

# Exploratory study on the use of alternative methods in substitution to non-human animals

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## Abstract

The use of animals in the research and teaching is not new in Science. This practical comes exciting moral conflicts in the current society, argued in the scope of Animal Ethics. It is in this area that the substitution of animals for alternatives methods gains space, being frequently boarded. In Brazil, the approval of the Law 11.794/08, regulated by Decree 6,899/09 has stimulated debate about this thematic. The search of the subject for health professionals (included biology) – considering that this segment will be directly affected by the legislation – led to the proposal of this research in our university. The analysis of answers allowed us to conclude that the percentage of professors worried about the subject is small. Of the sample, a significant number positioned itself as intent to welfare, pain and reduction of the number of animals, accepting the alternatives and not opposing to test them. Many respondents, however, affirm to be unaware of the alternative methods.

**Key words:** Bioethics. Animals. Animal use alternatives. Laboratory research.

**CEP PUCRS approval No. 7/4017**



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In the scientific scenario, the use of non-human animals for scientific investigation, tests and teaching is a common practice that is keeping pace with the development of science for decades. Its use, however, has been causing moral conflicts which are discussed within bioethics, on a more and more constant way, by Animal Ethics. By means of multidisciplinary discussions brought about by the issue, the defenders of animal ethics seek to propose limits to the operation of the human being in relation to animals, in order to assure ethically adequate attitudes to these sentient beings – as defended by the Australian philosopher, Peter Singer <sup>1</sup>.

Since Ancient Greece, there are records on the use of non-human animals for scientific development.



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Aristotle, for example, described more than 500 species of animals in his works. In the 16<sup>th</sup> century, we may quote Versalius, who used dogs and pigs at public demonstrations of anatomy <sup>2</sup>. In chronological sequence, one may indicate Descartes, who denied the condition of sentient being to animals, inaugurating the Cartesian thesis opposed to any duty of man to animals <sup>3</sup>. Although the experimental physiology is grateful to the British Stephen Hales, who demonstrated the difference of blood pressure between veins and arteries using for his investigations a great number of small animals <sup>4</sup>, it was Descartes' contribution that influenced Magendi and Bernard's conceptions, in 19<sup>th</sup> century France, where these scientists used animals to validate the scientific method <sup>5</sup>.

The use of animals in research and teaching continues causing problems of a moral character that vary according to cultures, societies and countries. Such practices, whose acceptance is not unanimous in the modern plural society, give opportunity to the ethical reflection on the position of non-human animals in the sphere of moral consideration, core of the animal ethical reflection. Philosophically speaking, two contemporary approaches stand out regarding the way this subject is approached: Peter Singer <sup>1</sup>, utilitarianist, who is opposed to speciesism, an idea derived from the generalization of the discontinuity thesis among men and animals, leading to free cruelty against the latter, and Tom Regan <sup>6</sup>, who advocates the rights of animals from the proposition of own criteria, understanding that animals present individually an intrinsic value. One may emphasize also Raymond Frey's view, also utilitarianist, but different from Singer's, who fundamentals his thesis on the importance of autonomy and the unique condition of life enrichment that autonomous individual presents. In this conception, Frey understands that normal adult human beings stand out from "marginal cases" (human beings mentally committed, terminal patients etc.) and animals <sup>7</sup>.

In addition to ethical character questionings, the society ponders on practical and economic considerations that equally justify the need and convenience to continue using animals in research and teaching or in developing, validating and using alternative procedures to the indiscriminate use of animals in laboratories. In the international scenario, many countries have a specific legislation as to the use of animals in research and teaching, which encourage alternative methods, showing maturity in relation to a so current and conflicting issue.

The search for official limitation on the use of non-human animals for research and teaching led Brazil to approve, in 2008, Law No. 11,794/08<sup>8</sup>, which regulates the use of animals in practical classes and scientific investigations. This law is strengthening the perspective of Animal Ethics in our country, proposing multidisciplinary reflections and a dialogue between different and even antagonistic groups on the issue.

The officialization of the Brazilian law, through Decree No. 6,899/09<sup>9</sup>, requires the adequacy, by higher education institutions (IES), on an immediate way in some topics, establishing deadlines for the adequacy of other items. The law, detailed by decree, establishes the responsibility of the institutional ethics commissions for animal use (Ceua) to control the teaching and research activities at universities. Currently, we experience an historical moment in our country regarding this issue. Reflection on the use of non-human

animal is gaining space in our society that begins to think that they should be respected. Its well being, its sensitivity and, who knows, its moral status shall be taken into account. The document further encourages the use of alternative methods, showing the tune of our legislation with the international scenario as regards the use of non-human animals in science.

Although the term *alternative* has not been specifically defined in any official document related to the use of animals, researchers, professors and persons involved in the handling of animals understand its meaning in the context of scientific investigation and education. Alternative, for many, are methods that result in the reduction of the number of animals used, requiring previous statistical design of the proposed research, incorporating refinement in the procedures involving animals and/or predicting their replacement by parts of the body, by non-living or computerized model<sup>10</sup>.

This comprehension of the term is influenced by the famous theory proposed in 1959, in England, by the zoologist William Russell and by the microbiologist Rex Burch, with the publication of the work *The principles of human experimental technique*, known as the three Rs theory: *reduce, refine, replace*<sup>11</sup>. Such theory is followed until now and quoted in specific documents and laws to the use of animals in experimentation, consubstantiation the practical recommendations for the adequate use of animals by human beings.

*Reduce* leads to the decrease in the number of animals in researches, requiring an adequate previous design, controlled animal colonies and the construction of reliable animal units (with sanitary and genetic control) <sup>12</sup>. *Refine* guides analgesia, anesthesia and euthanasia techniques, trying to minimize pain, discomfort and stress of animals, requiring researchers with experience in their handling. Finally, *replace* demands the option for alternative methods, whenever possible, replacing non-human animals.

### Method

Scientists and professors have been seeking in technology the support to continue developing their specific activities with the same level of excellence and an expressive reduction in the quantity of animals, as a result of moral conflicts that frequently occur when animals are used in research and, particularly, in practice classes. In this context, emerge the alternative methods defended, inclusive, by the national legislation, more specifically sub item II, of Article 2 of said Decree No. 6,899/09, which defines them as procedures to replace or reduce the number of animals.

As alternatives to research there may be cultures of cells and tissues, computer simulations and bioinformatics, DNA recombinant technology and nanotechnology, among others; as substitute instruments for teaching, we may cite computer programs, virtual reality, interactive or demonstrative videos, specific mannequins, in vitro investigation.

Such alternative methods, which require formal validation by the interested parties, are instruments proposed to be used in substitution to animals in the classrooms and also in test and research techniques <sup>13</sup>. However, this interpretation of the *alternative* concept is not unanimous. Santos is peremptory when affirming that, in his opinion, alternative methods are only those which effectively waive the use of animals, a crime in author's interpretation to use animals when there are alternative methods <sup>14</sup>.

For the realization of the present transversal study, qualitative and quantitative approach, an invitation to participate in the research was extended to all professors/researchers in the area of health and biological sciences at PUCRS, according to the areas of knowledge of CNPq. The research project was previously approved by the institution's ethics in research committee, (CEP/PUCRS), after contacting the Professors' Association and the directors of the academic units.

Questionnaires were distributed, whose heading contained all the explanations on the investigation in progress, as well as the objectives and other information on it, in compliance with the recommendations of Resolution 196/96 of the National Council of Health regarding the free and clarified consent term (TCLE). It was considered as a criterion for exclusion the return of non-filled out questionnaire.

The multidisciplinary team of the Laboratory of Bioethics and Ethics Applied to Animals of the Institute of Bioethics of PUCRS created a database, which were analyzed by the statistical program SPSS, edition 11.5. The qualitative matters were analyzed through the content analysis method according to Engers, by the same group <sup>18</sup>.

Professors/researchers comprising the sample of the research were linked to the several existing courses in health area at PUCRS: Nursing, Nutrition and Physiotherapy (Faenfi), Pharmacy, Physical Education (Fefid); Dentistry, Medicine (Famed) and Biological Sciences (Fabio). Of these, 69 professionals were doctors and 42 held a master's degree. Of the group of respondents, 19.81% were only professors, who did not make research. The answers may reflect respondents' professional experience, but may also show values obtained at the time of these professors/researchers' formation on the topic *animal ethics*.

Four hundred and forty-two questionnaires were distributed among the professionals. Of these, 60 were delivered to Faenfi, 17 to the College of Pharmacy, 23 to Fedif, 71 to Fabio, 89 to the Dental School, and 182 to Famed.

It was also verified that only 111 (25.11%) from the total of 442 questionnaires delivered were responded in the following proportion: 1 by Faenfi (1.6%), 5 by Pharmacy (19.4%), 16 by Physical Education (69.5%), 25 by Biology (35.2%), 26 by Dentistry (29.2%). The

number of questionnaires returned may indicate the need of working this polemic and actual subject with professors/researchers at the institution, since this small return allows to infer lack of knowledge, disinterest or lack of valuation of the subject by the professionals invited to the sampling. It is important to stress that 48.2% of the respondents use animals in teaching, while 53.4% use them in research.

Next, data collected at the quantitative analysis of the questionnaires, which shall be discussed in the sequence of presented questions will be presented.

## **Results and discussion**

Actually, any activity involving animals should justify its rational and needed and appropriate use, clarifying the reason for not undertaking it with alternative methods. Such formal explanation is now required by the institutional commissions of ethics, in addition to the need of justifying the number of animals to be used, based on a statistical study, as well as the number of times that the experiment will need to be repeated in order the researcher may obtain reliable and reproducible results.

However, particularly in the teaching environment, the professor familiarized in using animals in their classes may be reluctant in replacing them by alternative methods, considering them, frequently due to lack of knowledge, inefficient to achieve their objectives.

In 1999, Valk et al tried to explain the reason for the reluctance of the professors in replacing the use of animals by alternative methods, by stressing some factors <sup>15</sup>:

1. Lack of knowledge by the professors on the existence of efficient alternative methods and their potentials;
2. Lack of opportunity, by the professors, in testing the available alternatives to validate them as replacement material;
3. Resistance to the change presented by some professors, maybe because they do not accept waiving their central positions as only sources of knowledge, in the context of the practical class, or by defending that the conventional use of animals in the practical teaching activities is the most appropriate;
4. Lack of financial resources and time to study alternatives with the specific purpose to incorporate them to classes, either by professors or the institutions.

One notices in the academic context the increasing insistence of students to use alternative methods in substitution to live animals in practicing classes. The alternatives are considered good methods for acquiring knowledge, replacing the animals in these activities <sup>16</sup>. Tréz <sup>13</sup> also corroborates with such opinion by affirming that the number of students and professors who are against the use of animals during practical classes has significantly increased, reinforcing the need of a search for alternatives.

The methodological and pedagogic aspects of the computerized models in replacing animals

still need to be discussed, since there are disagreements between who formulates the pros and cons. However, such discussions promote the relevant ethical aspects to start being respected and that technology not only helps the subject's professors, but also radically modifies the future classes in, at least, two ways: changing the professor's central position as a source of knowledge and the live animal as the sole practical model for a good teaching level. It may be said, therefore, that bioethics (especially in the field of ethics applied to animals) is one of the fields of interaction more highly developed between ethics and technology'.

Another important point to be emphasized related to the need of reflection on *why replacing?* <sup>13</sup> The answers to this question shall guide different assumptions of positions and shall also be discussed in the bioethical scenario on a multidisciplinary way. It is unarguable that the validation stage of an alternative method is the most difficult to surmount, since it depends on it the credibility in the proposed method. In the educational sphere, the validation of the alternative method is priority for the substitution of animals in classrooms. Such validation may be made by the companies that propose the alternative method, but this will certainly have real value if tested and approved by the professor of the course, who will use it safely and with credibility, since he will be certain of achieving the objectives proposed in his class plan.

The orientation to the ethically correct use of non-human animals shall be handled by the

institutional ethics commissions established for this purpose by law. Such entities need to base their standards on principles that respect general animal life, pointing out that beings are included within the concept of *animals* and officially protected by regulations, to assist in justifying its conduct of professors and researchers orientation. Such commissions need to encourage the substitution of non-human animals in the research and teaching activities by alternative techniques, in order the institution in which they operate may be in compliance with the legislation in force in Brazil.

Commissions need to know what is the thought of the segments that form the university community in which they are now inserted as an also inspection body, in order they may propose educative activities seeking to orient the adequate use of animals in experiments. In order this may be effected, there is a need for field studies to assess the view by these different sectors, directly involved in the use of animals, as well as their possible substitution by alternative methods in science and education.

An investigation under this optic, published in 2008, was made with students in the courses in the area of health at the Pontifical Catholic University of Rio Grande do Sul (PUCRS), seeking to know the opinion of this segment in relation to the use of non-human animals in research and teaching. The article showed that students' interest for the subject has been increasing, which is excellent, since these students will be professionals in the future and, like their teachers today, opinion makers <sup>17</sup>.

The importance of the professor's role as a model in the transmission of values through an ethically correct attitude in relation to the respect for life and the pain of animals is unquestionable and indispensable in order the Brazilian official law be effectively, or better, consciously enforced. For the institutional Ceua, it would be important, in relation to animal use and their substitution by alternative methods, to know the opinion of the teaching staff linked to the biological and health areas (in the PUCRS courses). It is important to stress that in PUCRS every researcher also teaches classes and is, therefore, included in the teaching staff.

It was under such perspective that the present Field research was made, seeking, through the analysis of the findings, to detect points to be worked out and to be reinforced at the institutional ambit, with the professors and researchers, for the implementation of such new perspective on the use of animals in research and teaching, assisting the institutional Ceua. The presentation and discussion of each researched point follows.

### **Do you have any knowledge on the subject "ethics and animals"?**

From the research sample, 0.1% declared that they have knowledge. Such knowledge, even relative, may be the reflex of the work by the ethics commission at the university, which since 2007 was working with the university community the topic animals and analyzing research projects. In fact, the subject has been discussed on a multidisciplinary way in the institutional scope

in the areas of Bioethics, Philosophy and Law, in courses open to the community years ago.

**In your professional formation, have you participated in any practical class that used animals (Guinea pigs)?**

The results found allowed to verify that 86.6% of the respondents in their formation participated in practical activities involving animals – a kind of a class very common in health and biology areas until recently. Such experience certainly influenced professors to repeat the same activities. It is known that today there is a trend to the human being awareness regarding respect not only for another human being, but also for the environment and animals <sup>19</sup>. Such way of thinking the world, a little less anthropocentric, leads to the incentive of replacing animals in practical teaching activities.

The contemporary debate involving animals assumed today that there is a common ethical principle regarding the subject: the notion that it is inadequate causing suffering (at least unnecessary) to other living beings with the exclusive objective of satisfying the needs of the human beings. The idea of speciesism, in which human beings tend to defend other human beings for the single fact of being of the same species, and presenting total freedom in the use of animals of other species, also appears as a way of requiring the definition on the non-human animal having or not *moral*

*status*, forcing the grounds to establish the dividing line between human beings and other animals <sup>20</sup> or the opposite positioning. It should be stressed that this aspect was not discussed at the time of the formation of most respondents in the sample.

**Do you think animals could be replaced by alternative methods in teaching (practical classes)?**

With the data analysis, it was verified that, although 65.1% agreed with the use of alternatives and 18.3% disagreed, 16.5% affirmed that they have never thought about the subject, a percentage at least interesting when considering the contemporaneity of the subject. It should be stressed that that this last group was formed by representatives of the courses of Medicine, Dentistry, and Physical Education.

The use of alternatives, that would bring new perspectives and new values to the future professors and researchers, currently students, would be a way of innovating culture, including the scientific one, since the acceptance of the alternative method would not replace only the animals, as affirmed by Tréz <sup>13</sup>, would replace mentalities and patterns of behavior focused on anthropocentrism. Such awareness could also assist to assume a new attitude before the planet and to the imminent finitude of natural resources'.

Although one cannot affirm with certainty, one can infer that the slow substitution by alternative methods is

due to the lack of knowledge on such options or on where to know them. Since most of the respondents in the sampling was favorable to the substitution, it is necessary to have the interest from the institutions to offer access of their professionals to alternative methods, as well as fostering the establishment of new didactic-pedagogic resources, joining efforts from different areas. Knowing also the international development in this area of alternatives, the fact that professors and researchers categorically affirm that they never thought on the subject, is a point to be stressed and worked by IES.

**When using animals in a scientific research do you take into account the pain and suffering caused to animals?**

A significant number of researchers (89.7%) showed to be sensitized with the pain and suffering of animals, although 8.4% have never thought on the subject. The sensitivity criterion is one of the most acceptable ones currently when determining the moral status of the animals or at least, to require that the animal be taken into consideration and respected when handled. However, the definition of the term is subjective. It is widely accepted and this can be verified in most legislation researched, that sensitivity is recognized in the vertebrate animals and, even on a more specific and frequent way to vertebrates considered superior, since they are close to the human animals in the phylogenetic scale. This is, inclusively, the interpretation of the national legislation <sup>8</sup>.

To understand such argument, it is fundamental to recall the phylogenetic evolution of sensation. Under the evolutive history of a species, one can understand the development of increasingly complex mechanisms for the protection of their organisms. The *development of the painful sensation and the consequent response to it, which can be detected from the innate reflexes to the more complex behavior, oriented by social, cultural, cognitive and affective factors, shows the evolution of the nervous system in animals* <sup>21</sup>. It is basic for animals, then, to prevent unpleasant stimuli through the action of specialized receptors. *The U.S 'Guide for the care and use of laboratory animal* <sup>22</sup> accepts the fact that the ability to experiment and respond to pain is common in the animal kingdom.

**When using animals in a scientific research do you take into account the animals' welfare, including the way they are raised in animal facility?**

The analysis of the answers allowed to verify that 52.3% take into account the animal welfare in the research. It may be inferred from the analysis that 45% of the respondents had never thought on the subject. Such observation Such situation stresses the need for the subject to continue to be discussed at the university, aiming at sensitizing those professionals to a so important issue at the international level and now, national level, with the advent of the Brazilian law. One may say that the animal welfare chain is based on the.

utilitarianism of Jeremy Bentham and occurs before the movement for the rights of animals. The current great utilitarianism representative is philosopher Peter Singer<sup>23</sup>, previously mentioned. In 1926, the University of London Animal Welfare Society Foundation (Ulaws) is accepted as the initial landmark in the history of animal welfare in the scientific area. Currently, the Universities Federation for Animal Welfare (Ufaw - former Ulaws) encourages the humanitarian use of non-human animals <sup>24</sup>.

Costa and Assis Pinto <sup>25</sup> stress that there are two perspectives regarding the animal welfare. The first one gives importance to the animal itself (intrinsic value) and advocates respect and unnecessary suffering. The second one values the consequences of animal suffering to human beings (extrinsic value), The understanding on animal welfare requires a multidisciplinary approach and also integration of concepts from several areas of knowledge. The welfare animal chain sustains gradual modifications in attitudes and conceptions of human beings regarding non-human animals, which is reflected in updated legislations and in the requirement of quality of scientific research, for example, within the ethical patterns <sup>26</sup>. That trend is also concerned with adequate environmental conditions for the creation and permanence of the animals (macro and micro environment), which will lead the researcher to achieve reliable and reproducible results – the animals remain lodged in locations called animal facility, which shall maintain under control the temperature, humidity, ventilation, illumination and noise variables <sup>27</sup>.

**When using animals in a scientific research do you take into account the number of animals, seeking to use the least possible number?**

Although 46.4% of the respondents have stated that they do not use animals in the research, 48.2% showed concern in minimizing the number of animals to carry out the activity. The concern with the reduction in the number of animals in scientific investigation, shown by the answers of most professionals included in the sample, meets the theory of the three Rs.

Such theory, in which the axis refers to the reduction in the number of animals used, is considered by many as normative, procedural orientation for the animal use in experiments which should be followed by all who work in research with animals. It even appears as criterion of respect to animals in many international documents and now in the Brazilian legislation. However, a fact that should be stressed, by itself such theory does not require ethical reflection on the relationship human being/non-human animal. Such notion shall only be conceived as a moral norm if it is internalized *a priori*, conceiving another interpretation on who is the animal, why it should be respected and why, as a result, it should not be used on a futile way<sup>23</sup>.

**When using animals in teaching (practical classes) do you take into account the pain and suffering caused to animals?**

When asked if they took into account the pain and suffering of animals used in teaching, most respondents showed sensitized (83.8%). However, again 14.1% of the interviewees never thought about the subject.

Sensitivity, as it is known, does not necessarily involve the capacity of feeling pain, but pain (and the suffering derived therefrom) is one of the ways of sensitivity. In fact it is recognized that all known living beings, including the unicellular ones, show some form of sensitivity which makes it difficult the application of the criterion in the event some differences are not examined as to the degree of sensitive capacity and what it causes in each animal species<sup>28</sup>. It is difficult for human beings to interpret the animal behavior to know when it is feeling pain and its intensity. The more distant this animal is from man in the phylogenetic scale, more difficult will be the sensitivity of the human being to the animal discomfort, since the animals close to human beings usually show a response similar to ours.

The consideration of the animal needs, providing space to animal perspective, has been increasingly accepted in past years, although always focusing on the species considered superior from the phylogenetic standpoint. There is no more need to discuss the evidences of the capacity of those animals suffering pain and fear, since such discussions became irrelevant. The expression of behaviors to prevent the nociceptive stimulus is determined by factors inherent to each species, such as the anatomic and

physiologic complexity. This complexity of systems conveys different behaviors, but it does not assure that animals more distant to human beings feel less bothered than the latter with stimuli that lead human beings to feel pain.

Thus, the anthropocentric patterns of pain manifestation, also demonstrated by a great number of mammals, may not be the only ones determining the level of pain or discomfort that a particular experiment will cause to an animal. The scientific development of knowledge in the area of physiology does not allow such position any more. It is necessary that scientists and people handling animals understand that any stimulus that activates nociceptors or similar structures producing an aversive answer should be understood as painful. And the concern with the minimization of such painful stimuli would be an ethically adequate attitude, regardless the animal species<sup>4</sup>.

**When using animals in teaching (practical classes) do you question yourself on animals' wellbeing, including the way they are raised in animal facility?**

In relation to the animal welfare topic in practical classes, 44.5% of the interviewees showed concern. It is emphasized again that 51.8% of the sample do not use animals in practical classes. The animal welfare accepts the use of animals, but defends the change of certain conducts when they may minimize pain and suffering, pointing out again to the three Rs theory, proposed by Burch and Russel in 1959<sup>11</sup>.

Such theory receives criticisms by those who defend animals who argue that the three Rs, in fact, legitimate the use of animals, considering that its principle admits as valid the single refining of experiments and reduction of the animals used, when the correct action would be the application of the replacement of the tests in animals through methods that would not use them <sup>29</sup>.

**When using animals in teaching (practical classes) do you take into account the number of animals, seeking to use the smallest number possible?**

When questioned about the number of animals used and its possible reduction, 36.8% of the respondents who used animals in practical classes are concerned with the issue. Such answer refers again to the three Rs theory, in which the reduction, refinement, and replacement should be followed by professionals in health area. However, more than following the theory, professors need to take into account the importance of their example in students' formation, also in which concerns the use of animals.

The development of sciences is strongly connected to the constant use of animals as a biological model, a practice that was strongly incorporated into current professors' formation - who use this teaching method as an ancient tradition. The influence of the professor's image on the student is unquestionable, regardless the level of study. The human dimension of the professor-student relationship may

involve values and attitudes that transcend the context of books, classroom and other curricular material. One of the strongest influences of a professor on students refers to methods used in classroom, since they bring messages on life values and attitudes <sup>30</sup>.

Professors and researchers have usually shown the trend to believe that their responsibility in education is limited to teaching techniques and concepts. However, as reminded by Bird <sup>31</sup>, they should take into account the professional values and ethically justifiable postures which are also learned and understood by the students, through given examples <sup>32</sup>. Some authors <sup>30,31</sup> defend that the use of animals in education shall be directly connected to the use of animals in science, since they will be used to prepare students for the of researcher's career, a fact that cannot be forgotten.

Respondents were asked about their interest as to the subject and also in particular of extension courses on it. From the answers, 81.8% of the interviewees confirmed to be in the subject and 57.4% are willing to participate of the extension activities. Such concrete data proof the existence of a significant number of respondents tuned to the international community regarding the valuation of the subject, being up to Ceua to continued proposing activities on the non-human animals as well as the lawfulness on its use. Since Ceuas are agencies with a primarily educational function, they need to start

their work discussing with their members and the university community specific questions on the general respect to animal life, animal's moral status, the beings included in the *animal* concept and officially protected by regulations, among others <sup>32</sup>.

However, one recognizes the difficulty of Ceuas educational work in societies that are markedly anthropocentric such as ours. These agencies should work toward expanding the limits of human ethical horizon, extending comprehension about the *other* in order to respect alterity in life forms distinct of human – but not least important <sup>32</sup>. Timm de Souza emphatically affirms that we need to understand *that ethical perception of animals' otherness is not an intellectual utopia or a contemporary caprice, but – besides being a radical ethical imperative - a question of survival* <sup>33</sup>.

The last questions dealt with alternative methods. Participants were asked if they were interested in the subject *alternatives* - and 88% of the respondents said yes. When asked if the researchers were supposed to update alternative methods, 99.1% answered affirmatively; and if that was up to the professors, 97.2% also answered yes. Research methods seeking alternatives have significantly contributed to the reduction of animals used in scientific procedures, since the substitution is being accepted, sought and made by an increasing number of researchers. It should be stressed that the formal validation of alternatives by

stakeholders, and researches are being made seeking the validation of methods that will increasingly substitute the use of animals in procedures <sup>34</sup>. Legislation of many countries has been concerned for years with the incentive to the use of alternative methods.

### Qualitative analysis

The qualitative analysis of the investigation, made from the analysis of open questions, briefly answered by the respondents, sought to know the opinion of the members of the sampling on the full substitution of non-human animals in the research and teaching, as well as the establishment of a bank of institutional alternatives. The open questions contained in the instrument were as follows:

1. Do you understand that alternative methods may fully substitute animals in research activities? Justify.
2. Do you understand that alternative methods may fully substitute animals in practical activities? Justify.
3. Which is your opinion about creating a *bank of alternatives* at the institution which would catalogue existing alternative methods and would assist in the proposition of new alternatives? Justify.

The answers, analyzed through contents analysis method according to Engers <sup>18</sup>, let emerge two great categories: *negation* (subdivided into three subcategories: *radical*, *lack of knowledge* and *minimization of use*) and *agreement*.

### Regarding negation

In the subcategory *radical negation* the respondents were against the substitution of animals in research through alternative methods, and did not accept waiving the use of animal models. Such type of position shows, once again, how much the use of animals is deep rooted to our scientific culture. Many professors also use the justification of the value of experience in *handling* the animal, for student's professional formation. One respondent, for example, affirms: *It is necessary to the student this contact and experience with a live system to develop abilities and competence to act adequately and efficiently regarding the benefit to human beings.*

This argument given by the professor and corroborated by many researched authors is challenged by Hapner <sup>35</sup>: 1) The *handling* experience would be used to aggregate more knowledge to the student. However, if this student has a moral objection to the use of animals in apprenticeship, the experience will not achieve its objective; 2) if the teaching search is made through the handling, why not handling models, interactive models or any other alternative method previously validated by the professor? The knowledge obtained would be the same and there would be the possibility of a greater number of handlings with the same animal. O'Hara <sup>36</sup> stresses the use of simulators as a way to eliminate the possibility of error, making apprenticeship more comfortable and leading the student to use technology as a study tool

In fact, it is increasingly difficult to justify the death of an animal with the sole purpose of teaching handling techniques.

Subcategory *negation for lack of knowledge* emerged basically from answers to question three, which questioned the creation of a bank of alternative methods. The interviewees affirmed that their peers did not use alternative methods because they did not know them, corroborating with Hapner <sup>35</sup>, who argued that the position opposing substitution may be influenced by the lack of knowledge. One respondent declares: *Excellent idea, since it is possible that some colleagues are not aware of them.*

The subcategory negation, but acceptance in minimizing the use, appears from the analysis of the three questions posed in the questionnaires: *Excellent idea which would enable the reduction in the number of researches using animals; No. But I believe the alternative methods enable directions to the work to be developed, and may in many cases minimize the use of animals.* Such positions show that the professors are concerned with the abusive number of animals used, either in research or in education - which agrees with the proposed three Rs theory by Russel and Burch, already mentioned.

### Regarding agreement

This category appears mainly from the analysis of the answers to question two

## Final considerations'

where the substitution in questioned in education (practical classes), showing a strong trend by respondents to substitute animals by alternatives: *Yes, practical classes in experimental animals are of little value, only a few are able to keep up and 'obtain' a satisfactory use.* As pointed out in the present work, there are evidences that that the alternatives are good methods, frequently better and more efficient for achieving knowledge that dissection itself, for example, so used in teaching procedures <sup>13</sup>.

The substitution of animals in practical activities is knowingly an emerging issue in Brazilian higher education, minimizing conflicts brought with the use of living beings. Such change brings important implications in the field of didactics, requiring their inevitable innovation, although there is an effective trend to preserve traditional models of practical classes <sup>13</sup>. The acceptance of alternative models in this area represents a significant change of professors, showing how they are seeking innovation. As stressed by Trez <sup>13</sup>, substitute methods, more than a way of doing, represent a *substitutive* mode of thinking, since substitution means not only substituting methods but mentalities and behavior patterns, conceiving another mode of teaching.

This investigation, made with professors in health and biological sciences areas of PUCRS, proved that non-human animals subject has been achieving a space in the academic environment. The official recognition of Law 11,794/08 and Decree 6,899/09 certainly contributed to that purpose, but several multidisciplinary actions need to be proposed by the institutional Ceua to assist in the awareness of a significant portion of that important university segment, researches and professors, regarding animals.

At the institutional ambit, the ethically correct use of non-human animals may be obtained with the concern of the professionals regarding animal pain, sensitivity and welfare. The search, validation and use of alternative methods substituting the non-human animal, well appreciated at the international level, meets that proposition. It may be seen, as shown by the findings of this investigation, the growing interest by such methods also in our reality, with the good acceptance of the idea of the establishment of a bank of institutional alternative methods. Researchers and professors should adequate themselves to unquestionable changes of view by our society, which demands even more plausible and robust justifications for the use of non-human animals in scientific investigation and teaching, according to the domestic legislation.

## Resumo

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### **Estudo exploratório acerca da utilização de métodos alternativos em substituição aos animais não humanos**

Este artigo decorre de pesquisa realizada para levantar a aceitação do uso de animais na pesquisa e docência. Esta prática tem gerado conflitos morais na sociedade atual, os quais vêm sendo discutidos na esfera da ética animal. Nesta área a substituição de animais por métodos alternativos ganha espaço, sendo frequentemente utilizada. A aprovação da Lei 11.794/08, oficializada pelo Decreto 6.899/09, incentivou o debate sobre a temática em nosso país. A busca do interesse dos profissionais da área da saúde (incluindo biologia) pelo tema, considerando que este segmento será diretamente afetado pela legislação, levou à proposta desta pesquisa de campo em nossa universidade. A análise das respostas permitiu concluir que o percentual de professores preocupados com o tema é pequeno. Da amostra, significativo número se posiciona como atento ao bem-estar, dor e diminuição do número de animais, aceitando as alternativas e não se opondo a testá-las. Muitos respondentes, entretanto, afirmam desconhecer métodos alternativos.

**Palavras-chave:** Bioética. Animais. Alternativas ao uso de animais. Investigação laboratorial.

## Resumen

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### **Estudio exploratorio sobre el uso de métodos alternativos para la substitución de animales no humanos**

El uso de animales en la investigación y la docencia no es nuevo en la Ciencia. Esta práctica ha generado conflictos morales en la sociedad actual, discutido en el ámbito de la Animal Ethics. En esta área la substitución de animales por alternativas tiene espacio siendo frecuentemente abordada. La aprobación de la Ley 11.794/08 oficializada por el Decreto 6.899/09 en Brasil ha fomentado el debate sobre el tema en nuestro país. La búsqueda en el interés de los profesionales de la salud (incluyendo la biología) en el tema, teniendo en cuenta que este segmento se verá directamente afectado por la legislación, llevó a la proposición de esta investigación en nuestra universidad. El análisis de las respuestas nos permitió concluir que el porcentaje de maestros preocupados con el tema es pequeño. De la muestra, un número significativo se coloca atento al bienestar, dolor y reducción de números de animales aceptando las alternativas e no recusándose a experimentar. Pero muchos de los encuestados afirman no conocer los métodos alternativos.

**Palabras-clave:** Bioética. Animales. Alternativas al uso de animales. Investigación de laboratorio.

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Received 1.28.11

Approved 7.18.11

Final approval 7.25.11

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### **Authors' participation in article**

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Rodrigues and Sanders worked in questionnaire designing and application, analysis of findings, editing, bibliographic assessment and design. Feijo worked in designing, guidance and final review.

## BIOETHICAL LABORATORY AND ETHICS APPLIED TO ANIMALS

The Laboratory of Bioethics and Ethics Applied to Animals is working in a research project on the use of animals in research and in practical classes and is probable substitution for alternative methods. Such study wants to know the opinion of PUCRS professors related to the area of Health, on the use of animals in the scientific research and in practical classes to assist the Committee of Ethics to the Use of Animals of PUCRS (CEUA-PUCRS) and propose their educational activities. Their participation is very important, but not mandatory. To participate, please fill out the questionnaire without inserting your name and return it to the secretariat of your course. The non-participation will not cause you any damage. Any doubt or additional information, please contact Prof. Dr. Anamaria Feijo, through e-mail [agsfeijo@pucrs.br](mailto:agsfeijo@pucrs.br), or the Committee of Ethics to the Use of Animals of PUCRS, through telephone 3320 3345.

Name (initials): \_\_\_\_\_ Age: \_\_\_\_\_ Gender: ( ) Male ( ) Female  
Course: \_\_\_\_\_ Major degree: \_\_\_\_\_  
Professor ( ) Researcher ( )

1. Do you have any knowledge on the subject "ethics and animals"?  
( ) Yes ( ) No
2. In your Professional formation have you ever participated in a practical class with the use of animals (guinea pigs)?  
( ) Yes ( ) No
3. Do you think animals could be substituted by alternative methods in teaching (practical classes)?  
( ) Yes ( ) No ( ) I never thought about the subject
4. When using animals in a scientific research do you take into account the pain and suffering caused to the animals?  
( ) Yes ( ) No ( ) I never thought about the subject
5. When using animals in a scientific research do you take into account the welfare of the animals, including the way they are raised in the animal facility?  
( ) Yes ( ) No ( ) I never thought about the subject  
( ) I do not use animals in research activities
6. When using animals in a scientific research do you take into account the number of animals, trying to use the smallest number possible?  
( ) Yes ( ) No ( ) I never thought about the subject  
( ) I do not use animals in research activities
7. When using animals in teaching (practical classes) do you take into account the pain and suffering caused to animals?  
( ) Yes ( ) No ( ) I never thought about the subject
8. When using animals in teaching (practical classes) do you question on the welfare of animals, including the way they are raised in the animal facility?  
( ) Yes ( ) No ( ) I never thought about the subject  
( ) I do not use animals in research activities  
( ) I do not use animals in practical classes
9. When using animals in teaching (practical classes) do you take into account the number of animals, trying to use the smallest number possible?  
( ) Yes ( ) No ( ) I never thought about the subject  
( ) I do not use animals in research activities  
( ) I do not use animals in practical classes
10. Are you interested in the subject use of animals in research and education?  
( ) Yes ( ) No
11. In the event an extension university course is offered on the subject, would you participate?  
( ) Yes ( ) No
12. Are you interested for the subject alternative methods?  
( ) Yes ( ) No
13. Do you understand that it is the role of the professor to keep himself informed on alternative methods?  
( ) Yes ( ) No
14. Do you understand that it is the role of the researcher to keep himself informed on alternative methods?  
( ) Yes ( ) No

### Open questions

1. Do you understand that the alternative methods may fully substitute the animals in research activities? Justify.
2. Do you understand that the alternative methods may fully substitute the animals in practical activities?
3. What is your opinion on the establishment of a *bank of alternatives* at the institution which would catalogue alternative methods and would assist in the proposition of new alternatives? Justify.