
2011	2	2	4	5	1	4	0	3	1	0	0	1	**23**
2012	7	3	1	5	0	7	3	1	0	0	2	1	**30**
Total by Type	**258**	**238**	**115**	**180**	**66**	**216**	**99**	**143**	**30**	**65**	**44**	**106**	**1560**

Trends observed over successive 3 year periods

The average number of conditions and recommendations in successive 3 year periods is shown in Figure 1. From the start of routine inspections in the early 1990s, the average number of conditions and recommendations increased, reaching a peak between 1995 and 1997 and then declining between 1997 and 2012. The initial rise in the trend over the second and third 3 year ranges is due in large part to an increasing

number of conditions and recommendations for *Operations*. Also, the *Housing, husbandry and physical environment* category was the reason for almost half of the early (1992-94) conditions and recommendations, but this dropped significantly with each type then being the reason for approximately the same number of conditions and recommendations between 2001 and 2012.

Figure 1 *Average number of conditions and recommendations applied to 46 animal research establishments in successive 3 year periods.*



The groupings of conditions and recommendations separated into their respective categories are shown in Figure 2, which also shows a general downwards trend in all categories after 2000. From the beginning in 1992, the *Housing, husbandry and physical environment* and *Operations* categories of conditions and recommendations were more frequently applied than the *Ethics and reporting* and *Compliance and training* categories. All categories exhibited a declining trend in frequency of application between 2001 and 2012, with slight reversals in the *Housing, Husbandry and Physical Environment* category in 2004-2006, and in the *Operations* and *Ethics and reporting categories* in 2007-2009. Figures 3 and 4 respectively, present conditions and recommendations separately and show that an increase in the number of conditions applied was responsible for these small changes.

The peak in 2004-2006 was associated with increases in the application of HH and BF conditions (Table 1). The peaks in 2007-2009 were mainly associated with increases

in the application of MR conditions (Table 2), PR recommendations (Table 2) and a combination of OP conditions and recommendations (Tables 1 and 2).

Figure 2 *Average numbers of conditions and recommendations by category applied to 46 animal research establishments in successive 3 year periods*

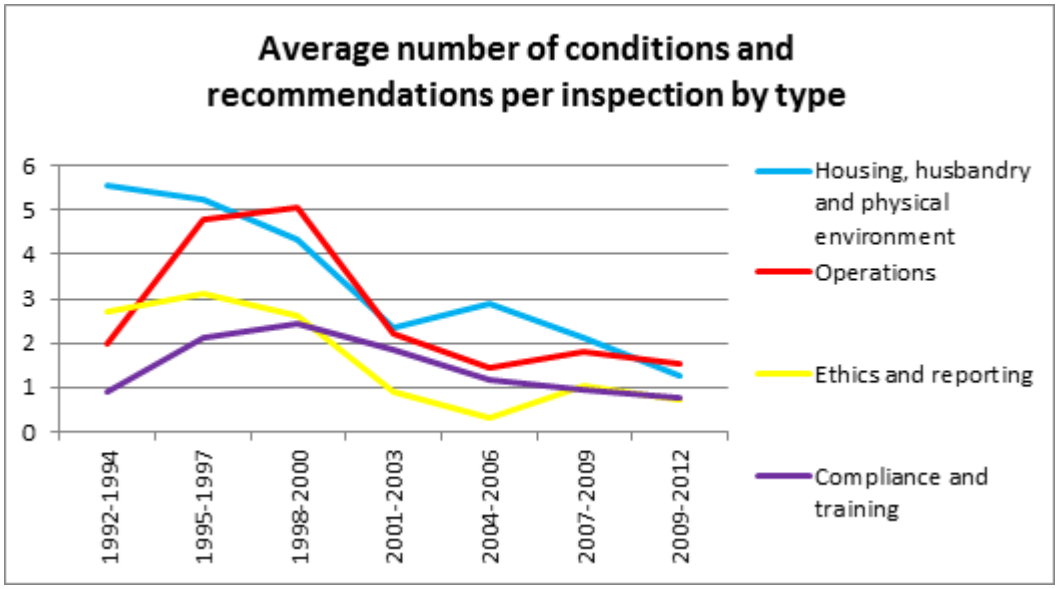


Figure 3 *Average numbers of conditions by category applied to 46 animal research establishments in successive 3 year periods*

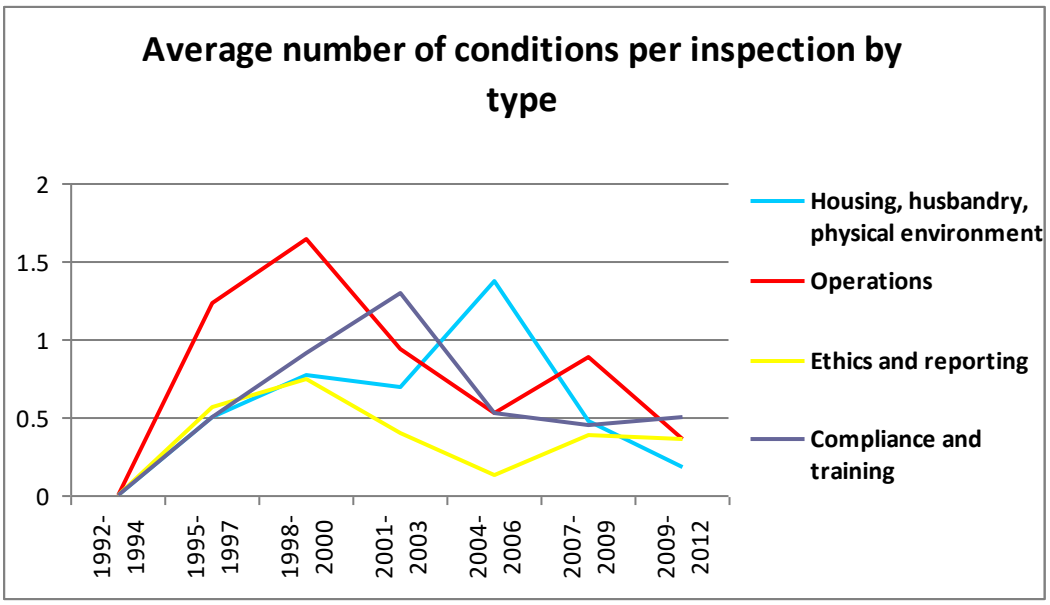
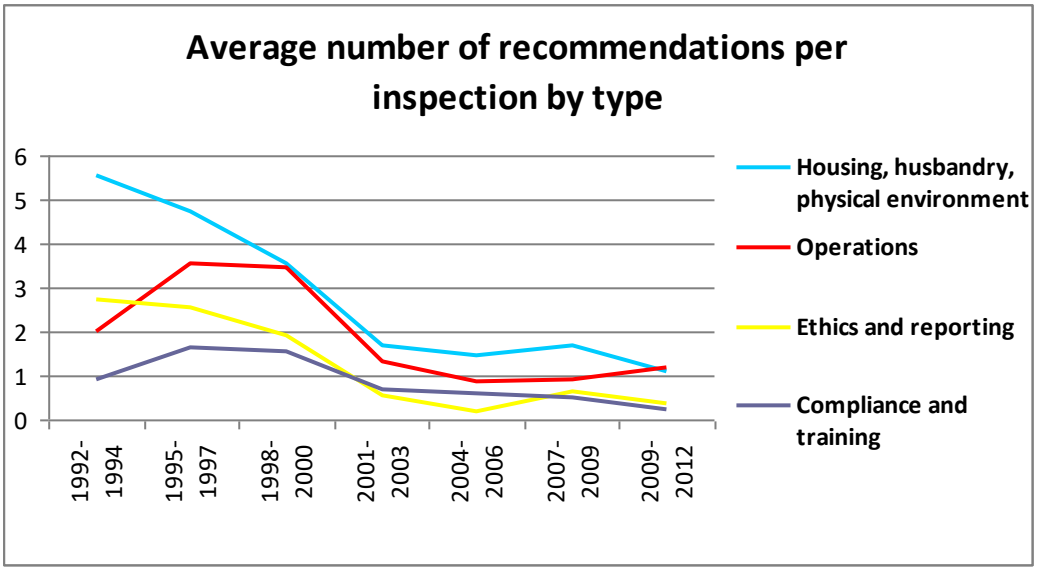


Figure 4 *Average number of recommendations by category applied to 46 animal research establishments in successive 3 year periods*



Discussion

In summary, between 1992 and 2001, the conditions and recommendations applied following site inspection were primarily focussed on Operations and Ethics and Reporting which explains the greater frequency of application of these categories compared with others during that period. The application of Compliance and Training recommendations was also greatest between 1992 and 2001 however the application of conditions in this category peaked later, between 2001 and 2003. Around 2004, although fewer conditions and recommendations were being applied overall compared with earlier years, there was a moderate increase in application of Housing, Husbandry and Physical Environment conditions particularly. A moderate increase in the application of Operations conditions occurred following inspections in 2007-2009 and there was also a small increase in the application of both conditions and recommendations in the Ethics and Reporting category over the same period.

Objective measurements of the overall effects of inspections are difficult to make. In NSW, in the period since inspections began, standards of animal care and management and the sophistication of animal ethics committees in overseeing this improved significantly. However, it is not easy to quantify how much of this was due

to the inspection process and how much to other factors. The initial phase in the development of monitored self-regulation in the state of NSW included visits to research establishments by members of the NSW Animal Research Review Panel, to explain the licensing provisions and the scope and purpose of the Act. Inspections commenced in earnest after 1990 and initially, a substantial effort was required to ensure that the maintenance of the animal housing infrastructure and conduct of day-to-day operations in research facilities were in accord with the legislation and the principles of the Code. During this time conditions and recommendations were used to require some research establishments to effect necessary renovations to improve the quality of their animal housing facilities. The need for the *Housing, husbandry, and physical environment* category of conditions declined between 1992 and 2001 as establishments progressively upgraded their facilities to meet the standard expected under the Code. As new studies appeared indicating the importance of enriched housing to the wellbeing and normal development of laboratory animals, conditions were applied to some establishments to facilitate improvements in the housing environment which is indicated by the small increase in 2004-2006. Also, published information on the husbandry and housing of particular species began to be collated into evidence-based guidelines, for example in Canada (CCAC 1980, 1984, 1993); Europe (Council of Europe 1986) and several which were developed by the Animal Research Review Panel, in part utilising knowledge of practices and procedures gained from site inspections as well as published information (Table 3). These were promoted to research establishments to assist them in making improvements to existing facilities and in planning new ones. These guidelines were also used, where necessary, to underpin specific conditions and recommendations.

Table 3 Evidence-based housing and husbandry guidelines developed by the NSW Animal Research Review Panel

Year	Title
1999	*Guideline 14 Guidelines for the Care and Housing of Dogs in Scientific Institutions* http://www.animalethics.org.au/__data/assets/pdf_file/0020/222509/housing-dogs-scientific-institutions.pdf
2003	*Guideline 18 Guidelines for the Care and Housing of Rabbits in Scientific Institutions* http://www.animalethics.org.au/__data/assets/pdf_file/0013/222511/housing-rabbits-scientific-institutions.pdf
2007	*Guideline 20 Guidelines for the Care and Housing of Rats in Scientific Institutions* http://www.animalethics.org.au/__data/assets/pdf_file/0014/222512/housing-rats-scientific-institutions.pdf
2006	*Guideline 21 Guidelines for the Care and Housing of Guinea Pigs in Scientific Institutions* http://www.animalethics.org.au/__data/assets/pdf_file/0012/222510/housing-guinea-pigs-scientific-institutions.pdf
2010	*Guideline 22 Guidelines for the Care and Housing of Sheep in Scientific Institutions* http://www.animalethics.org.au/__data/assets/pdf_file/0010/249913/Guide-23-housing-sheep.pdf
2012	*Guideline 23 Guidelines for the Care and Housing of Mice in Scientific Institutions* http://www.animalethics.org.au/__data/assets/pdf_file/0004/249898/Guideline-22-mouse-housing.pdf

In addition to these guidelines, the Animal Welfare Unit and the ARRP developed policies and guidelines on Animal care, Animal supply, Animal rehoming, Collaborative research between Accredited Animal Research Establishments, Information for accredited establishments, Institutional support for animal ethics committees, Operation of animal ethics committees, Research procedures, Use of animals in teaching, Wildlife Research and Training personnel. External inputs were sought from people with expertise in the relevant fields and when drafted, these documents were widely circulated amongst the stakeholders for public comment. Once adopted they were made generally available via publication on the Animal Ethics Infolink website https://www.animalethics.org.au/ . The Animal Welfare Unit and ARRP also organised regular one day meetings to which members of AECs, researchers, animal technicians, animal house managers and research administrators from all accredited animal research establishments were invited. Members of the ARRP and Departmental inspectors also attended. Meetings were run at

approximately 2 to 3 year intervals and included keynote speakers, panel discussions and workshops. Topics covered included ethics, Code reviews, Legislation, animal welfare and environmental enrichment, animal care and husbandry, research methodologies, writing and assessment of research protocols and operation of AECs. Meetings were generally very well attended, promoting networking and dialogue between the stakeholders in a collegiate setting. From time to time the Panel and the Animal Welfare Unit also ran smaller workshops on specific topics.

Conditions and recommendations relating to *Operations* were affected by a number of factors including the requirements of the Code and innovations in monitoring techniques for animals undergoing research procedures and improvements in electronic record keeping for the management of breeding colonies and stock supply animals. This explains the peak in conditions and recommendations being applied in the period between 1995 and 2000. As researchers, animal house managers and AECs learned of and adopted new procedures and technologies, the need for conditions and recommendations decreased. Since 2004, the routine linking of monitoring observations to the specific effects of experimental procedures on the animals and the publication of objective scoring techniques quantifying these effects was reflected in the application of specific conditional and recommendations encouraging researchers and AECs to adopt these procedures.

Overall, the areas of *Ethics and Reporting* and *Compliance and Training* necessitated fewer conditions to be applied however the need for some specific improvement in anaesthesia, the routine use of intra and post-operative analgesia and other treatments is reflected in the peak in the application of the *Ethics and Reporting* category in the period from 1992 to 2000. Building upon an earlier study by Morton and Griffiths, 1985 and others, a report from the Federation of European Laboratory Animal Science Associations (FELASA) by Baumans et al, 1994, defined pain, distress and suffering in laboratory animals, described the mechanisms and clinical signs of pain and reviewed the methods available for grading the severity of pain and distress. Flecknell, 1994, reviewed both the assessment and alleviation of pain and distress, reiterating the importance of monitoring with objective assessment and treatment of pain as a principal goal in the refinement of animal research. Such references established an initial process for assessing the effects of invasive research and

guidance on how animals should be monitored to enable early intervention. As researchers and AECs became aware of recently published information and adopted safer, more efficient anaesthetic techniques and better analgesia, fewer conditions and recommendations were necessary to ensure compliance with the Code. New information on the objective assessment of pain (Flecknell 1994, Roughan and Flecknell 2001, 2003, 2004 and 2006) generated some conditions and recommendations to promote new techniques to improve the assessment and alleviation of pain. Similarly, the need for training of researchers to assist them to understand their ethical and legislated responsibilities and practical aspects of handling and treating research animals was recognised, as was the need for provision of training and resources to members of AECs. This is indicated by the peak in application of the *Compliance and Training* category between 1992 and 2001. As institutions began routinely providing workshops and other training resources to assist researchers and AECs, improvements were observed in the provision of information to committees in research protocols and reports and the need for application of this category of conditions and recommendations declined.

The development of novel techniques following the publication of original research and evidence-based guidelines led to a slight increase in the application of the *Ethics and Reporting* category between 2004 and 2009 to encourage adoption of new methods, particularly further refinements in the identification and alleviation of pain and incorporation of these into research protocols submitted for the consideration of AECs.

Conclusions

The process of regular external inspections augmented by site inspection reports containing conditions and recommendations has provided animal research establishments and their AECs with clear objectives for achieving compliance with legislative requirements and benchmarks against which they can assess progress in the implementation of best practice. The need for conditions and recommendations generally declines over time as establishments develop effective processes for the ethical governance of animal research and adoption of innovative care and husbandry methods. External inspections must continue to serve as a monitor of this process, helping to maintain probity, transparency and accountability. In order to achieve this,

I suggest that those conducting inspections must be selected on the basis of appropriate qualifications. They must be trained, mentored and resourced in order to maintain rigor in the inspection process. To facilitate dialogue with the relevant stakeholders they must be aware of both animal welfare and ethical issues and in particular, advances in research technologies that promote Replacement, Reduction and Refinement in animal-based research. Any change in the legislation, including changes that have been made or are proposed to the regulatory and inspection process must ensure that the progress made over decades continues, in accord with community expectations.

The progress made through the monitored self-regulatory and inspection process has been supported by the development and maintenance of evidence-based resources for accredited animal research establishments, their AECs and researchers. These resources must be regularly updated to ensure that new procedures, processes and refinements are added as they are peer reviewed and published. This requires the ongoing provision of appropriately qualified and experienced staff and sufficient guaranteed funding.

References

BaumansV, Brain PF, Brugére H, Clausing P, Jeneskog T and Peretta G 1994 Pain and distress in laboratory rodents and lagomorphs. *Laboratory Animals* 28: 97-112

Canadian Council on Animal Care 1980 Guide to the Care and Use of Experimental Animals vol. 1 Ottawa Ontario Canada

Canadian Council on Animal Care 1984 Guide to the Care and Use of Experimental Animals vol. 2, Ottawa Ontario Canada

Canadian Council on Animal Care 1993 In: Olfert ED, Cross BM and McWilliam AA (eds) Guide to the Care and Use of Experimental Animals Volume 1 2nd edition

Council of Europe 1986 ETS123 European Convention for the Protection of Vertebrate Animals used for Experimental and Other Scientific Purposes, Strasbourg

France

Flecknell PA 1994 Refinemenmt of animal use –assessment and alleviation of pain and distress. *Laboratory Animals* 28: 222-231

Morton DB and Griffiths PHM 1985 Guidelines on the recognition of pain, distress and discomfort in experimental animals and an hypothesis for assessment. *Veterinary Record* 116: 431-436

National Health and Medical Research Council 2008 *Guidelines to promote the wellbeing of animals used for scientific purposes: The assessment and alleviation of pain and distress in research animals*. Canberra National Health and Medical Research Council Australia
http://www.nhmrc.gov.au/index.htm

National Health and Medical Research Council 2013 Australian Code for the Care and Use of Animals for Scientific Purposes 8th edition: Canberra National Health and Medical Research Council Australia
http://www.nhmrc.gov.au

Roughan JV and Flecknell PA 2001 Behavioural effects of laparotomy and analgesic effects of ketoprofen and carprofen in rats. *Pain* 90: 65-74

Roughan JV and Flecknell PA 2003 Evaluation of a short duration behaviour-based post-operative pain scoring system in rats. *European Journal of Pain* 7(5) 397-406

Roughan JV and Flecknell PA 2004 Behaviour-based assessment of the duration of laparotomy-induced abdominal pain and the effects of carprofen and buprenorphine in rats. *Behavioural Pharmacology* 15(7) 461-462

Roughan JV and Flecknell PA 2006 Training in behaviour-based post-operative pain scoring in rats – An evaluation based on improved recognition of analgesic requirements. *Applied Animal Behaviour Science* 96 (3-4) 327-342

About the author

I am a registered veterinarian graduating in 1979 and employed with NSW Agriculture, later restructured as Department of Primary Industries and Industry and Investment NSW. I worked as a field veterinary officer at Bourke in north western NSW and later as a veterinary research officer at the Veterinary Research Station, Glenfield and at Elizabeth Macarthur Agricultural Institute, where I served on the AEC for a number of years, including time as Chair. I joined the Animal Welfare Unit as an inspector in 1998, retiring in 2014. During that time, I was also a planning manager and liaison officer in the DPI emergency first response team. Since then, I have volunteered with the Australian Registry of Wildlife Health, Taronga Conservation Society Australia and served as a Category A (veterinarian) member of the TCSA AEC.

I cannot comment on the current situation with respect to monitored self-regulation and inspection, apart from having mentored an experienced veterinarian in 2015, to fill the job that I had vacated. I understand that since that time, further restructuring and changes within DPI have resulted in the inspectorial responsibilities being transferred to a separate regulatory group within the organisation.

While the above information was compiled with the assistance of colleagues as described, I declare that responsibility for any errors or omissions and any opinions expressed is entirely mine.

I thank the Parliamentary Committee for your time in considering my submission.

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