



A Veterinary Student's Perspective on Educational Animal Use and the Potential for Humane Alternatives

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Summary

Veterinary students internationally, as well as students from other life and health science courses, may be provided with animals as learning tools during their education. Such use of animals offers a unique privilege, allowing students to practice technical or clinical skills and to acquire knowledge through physical exploration. The animals obtained may not always be ethically sourced, however, nor supplied for a humane or educationally necessary purpose. Although significant animal welfare benefits accrue when institutions cease the killing of animals for teaching purposes, the sourcing of living animals and cadavers may continue to pose ethical and welfare problems. The necessity and effectiveness of these modes of learning therefore requires further consideration, especially given the availability of alternative teaching tools and methodologies that safeguard the welfare of animals. Tools such as video demonstrations may be available, or potentially so, and yet be disregarded in lieu of traditional teaching methods. Often, alternative technologies are perceived as supplementary to animal use, rather than accepted as viable replacements to advance student learning and contribute to reduction of animal use. Student attitudes may also be conditioned in favor of harmful animal use. Within Australia, the University of Sydney has been at the forefront of efforts to introduce humane veterinary curricula. Accordingly, this paper provides the perspective of a University of Sydney veterinary student on the potential application to veterinary education of current and developing humane alternatives, and the advantages and drawbacks these may present.

Keywords: veterinary student, education, ethically sourced, alternatives, cadaver

1 Introduction

Acceptance into the veterinary degree presents students with the responsibility of utilizing animals for educational purposes. This fundamental privilege presumably enables the practice of important technical skills and the acquisition of knowledge through physical exploration of animal tissues. The University of Sydney Faculty of Veterinary Science has been progressive in advancing humane veterinary curricula, having ceased the killing of animals for teaching purposes in the mid 90's and adhering to the 3Rs in education (Faculty of Veterinary Science, 2011a). However, cadaver sourcing remains contentious, and student and staff awareness regarding viable alternatives may impede ethical and pedagogical advances. Animal use and the expectations for students to cope with the associated psychological demands may also result in desensitization and impaired moral attitudes. A pilot survey I conducted to ascertain cadaver preferences of my University of Sydney veterinary student colleagues highlighted inadequate knowledge regarding humane alternatives and a lack of ethical consideration. The following discussion provides further comment on the applicability of current alternatives within the course, the potential for humane alternatives, and the development of innovations within the Faculty, including an interactive multimedia module and ovariohysterectomy simulator model.

Historical animal use within the University of Sydney veterinary curriculum

Curricular changes that occurred before 2000, to align with my Faculty's decision to cease the killing of animals for teaching purposes, included: replacement of invasive physiology practicals with tutorials using experimental data and non-invasive self-experimentation practicals; elimination of terminal surgeries by replacement of live dogs in surgery practical classes with cadavers, in association with the establishment of an animal shelter desexing program; increased use of models, multimedia resources, and cadavers (Taylor, 2002). More than a decade later, our ability to achieve the required learning outcomes indicates the lack of necessity for these invasive learning practicals, which remain prevalent in veterinary schools and other courses internationally.

Current animal use within the veterinary curriculum

As of 2011 the use of animal cadavers in dissection practicals has remained a central component of our veterinary anatomy course. The greyhound racing industry, which euthanizes thousands of healthy greyhounds deemed unprofitable or no longer profitable, serves as the predominant source of cadavers. Animal shelters (including local council "pounds") provide cadavers of dogs routinely euthanized due to overpopulation or an inability to be rehomed, and abattoir specimens are obtained as excess from slaughterhouses. While all of these sources exist



independently of our usage, ethical concerns arise due to their origin as by-products of practices that are not conducive to animal welfare (Martinsen and Jukes, 2007). It is important to note that they are not categorized as ethically sourced cadavers, since this definition implies that the animals have died due to medical reasons, in an accident, or from natural causes (Knight, 1999).

While our participation in dissection classes is based upon the assumption that sources of specimens are classified as humane, the ethical status of cadavers is often contentious, due to a lack of familiarity with peer-reviewed definitions of “ethically sourced.” Since humane advances in the curriculum appear reliant on the evolving views of students and staff (Taylor, 2002), their knowledge level regarding availability and efficacy of humane alternatives has significant influence over the introduction of such alternatives. Thus, there may be a lack of impetus towards ethically superior options, such as donated dog cadavers, if academics and students who usually receive minimal training in critical reasoning and bioethics remain uninformed (Knight, 2008).

2 University of Sydney veterinary student cadaver preference survey

To ascertain the knowledge level and attitudes of my peers regarding cadaver use, I conducted a pilot survey based on the study “Veterinary science students preferences for the source of dog cadavers used in anatomy teaching” (Tiplady et al., in press). In my study, surveys were distributed to students in years one to five of the Bachelor of Veterinary Science degree, and students anonymously selected their preference for one of the following: donated dog cadavers (i.e., ethically sourced), ex-racing greyhound cadavers, pound dog cadavers, or no preference (Tab. 1-6). They also were required to explain the reason/s for their selection (Tab. 3-6). Across all years, 233 students responded out of a total 599 (38.9%). (Further detailed results of this study are available from the author upon request).

Tab. 1: Total respondents for the cadaver preference survey of University of Sydney Veterinary Science students years 1-5

Vet student year	Total respondents per year	Female respondents	Male respondents	Total students in each year
1	55	39	16	126
2	56	45	11	138
3	45	40	5	125
4	50	42	8	129
5	28	23	5	86

Tab. 2: Overall cadaver preferences of University of Sydney Veterinary Science students years 1-5

Cadaver type	Overall preference %
Donated dog	25.1
Pound/shelter dog	6.5
Ex-racing greyhound	18.5
No preference	50.7

Tab. 3: Examples from students who selected “strong/some preference for greyhound cadavers”

- “Unfortunately the best specimens for anatomy classes are ones which are clinically normal. I do not like the wastage of greyhounds but if their cadavers exist regardless of university use then they are the best option for learning in this case.”
- “Everyone has same dog, hardly any fat, there is a surplus of ex-racing greyhounds that wouldn’t be able to be rehomed anyway.”
- “Donated dog – can’t possibly learn normal anatomy. Ex-racing greyhound cadavers allow a homogenous study of anatomy (they will be put down anyway). It is unfortunate but it is the best way to learn anatomy and the bodies of these dogs will go to landfill regardless.”
- “Learning normal anatomy is facilitated best when observing and dissecting healthy greyhound cadavers. Variability in pound dog cadavers would be sub-optimal.”
- “Generally I don’t have that much of a preference but I think ex-racing would most likely be healthier and we would get the most out of the dissection, provided of course that the dogs weren’t being euthanized for the sole purpose of dissection.”
- “It would be nice to use donated cadavers, however it is very likely these would have significant pathology, which is confusing when trying to learn normal anatomy. Pound dogs and ex racing greyhounds unfortunately have the same destination, so it is nice to use these unwanted animals for educational purposes. Greyhounds are lean and easy to learn from considering their size and consistent conformation.”
- “As bad as it sounds, there is a sort of desensitization to greyhound cadavers, also they have less fat.”
- “It is sometimes more distressing to see pound dogs or donated dogs in the anatomy lab as students may be more likely to reflect on their own personal bond they have with their own animals, whereas the greyhound cadavers provide some means of distance which is also important for learning.”



- “Don’t think there would be enough cadavers just from donation and it would be inconsistent (breeds) whereas greyhounds are always available and don’t die for us. They have to be put down anyway.”
- “Even though I don’t think it’s right to kill these dogs just because they’re not good racers, it is much easier to see anatomical features on a greyhound as opposed to other dogs, e.g., less fat, increased muscle tone etc.”
- “Easier for teaching and learning if the dogs sourced are of the same genotype, at least for first year studies.”
- “Greyhounds will be euthanized anyway and they are the best dogs to use for anatomy (no fat), but other euthanized dogs/pound dogs that would be put down for other reasons would also be ok. Basically any dog that was already going to be killed, I wouldn’t want dogs killed specifically to be cadavers! P.S: Also I would of course prefer all greyhounds to be rehomed after racing instead of ending up as cadavers.”
- “Greyhounds will still be put down in large numbers and if we don’t use them they’ll just go to waste.”
- “It is sad to use any cadaver type in the practicals, particularly as most are healthy animals that have been euthanized. However, dissection was made easier by using the greyhounds as they are lean, large dogs and there is less variation due to breed, meaning that learning the anatomy was also easier.”

Tab. 4: Examples from students who selected “strong/some preference for pound/shelter dog cadavers”

- “These animals are euthanized regardless, they might as well be put to use than just discarded.”
- “Donated dog is preferable however it is necessary to have good quality cadavers to enhance learning (especially in anatomy classes). I strongly believe that any dog that has died/been euthanized is as acceptable as any other be it a pound dog, greyhound or donated dog cadaver. In terms of dissuading greyhound owners from euthanizing their dogs I think the best option here is to encourage re-homing services and making it easy for owners to do.”
- “It is making use of a wasteful resource. Something good out of something bad.”
- “I have no issue with the source of cadavers as it currently is at uni (mostly greyhounds). However, I feel that the pound dogs offer more variety in terms of breeds etc. – which is more educational. It would be near impossible to collect the adequate number of donated dogs for each practical class – students would miss out on opportunities to dissect etc individually. Plus dogs that died in an accident or due to medical reasons would not be of a high quality and would not display normal anatomy.”
- “Would be better if racing greyhounds were not used but only because there was a stop to the racing industry, not just because we reject them, they still die anyway.”
- “I don’t have a problem with using cadavers from animals that would be put down regardless. In a way using them, as long as it is in a respectful way, is better than them just being disposed of.”
- “If these animals are to be destroyed for other reasons we should at least try to make their death mean something by helping us to help animals in the future. I would prefer just as would the greyhounds that these animals try to be re-homed rather than euthanized for us to use.”
- “Didn’t die for nothing, more chance to obtain them.”
- “Pound/shelter/ex-greyhounds – most are killed when they are healthy which is useful for anatomy pracs. Donated cadavers have mostly died from a disease which may be more suitable for pathology pracs.”

Tab. 5: Examples from students who selected “no preference”

- “It doesn’t matter as long as they haven’t died for the purpose of dissection.”
- “As long as they are euthanised in a humane way and for a “good” reason.”
- “Recommend pound dogs and greyhounds, as can’t learn normal anatomy with donated dogs and nobody will donate dogs so won’t be enough for pracs.”
- “Because in all of the above cases the dogs died/got put down and will continue to be regardless of our use of them so I believe that we should use any sources so no dog goes to “waste”, i.e., their death at least results in something positive.”
- “They all died so doesn’t matter. Cadaver might as well be used.”
- “Unfortunately relying on donated dogs would not work because of the large number of pracs most years have per semester. Also being a pound dog or an ex-racing greyhound doesn’t make the dog better or less valuable than any other dog.”
- “Maybe a mixture of greyhounds best for seeing structures but would be good to see variation in other breeds.”



- “They’re mostly going to die anyway – at least they can be used to advance medical knowledge.”
- “Anything that we can get we should take without complaints. The reality is, unfortunately, that ex-racing greyhounds are in surplus and most get euthanised, so we should accept their donation and use them accordingly.”
- “No preference – just want the animal to be euthanised not specifically for us. If animal is to be euthanised, I would rather it be put to good use as a learning tool.”
- “As long as cadaver was due to be euthanised regardless and not solely for the purpose of our prac classes.”
- “They have to come from somewhere, this might sound mean but it’s for the bigger picture for us as vets to learn how to save more lives when we finish. You have to kill a cow to get a burger.”
- “As long as they experience no pain prior to death and weren’t euthanised purely for our prac classes.”
- “I really have no preference. All these dogs are euthanised for valid reasons. Whilst it is sad that greyhound dogs that are no longer considered good enough for racing are euthanised, they would almost certainly be euthanised at a pound/shelter due to difficult in re-homing. I do not mind if the dog i practice surgery operations or learn anatomy on is from any of these origins. They are all valid options as the dog cannot be re-homed. It is an incredibly valuable teaching resource to have these real dogs. We would not be adequately prepared for a career as a veterinarian should we learn our anatomy and surgical procedures on models.”
- “Dogs from the pound and ex-racing greyhounds are being euthanised anyway, so I see no problem in using them.”
- “They are putting down 40,000 dogs per year as it is, so might as well do something good with them and use them for learning.”
- “As much as I like the idea that the dog may have needed to die for some medical reason and not for us to learn, it is important for us to learn what normal is like before you can identify abnormalities. Unfortunately this is only generally found in healthy animals either attained from pound or ex-racing greyhounds.”

Tab. 6: Examples from students who selected “strong/some preference for donated* dog cadavers”

*Refers to dogs that have died naturally, in an accident or were euthanized for medical reasons

- “Disagree with racing industry, feel uncomfortable dissecting a dog killed because it outlived its ‘usefulness’. At the same time, at least ex-greyhounds are getting an extra use. Still very uncomfortable about it”
- “Feel less guilty”
- “Would rather the dogs be willingly donated after they have died over encouraging euthanised of what are likely to be healthy animals.”
- “I would rather the dog I was dissecting had to be put down for a reason other than “the dog is too old to race or doesn’t race well enough” (ideal world sadly!!).”
- “I feel that at least this animal’s illness/injury could mean that students could learn. I don’t think that euthansing healthy greyhounds simply because they can no longer race is appropriate.”
- “Welfare. Any other dogs (pound/ex-racing greyhound) deserve few more years good quality life. however if they can’t receive these then use for educational purpose to me is justifiable.”
- “Although I have a preference for ex-racing greyhound since they are the perfect anatomical specimen, I wouldn’t want this to influence their euthanasia, so I choose donated dogs.”
- “Donated dog is preferable however it is necessary to have good quality cadavers to enhance learning (especially in anatomy classes). I strongly believe that any dog that has died/been euthanised is as acceptable as any other be it a pound dog, greyhound or donated dog cadaver. In terms of dissuading greyhound owners from euthanising their dogs I think the best option here is to encourage re-homing services and making it easy for owners to do.”
- “Morals”
- “The dog has already been euthanised and if the owners wouldn’t mind donating them to science a variation of breeds would be studied.”
- “Gives a reassurance that the dogs were not killed for the sake of dissections and that it was donated.”
- “Because I would prefer that animals were donated for dissections so that owners have some knowledge of what their animals are used for.”
- “I would prefer if the dogs had died of natural causes/medical reasons, but I also understand that some illnesses would probably result in more extreme post mortem changes that may hinder the purpose of our practicals.”



- “In an ideal world there would be no shelter/pound dogs or racing greyhounds so donated animals would be best. However, at this time I think it is fine to use shelter/pound dogs or greyhounds but only if they were going to be put to sleep anyway for behavioural or medical reasons, or after all efforts were made to rehome them.”
- “I’d rather use cadavers that have died naturally or in an accident, as I don’t want pets killed just for the purpose of dissections.”
- “The fact that they aren’t euthanised purely for our benefit. Also might be good to see some pathology.”
- “Gives you peace of mind.”
- “I do not feel that by not accepting greyhounds or pound dogs this would prevent them from being euthanised. So I really don’t think it would make much of a difference, but in a perfect world it would be nice to think all the dogs we use were euthanised only out of necessity (i.e., accident, disease, etc.).”

Student convictions regarding pedagogical value of cadavers

The written responses obtained demonstrated largely uninformed convictions regarding the efficacy and feasibility of ethically sourced cadavers, as well as lack of moral consideration (Tab. 3-6). Preferences appeared to be based upon assumptions regarding superior learning experiences, rather than actual pedagogical value. This was evident in the claim by the majority of students that greyhounds had the greatest advantages due to uniformity in anatomy, minimal fat, and clarity of structures (Tab. 3, 5, 6). Conversely, evidence demonstrates variation in breed and biological diversity may yield greater learning value (Knight, 2007). The majority of students, including those who preferred donated dogs, regarded the clinically healthy status of greyhounds and pound dogs as a necessary learning attribute (Tab. 3-6). They also claimed that presence of pathology in donated cadavers would adversely affect learning (Tab. 3-6). However, significant evidence demonstrates the pedagogical advantages gained by having students exposed to pathological specimens and associated clinical histories in their first years of anatomy (Kumar et al., 2001). These benefits are documented in successful veterinary anatomy courses, including Tufts University School of Veterinary Medicine (SVM), which has used ethically sourced cadavers for more than a decade (Kumar et al., 2001). Student reluctance with regard to donated dogs also was due to perceived difficulties in logistical supply (Tab. 5). However, the feasibility of procuring sufficient numbers of animals is apparent in veterinary colleges worldwide (Knight, 2007; Kumar et al., 2001).

No preference

The vast majority of students across all years (~50.7%) selected “no preference,” with written answers demonstrating a ready acceptance of any cadaver source, provided dogs were not directly killed for our purposes (Tab. 5). Most responses conveyed students’ indifference and resignation with respect to the greyhound overbreeding and shelter overpopulation problems (Tab. 5). Students regarded these issues as irresolvable, thereby justifying preferences for non-ethical sources. Yet, the introduction of a cadaver donation program at Tufts University SVM enabled the replacement of previous greyhound killing with an adoption program, thereby positively addressing this issue (Martinsen and Jukes, 2007). Similarly, successes such as the Animal Welfare League of Queensland’s “Getting to Zero” Model dem-

onstrate the potential for solving the unnecessarily high euthanasia rate of shelter dogs (AWLQ – Animal Welfare League of Queensland, 2011). Using surplus animals may further facilitate risk of potentially creating a market for them (Martinsen and Jukes, 2007).

Greyhound cadaver preference

The conscious desensitization resulting from greyhound cadaver use was apparent in several written comments (Tab. 3). Students described the necessity for detachment from the animals used in dissections. For instance, a first year student described her motivation for selecting a preference for greyhound cadavers: “As bad as it sounds, there is a sort of desensitization to greyhound cadavers...” Similarly, a fifth year student stated, “It is sometimes more distressing to see pound dogs or donated dogs in the anatomy lab, as students may be more likely to reflect on their own personal bond with their own animals, whereas the greyhound cadavers provide some means of distance which is also important for learning.” The difference in regard for this customary cadaver source – perceived as an educational commodity – may result in a less compassionate consideration for this exploited breed.

Donated dog cadaver preference

While the majority of students appeared readily accepting of non-ethically sourced cadavers, a number of students preferring donated cadavers described feeling a moral conflict about supporting the euthanasia of healthy dogs (Tab. 6). However, emphasis upon this seemingly compulsory component of the course, and lack of equivalent alternatives presented, may make students reluctant to declare their concerns to avoid being excluded, deemed incompetent, or offending faculty members (Anon., 2011; Arluke, 2004; Gruber and Dewhurst, 2004). This may have detrimental effects upon students’ psychological well-being and capacity for learning, and desensitization may ensue to assist in coping (Arluke, 2004; Balcolme, 2000; Knight, 2007). Dedicated students may be discouraged from continuing the course, considering themselves unsuitable and being unaware of their right to request alternatives under the Faculty’s policy on Conscientious Objection (Anon., 2011; Faculty of Veterinary Science, 2011b). Similarly, prospective candidates may be deterred from entering the degree for fear of compulsory unethical animal use (Cung, 2011). However, under the Australian Code of



Practice for the Care and Use of Animals for Scientific purposes, it is a requirement that animals are only used in teaching where there are no suitable existing alternatives capable of achieving the same learning outcomes (NHMRC, 2004). Thus, increased use of alternatives is encouraged by governing policies.

Desensitization and decreased reverence

During an exchange of personal anecdotes, the impact of desensitization was accurately described in a fellow student's reference to veterinary students as "a different breed" (Theron, 2011). This alludes to the accepted consensus among students that the desensitization we experience helps to cope with the mandates of the course, including exposure to animal use and the anticipated stresses of the job, and effectively toughens us to a variety of normally unpleasant stimuli, conforming to the described masculine ethos of the profession (Arluke, 1997; Paul and Podberscek, 2000). It is not uncommon to witness or hear of students using dissection specimens in practical jokes, indicating a resistance to the usual sensitivity and repulsion elicited by these materials. The notoriously high alcohol consumption by veterinary students is further testament to this macho bravado culture. This may have adverse repercussions for individuals and the reputation of the veterinary profession; anecdotal reports from the UK describe markedly unprofessional behavior involving considerable disrespect towards animal patients, resulting in serious complaints by co-workers and deregistration by licensing boards (Knight, 2011). Such instances demonstrate how offensive, socially unacceptable behavior resulting from desensitization may potentially continue into practice.

3 The potential for humane alternatives

Introduction of cadaver donation program

To address the ethical and social issues associated with cadaver sources, it is appropriate to consider the inclusion of a cadaver donation program to facilitate the supply of ethically sourced cadavers, especially since small numbers of client cadavers are currently sourced for post-mortem practicals. Numerous published studies demonstrate many benefits of cadaver donation programs that have proven to be logistically feasible (Knight, 2002; Kumar et al., 2001). A cadaver donation program would contribute to eliminating conscientious objections, in addition to being educationally beneficial (Knight, 2007; Kumar et al., 2001; Stull, 2001). Moreover, veterinary schools using donor cadaver programs have claimed that students show greater respect for donated specimens that arrive with medical histories and are regarded as previously-owned pets (Stull, 2001). The successes of cadaver donation programs have been documented in several US veterinary colleges, with Tufts University's longest established program continuing to successfully supply all cadaver needs for gross anatomy classes (Knight, 2007; Kumar et al., 2001).

Humane learning tools

Most published studies have demonstrated the superior or equivalent learning efficacy achieved by the use of humane alterna-

tives (Knight, 2011b; Patronek and Rauch, 2007). Therefore, it is important for these to be more rigorously pursued and given greater credence. The most common alternatives currently used within our anatomy course include anatomy video demonstrations, online learning resources (e.g., anatomy quizzes), and plastinated models, potted specimens, and prosections. The Faculty's latest developments in humane alternatives include an interactive multimedia module, and an innovative ovariohysterectomy simulator model. In addition, an onsite plastination facility is being constructed, and there are plans for creating a dedicated clinical skills training center.

Preserved specimens

Plastinated models not only decrease reliance on cadaver numbers but also have implicit advantages in being 100% anatomically correct replications of the original animal tissue. They enable three-dimensional visualization of structures, and models can be closely examined and handled without damaging delicate constituents. However, the solid nature prevents observation of underlying structures. The usefulness of these models is evident in the current construction of an onsite plastination facility to enable increased production. Preserved, potted specimens have similar advantages, though these cannot be extensively handled.

Multimedia learning resources

The Faculty also has produced a number of well-received anatomy video demonstrations for several systems and organs (e.g., bitch reproductive system). Despite being considered revision tools rather than complete replacements, the significant popularity and learning efficacy of these is evident in regular student feedback demanding greater availability (Klupiec, 2011a). These videos have substantial educational value, providing a supportive learning environment with guidance by the dissector lecturer. Benefits include student autonomy, convenience, and time savings, as well as opportunities for revision and repeatability not afforded by gross anatomy practical classes. Learning in dissection classes also may be impeded by students inexpertly dissecting cadavers, guided by two-dimensional images, with insufficient demonstrators available (Linton et al., 2005). Video demonstrations have proven so effective for learning that it is common for students to refer to resources such as YouTube to locate similar guides. Online anatomy quizzes are similarly indispensable learning tools, facilitating familiarization with anatomical constituents and providing feedback through self-testing.

Interactive multimedia online module

To address the need for students to learn complex structures within limited timeframes, our anatomy lecturers have produced a pilot version of an interactive multimedia online module on the sectional "Anatomy of the Canine Stifle Joint," similar to the Virtual Canine Anatomy Head (Klupiec, 2011b; Linton et al., 2005). This module is expected to effectively reduce the number of dog legs required for practicals and to partially compensate for expected increases in student intake (Klupiec,



Fig. 1: The University of Sydney Faculty of Veterinary Science's recent innovation – an ovariohysterectomy (OHE) simulator model (OSM)

The abdominal wall is featured here, consisting of skin, subcutaneous tissue, and a muscle layer, overlying the organs and attaching to the hard plastic base.



Fig. 2: The abdominal contents of the OHE simulator model includes a bladder with ureters, female reproductive tract and intestinal tract with attached omentum

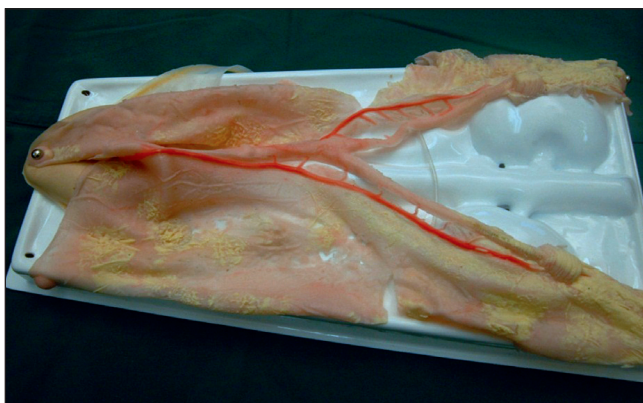


Fig. 3: The base of the OHE simulator model consists of molded plastic with indentations representing the vertebral column, kidneys and large intestine

The overlying female reproductive tract component is featured here.

2011b). The interactive module enables a three-dimensional visualization of the stifle joint, allowing students to rotate and examine the joint from various perspectives, in combination with models, radiographs, and plastinated specimens, as well as prosections and musculoskeletal class skeletons (Klupiec, 2011b). It received significant positive feedback after test trials by first year students, thereby indicating positive prospects for further development of other anatomical systems using this technology (Klupiec, 2011b).

Innovative ovariohysterectomy simulator model

Another major innovation being incorporated is a sophisticated silicone ovariohysterectomy (OHE) simulator model, created in liaison with a special effects company, Studio Kite (Gopinath et al., in press) (Fig. 1-3). This realistic simulated model, enabling non-invasive surgical skill teaching, has significant potential as an educational tool. Students can incise an abdominal wall consisting of skin, subcutaneous tissue, and a layer of muscle (Fig. 1), navigate through the abdominal organs (Fig. 2), and locate the female reproductive tract (Fig. 3) to conduct a spay procedure (OHE, i.e., female neutering operation). Its high-fidelity nature would not only facilitate skill acquisition, but the novelty of this exclusive innovation would likely be appealing to students who are often doubtful that such advances are even available for our use (Cooke, 2011). Given that less-developed OHE models have proven more effective in teaching students surgical skills than cadavers (Griffon et al., 2000), this comparatively high-fidelity model is expected to achieve similar or better outcomes. Plans for a clinical skills training center containing simulators and multimedia tools for students to practice clinical and technical skills are also under development (Baguley et al., 2010). It is important to note that the impetus for these alternatives was directed by a need to improve undergraduate technical skill development rather than by ethical concerns (Baguley et al., 2010).

4 Conclusion

Incorporating humane alternatives into the veterinary curriculum not only addresses issues associated with invasive educational animal use but also offers educational benefits. However, students require an increased awareness of the efficacy and availability of humane alternatives, especially ethically sourced cadavers. This may assist in facilitating acceptance of alternatives and could prevent ethically conscious students from being deterred from pursuing veterinary science. The introduction of a cadaver donation program is a viable option for addressing ethical concerns, as exemplified by successful veterinary schools, particularly in the US. Furthermore, it may assist in moral development of students, reducing desensitization and increasing respect for animal life. These and other alternatives can offer significant educational value for students. Thus, they should be regarded as important inclusions within veterinary curricula, especially given the popularity and efficacy of current tools such as video demonstrations.



The advanced technology of the interactive stifle joint module reduces animal numbers and has great potential application in the development of additional anatomical modules. Similarly, the innovative OHE simulator model provides an efficacious, high-fidelity learning tool that also serves effectively to promote humane alternatives. Ultimately, these humane advances can benefit the veterinary profession by fostering the development of ethical and compassionate student attitudes while effectively achieving learning outcomes.

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