

Essential directions for teaching animal welfare in South America

C.F.M. Molento⁽¹⁾ & N. Calderón⁽²⁾

(1) Laboratório de Bem-estar Animal, Setor de Ciências Agrárias, Universidade Federal do Paraná, R. dos Funcionários, 1540, Curitiba, Paraná, Brazil. E-mail: carlamolento@yahoo.com

(2) Centro de Investigación de la Interrelación de la Salud Animal, Humana y Ecológica, Universidad de La Salle, Cra. 7 N° 172-85, Bogotá, Colombia. E-mail: ncalderon@lasalle.edu.co

Summary

Both the public and the international institutions that regulate the veterinary profession have high expectations that veterinarians will understand and take the lead in issues of animal welfare. These expectations provide a powerful argument for the need to teach animal welfare. The objective of this paper is to share the experiences of animal welfare teaching in South America, examining which topics seem relevant and why. It builds upon the core international literature on teaching animal welfare to veterinary students, highlights priorities learned through direct experience of teaching this topic in South America, and has benefited from the experiences of other South American animal welfare professors.

In addition, the authors discuss major challenges in the animal welfare field and propose the perceived best strategies. The overall conclusion of the authors is that it is not possible to work as a veterinarian and make a valuable contribution to society unless the main concepts and issues of animal welfare are thoroughly understood and incorporated into practice.

Keywords

Animal welfare – Curriculum – Humanitarianism – Latin America – Mandatory curriculum – South America – Veterinary education – Veterinary medicine.

Introduction

As society changes its relationship with animals, our profession must increase awareness of our role in animal welfare. In fact, veterinary medicine's role in animal welfare in the twenty-first century has become pivotal to our continued role in society. Bonnie V. Beaver, past President of the American Veterinary Medical Association (1).

The public has an increasing expectation that animals will receive humane treatment and that their welfare will be taken care of. This expectation has a very significant impact on veterinary medicine. The assumption of the general public is that, when animals in a variety of situations are under the care of a veterinarian, he or she will strive to maintain animals in an acceptable condition, in other words, look after their welfare. Are veterinarians

doing this? The answer to this question is intertwined with animal welfare science.

Examining the topics considered important by the international veterinary bodies provides evidence of the relationship between veterinary medicine and animal welfare. The World Veterinary Association, the World Organisation for Animal Health (OIE), the American Veterinary Medical Association, the Panamerican Association for Veterinary Sciences and most other veterinary organisations have been strengthening their focus on animal welfare, as can be seen by a visit to their web pages. It is therefore not surprising that many veterinary schools have been including animal welfare courses in their curricula for the last two decades. Teaching animal welfare to veterinary students is an experience that is markedly enhanced by exploring the international discussions that are building consensus on core issues and

providing some agreement on key features of animal welfare.

The objective of this paper is to share the experience of animal welfare teaching in South America by examining which topics seem relevant and why. In addition, the authors discuss major challenges in the welfare arena and propose the perceived best strategies to resolve them.

General ideas

The authors would like to clarify two important issues which affect the general context of this paper. First, there are two terms that can be used in English for the concept of animal welfare: 'animal welfare' and 'animal well-being'. Both of these terms translate into a single term in Spanish (*bienestar*) and Portuguese (*bem-estar*). For this reason, and following the advice given by some prominent animal welfare scientists, such as those mentioned by Nordenfelt (18), the authors have decided to use only the term 'animal welfare', to encompass a completely animal-centred meaning.

The second issue involves the complexity of the South American continent in terms of its diverse cultures, languages, socio-economic factors and political and educational systems. It would be highly preferable to include data from all 13 South American countries, with their more than 200 veterinary schools. However, the limited availability of information makes this difficult. Even relatively simple information, such as the number of veterinary schools per country, is difficult to obtain. Table I shows the data obtained and the source.

Why should an animal welfare course be taught?

It seems common sense that veterinarians should understand animal welfare. For example, if one reads the oath to which veterinarians are expected to adhere, it is common for it, in many countries, to include a strong statement emphasising the welfare of animals. Another example is from the words of Bernard Vallat (25), the Director-General of the OIE: 'The OIE was thus proud to receive, in 2002, a unanimous mandate from its 167 Member Countries to become the leading international organisation in the field of animal welfare'. These high expectations contained in the professional values of veterinary medicine – that all veterinarians should both understand and take action on behalf of animal welfare – provides a powerful argument for teaching animal welfare in veterinary colleges and institutions.

The perception of veterinary students also seems to be that they should receive formal training in animal welfare. Most

Table I
The number of veterinary schools per country in South America

Country	Number of veterinary schools ^(a)	Data source
Argentina	11	WVA (29)
	8	FPFECV (19)
Bolivia	2	WVA (29)
	5	FPFECV (19)
Brazil	10	WVA (29)
	14	FPFECV (19)
	160	INEP (11)
Chile	6	WVA (29)
	3	FPFECV (19)
Colombia	32	MEC (14)
	1	FPFECV (19)
	16	COMVEZCOL (5)
Ecuador	2	WVA (29)
	1	FPFECV (19)
Paraguay	1	María Teresa Rovira, personal communication
Peru	1	WVA (29)
	5	FPFECV (19)
Uruguay	1	WVA (29)
	1	FPFECV (19)
Venezuela	2	WVA (29)
	1	FPFECV (19)

a) Note the data variability across different sources for the same country; the most reliable figures are those from local sources, when available

WVA: World Veterinary Organization

FPFECV: Pan-American Federation of Faculties and Schools of Veterinary Science

INEP: Instituto Nacional de Estudios e Pesquisas Educacionais

MEC: Ministry of Education of Chile

COMVEZCOL: Consejo Profesional de Medicina Veterinaria

students from the University of São Paulo prefer a compulsory animal welfare course, and this opinion seems to be gaining momentum (Fig. 1) (23). Moreover, animal welfare activities are becoming more important in veterinary schools, for instance, the demand for institutional animal ethics committees. Most universities in South America have been establishing such committees over the last decade.

One idea to reflect upon is the commonly offered argument that animal welfare is already taught within many of the other courses in the school. This is a situation that veterinary instructors should strive for. However, even so, veterinarians cannot afford the glaring absence of a specific forum for teaching concepts, assessment strategies and applied exercises in animal welfare.

Unfortunately, it seems that veterinarians are far from achieving this integration of animal welfare into the everyday curriculum. There are reports of an inverse correlation between education and an affection for animals:

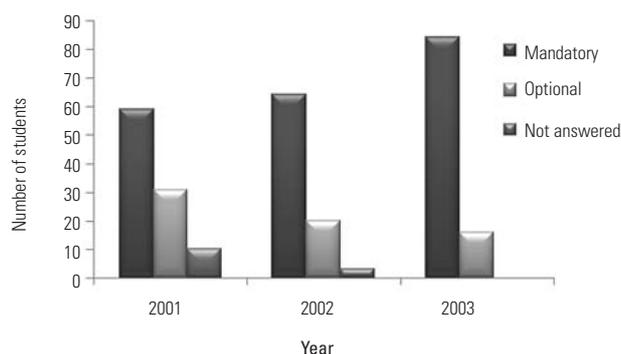


Fig. 1
Numbers of veterinary students who would prefer the ethics and animal welfare course in their veterinary programme at the University of São Paulo, Brazil, to be compulsory or optional (23)

the higher the level of education, the less affection is shown (26). A similar trend was reported in veterinary education: as male students moved from their first to their last school year, their degree of empathy towards animals decreased (20). As Vonesch states (26), it is difficult to accept such a perversion of education. (Interestingly, in the case of female students, the study showed that their level of empathy was maintained throughout academic life.)

This paradox requires action, since society tends to look upon veterinarians as professionals committed to the care of animals. Discussions usual to philosophers, writers, journalists and, to a lesser degree, zoologists and biologists have rarely been approached by veterinary professors and students. This absence is probably related to an educational process that puts more emphasis on animal production, surgery and clinics. The idea that animals are sentient beings and the ethical reflections following on from that concept are thereby rendered marginal to veterinarian academic life (4).

The desensitising effect of veterinary education is hopefully decreasing with the adoption of mandatory animal welfare courses and animal-friendly teaching methods. An example of humanitarian veterinary education comes from the work of Silva *et al.* (24), who used ethically obtained dog cadavers to replace the use of live animals when teaching surgical techniques. Another example is teaching anaemia diagnosis through the FAMACHA method (i.e. monitoring the colour of the mucous eye membranes), modified to preserve the integrity of the animals used in practical sessions (17). Throughout academic life, the opportunities to maintain and refine student compassion towards animals are many; seizing them should be the responsibility of professors and programme directors.

These ideas have been presented to support those universities which are either in the process of including animal welfare as part of their obligatory curricula or are

yet to start this undertaking. The question of a compulsory animal welfare course for veterinary students seems self evident; more challenging is the question of how to optimise its approach and content.

What should be taught?

To present a South American perspective on the best content for an animal welfare course, the authors have drawn on the ideas provided by Broom (2), Hewson *et al.* (10) and Manteca *et al.* (13). In teaching animal welfare concepts, it is important to stress the need for the combined consideration of physical, behavioural and psychological welfare. The idea of welfare as: 'the state of an individual as regards its attempts to cope with its environment,' (3) is especially useful, since it leads to the teaching of animal welfare assessment through physiological and behavioural indicators.

Teaching animal ethics in the first part of the course provides context for the applied skills section, which, in turn, gives the opportunity for some training in decision-making. The section on animal welfare assessment is enriched by the teaching and practical use of the Five Freedoms (27), comprising: freedom from thirst and hunger; freedom from discomfort; freedom from pain, injury and disease; freedom to express normal behaviour; and freedom from fear and distress.

The authors have been teaching their courses to an approximate ratio of one third conceptual issues and two thirds applied topics, including animal welfare legislation. They organise applied topics into critical points and reflections on viable improvement strategies for the welfare of companion, laboratory, entertainment, farm, working and wild animals. In accord with Manteca *et al.* (13), the authors believe that one objective of the course should be that students can clearly distinguish between arguments based on animal welfare and arguments centred on other issues, such as economics, organic farming, species conservation and homoeopathy.

In the experience of the authors, a common anxiety expressed by students involves the intrinsic difficulty in understanding exactly what an animal feels. This problem is exacerbated by the recognised idea that feelings are private experiences, only available to each individual self. However, exploring the ways in which veterinarians can find answers to this dilemma, in the absence of an absolute level of accuracy, can considerably enrich class discussions. As Duncan remarks (7), it is not necessary to know whether the tail-docking of lambs is a similar experience to a deep cut or a severe burn in a human being; it is important to know whether tail-docking is a negative experience, how negative it is, and how long it lasts.

The focus on sentience

Data from Brazil show that, when asked whether animals have feelings, 4% of people say no (16); when the question is about pain in fish, this percentage increases to 12.5% (21). After more than three centuries of Cartesianism, it is natural that both professors and students in all scientific areas, including the veterinary sciences, should be, on average, more sceptical about animal feelings. Thus, discussing animal consciousness is an essential pre-requisite for animal welfare to be taken seriously. When taught during preliminary classes, it sets the foundation on which further animal welfare concepts can be built. Otherwise, the lingering question, regardless of the specific subject of the day, might be: 'Yes, but is this really relevant?'

The fact that there are inconsistencies in perceptions of animal cognition among North American veterinary students, and of the humaneness of different procedures across animal species (12), is probably also true for South America. These inconsistencies have implications for veterinary education and animal welfare. They show the importance of discussing the most recent scientific knowledge on the distribution of sentience in the animal kingdom; for instance, the probability of animal awareness (9). This knowledge of sentience distribution should allow animal welfare work to be prioritised in an animal-centred fashion. Such knowledge is essential if the goal in teaching animal welfare is to give future veterinarians the tools to assess animal suffering and advise on the promotion of animal contentment.

The status of South America in terms of animal welfare teaching

Table II presents selected characteristics of animal welfare courses taught in six South American schools of veterinary

medicine. The content of the courses basically includes the issues mentioned above, with some variation. One frequent variation is an additional emphasis on ethological concepts, which is important when there is no specific ethology course. There have been various educational developments in Argentina, Chile, Colombia and Uruguay through regional, national and international congresses, as well as the addition of an animal welfare course, either compulsory or optional, in many veterinary schools.

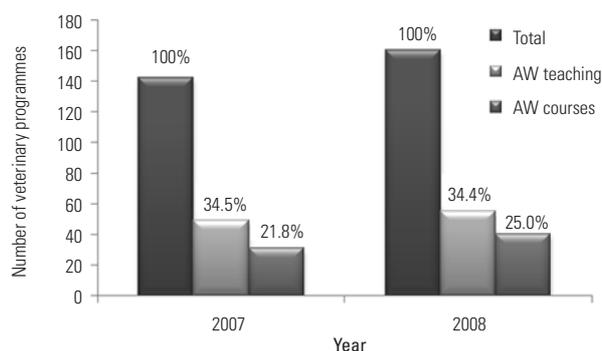
Status in Brazil

Two groups started working with applied ethology in Brazil in the 1980s, led by Professor Mateus Paranhos da Costa at Universidade Estadual Paulista and Professor Luiz Carlos Pinheiro Machado Filho at Universidade Federal de Santa Catarina. The first time an animal welfare course was taught to veterinary students was in 1999, at Universidade de Brasília. Recently, in Brazil, both animal welfare teaching and the number of veterinary programmes have become very dynamic issues. An update study was conducted through a questionnaire sent to 110 institutions that offer veterinary programmes (22). The results indicate that 34% of these veterinary programmes include animal welfare concepts, and 25% offer animal welfare as an independent course (Fig. 2). Most institutions offer animal welfare courses for students during the first three years of the programme. The teaching of animal welfare courses to veterinary students is growing faster than the number of veterinary programmes in Brazil, thus, the proportion of programmes offering animal welfare concepts is increasing. The impact of animal welfare teaching on Brazil is demonstrated by the rapid establishment of many new initiatives in animal welfare. One important motivation for these changes is the pressure from the public and society in general, particularly non-governmental animal

Table II
Selected features of the animal welfare courses taught in six South American schools of veterinary medicine

Institution, country	Year course first offered	Hours	Type	Place in the curriculum	Professor
Universidade Estadual Paulista, Jaboticabal, Brazil	2001	30	Optional	Second year	Mateus Paranhos da Costa
Universidad de La Salle, Colombia	2004	64	Optional	Fourth year	Néstor Calderón & Ricardo Mora
Universidad Nacional del Litoral, Argentina	2005	60	Compulsory since 2007	Fourth year	Roque Gastaldi
Universidad de la República del Uruguay, Uruguay	2005	30	Optional	Fourth or fifth year	Stella Huertas & Deborah Cesar
Universidade Federal do Paraná, Brazil ^{a)}	2006	60	Optional	Fourth or fifth year	Carla F. M. Molento
Universidad Austral de Chile, Chile					
Course A: Basic animal welfare	2006	45	Optional	Second year	Tamara Tadich
Course B: Applied animal welfare	2008	64	Optional	Fifth year	Carmen Gallo

a) For a list of animal welfare teaching characteristics in 55 Brazilian veterinary schools, please contact carlamolento@yahoo.com



AW: animal welfare

Fig. 2
Number of veterinary programmes in Brazil that teach animal welfare or offer animal welfare courses (21)

protection organisations, supported by advances in scientific knowledge on welfare issues. One example from the public health arena may illustrate this. Decades ago, many Brazilian cities implemented stray dog capture and elimination procedures, under World Health Organization (WHO) recommendations. A change in this strategy has now occurred for three reasons:

- pressure from no-kill animal protection groups
- pressure from animal welfare scientists and veterinarians, who studied population dynamics and realised the inadequacy of this approach
- the publication of new findings by WHO rabies experts in 2005 (28).

Stray dog control is a growing area of study in Brazil, and animal welfare knowledge is an essential asset for veterinarians who want to co-operate effectively with governmental bodies. In some cities, special attention is now given to dog identification and the promotion of better welfare for stray animals. This approach is coupled with a ‘catch, neuter and release’ programme, when feasible, while simultaneously aiming at better education and promotion of responsible pet ownership, which is the principal long-term goal.

Another example involves the welfare of farm animals. The development of farm animal welfare standards is being undertaken by both private initiatives and legislative approaches. In 2009, a private organisation was established to certify animal welfare on farms, a step which allows differential labelling of products. Ten years ago, the Brazilian Federal Environmental Act, under which it is a crime to mistreat, abuse or be cruel to animals, was passed. This law might be assumed to be available for use to prevent highly intensive production systems, but it is not specific enough. Some states have passed laws that specifically regulate farms and their treatment of animals; however, their application is presently on hold, due to

pressure from the agribusiness sector. This illustration of the Brazilian situation provides much ‘food for thought’ for those involved in animal welfare teaching, if future veterinarians are to meet the expectations of the South American public in the treatment of animals.

Challenges ahead

The need to devote a minimum of 60 hours to the subject of animal welfare is a challenge in a curriculum which is already long. To best achieve its learning objectives, animal welfare could be taught after the first three years of a five-year veterinary degree programme. At this stage, students have already studied physiology, ethology, zoonoses and production systems. The central role of ethology in this debate is highlighted by the important work of the International Society for Applied Ethology, which has led to advances in knowledge on motivation, consciousness, cognition and many other fields integral to an understanding of animal welfare. The provision of the basic courses mentioned above allows for detailed discussion of:

- how to assess animal welfare
- crucial factors in each field that are limiting or preventing improvements in animal welfare
- applied sessions on the development of viable alternative strategies to improve the welfare of animals in each of these areas.

In an ideal situation, there should also be an introduction to the subject of animal welfare in the first two years, as is the case at Universidad Austral de Chile (Table II).

Another challenge stems from the fact that most veterinary professors themselves did not learn animal welfare science during their academic careers. Moreover, it is a subject with room for a great deal of opinion on the best approach, which, in turn, can lead to considerable variation in the topics covered. For this reason, a clear and coherent programme covering the core elements of animal welfare should be developed and offered to professors as a specialisation. A study of definitions of animal welfare among Brazilian veterinary professors (15) showed a significant variation in their conceptual basis, which was much broader than the advisable underpinning ideas of:

- an animal-centred concept, which can be measured on a scale from poor welfare to good welfare (3)
- the inclusion of the key issues of natural life and behaviour, fitness and health, and contentment (27)
- the importance of how the animal feels (6).

This illustrates the need for debate and co-operation among professors and the importance of building consensus on core issues, since applied sections will depend upon, and be more variable than, fundamental concepts.

Teaching applied animal welfare issues benefits from using local information. There are two major reasons for this. First, learning is facilitated if the material is directly related to the everyday life of the students. Secondly, some of the animal welfare research conducted in industrialised countries is of limited applicability elsewhere (8). Likewise, many of the animal welfare problems in developing countries may have no equivalent in developed countries. Thus, animal welfare science is a promising field for veterinary research and development in South America. Locally published material has yet another extremely important characteristic: it is published in the local language. This removes a major barrier for students who only speak one language and makes access to the material easier for all local students.

Final considerations

For veterinarians to be able to reassure the public that all animals have acceptable welfare conditions, there is an absolute need for a compulsory animal welfare course in all veterinary training programmes. A good balance should be sought among:

- fundamental concepts of animal welfare, including definitions of animal welfare and sentience
- animal ethics, animal welfare legislation and methods of assessing animal welfare
- applied animal welfare topics, including making assessments of animal welfare in different scenarios and exercises on developing and implementing strategies for improvements.

Including local information is especially relevant when teaching animal ethics, animal welfare legislation and applied topics.

The authors conclude that it is not possible to work as a veterinarian and provide a valuable contribution to society unless the principal concepts and issues of animal welfare are thoroughly understood and incorporated into everyday practice.

It would be a positive advance if the core precepts and principles of animal welfare teaching reached animal science, agronomy and biology programmes and, in fact, all programmes directly or indirectly related to animals and/or the human-animal relationship. Monitoring the results of animal welfare education in all programmes would provide useful feedback and further help to improve animal welfare teaching, leading to the development and implementation of a more humane treatment of animals and, in turn, hopefully, a better world.

Acknowledgements

The authors would like to thank everyone who contributed valuable information to this text, especially Carmen Gallo and Néstor Tadich B. from Universidad Austral de Chile; Claus Köbrich from the Universidad de Chile; Roque Gastaldi from the Universidad Nacional del Litoral, Argentina; Roberto Kremer from the Universidad de la República del Uruguay and Pedro Pablo Martínez, Dean of Veterinary Medicine at La Salle University in Colombia and President of the Pan-American Federation of Faculties and Schools of Veterinary Science (FPFECV). The authors recognise the importance of the efforts made by the World Society for the Protection of Animals (WSPA) in promoting animal welfare teaching in South America in many ways. Particularly relevant to this study was the invitation of the WSPA to the authors to become involved as consultants to the WSPA project: 'Concepts in Animal Welfare', and the resulting networking amongst animal welfare professors.



Principales orientations pour l'enseignement du bien-être animal en Amérique du Sud

C.F.M. Molento & N. Calderón

Résumé

Le public général et les organisations internationales chargées de réglementer la profession vétérinaire attendent des vétérinaires qu'ils soient capables de percevoir l'importance du bien-être animal et de donner l'impulsion nécessaire à cette question. Cette attente plaide fortement en faveur de l'intégration du bien-être animal en tant que discipline à part entière dans les programmes d'enseignement vétérinaire. Dans cet article, les auteurs décrivent les expériences tentées à cet égard en Amérique du Sud, en soulignant la pertinence particulière accordée à certains thèmes. Ils s'inspirent des travaux majeurs publiés sur l'enseignement du bien-être animal dans les facultés de médecine vétérinaire et indiquent les priorités qu'ils ont pu identifier lors de leur propre expérience d'enseignants en Amérique du Sud, sans oublier l'expérience acquise par d'autres enseignants du continent dans ce domaine.

En outre, ils examinent les principaux enjeux du bien-être animal aujourd'hui et proposent quelques stratégies permettant d'y répondre de la meilleure façon. En conclusion, les auteurs affirment que pour exercer leur métier correctement et apporter une contribution valable à la société, les vétérinaires doivent désormais maîtriser les principaux concepts et problématiques du bien-être animal et les intégrer dans leur pratique.

Mots-clés

Amérique du Sud – Amérique latine – Bien-être animal – Enseignement vétérinaire – Humanisme – Médecine vétérinaire – Programme d'enseignement – Programme obligatoire.



Orientaciones básicas para la enseñanza del bienestar de los animales en América del Sur

C.F.M. Molento & N. Calderón

Resumen

Las entidades públicas e internacionales que reglamentan la profesión veterinaria confían plenamente en que los veterinarios, al conocer la importancia del bienestar animal, se convertirán en sus principales defensores. Por ello, es indispensable impartir formación al respecto. En este artículo se presentan la experiencia adquirida en la materia en América del Sur y los temas pertinentes a impartir, así como su justificación. Los autores se basan en las principales publicaciones internacionales sobre la enseñanza del bienestar animal a estudiantes de veterinaria y en la experiencia de otros profesores de

dicha disciplina en América del Sur. Asimismo, destacan las esferas prioritarias determinadas en la experiencia directa de la enseñanza sobre el tema en el subcontinente.

Los autores también examinan las principales dificultades con que tropieza el bienestar de los animales y proponen las mejores estrategias para enfrentarlas. En su conclusión, destacan que es preciso comprender las principales nociones y dificultades del bienestar animal, e integrarlas plenamente a la práctica, para poder ejercer la medicina veterinaria y realizar una importante contribución a la sociedad.

Palabras clave

América del Sur – América Latina – Ayuda humanitaria – Bienestar de los animales – Formación veterinaria – Medicina veterinaria – Plan de estudios – Programa de estudios obligatorio.



References

1. Beaver B.V. (2005). – Introduction: animal welfare education, a critical time in veterinary medicine. *J. vet. med. Educ.*, **32** (4), 419-421.
2. Broom D.M. (2005). – Animal welfare education: development and prospects. *J. vet. med. Educ.*, **32** (4), 438-441.
3. Broom D.M. & Fraser A. (2007). – Domestic animal behaviour and welfare, 4th Ed. CABI, Wallingford, 1-540.
4. Calderón N. (1999). – Reflexões em torno de uma ética animal. Available at: www.homeopatiaveterinaria.com.br/Reflexoes_de_uma_etica_animal.htm (accessed on 27 October 2008).
5. Consejo Profesional de Medicina Veterinaria (COMVEZCOL) (2008). – Asociación Colombiana de Facultades de Medicina Veterinaria y Zootecnia. Programas Asociados ASFAMEVEZ. Available at: www.comvezcol.org/conozcanos/asociacion.php?Tema=10 (accessed on 27 October 2008).
6. Dawkins M. (1980). – Animal suffering: the science of animal welfare. Chapman & Hall, London, 1-149.
7. Duncan I.J.H. (2005). – Science-based assessment of animal welfare: farm animals. In *Animal welfare: global issues, trends and challenges* (A.C.D. Bayvel, S.A. Rahman & A. Gavinelli, eds). *Rev. sci. tech. Off. int. Epiz.*, **24** (2), 483-492.
8. Fraser D. (2008). – Toward a global perspective on farm animal welfare. *Appl. anim. Behav. Sci.*, **113**, 330-339.
9. Griffin D.R. & Speck G.B. (2004). – New evidence of animal consciousness. *Anim. Cogn.*, **7** (1), 5-18. E-pub.: 5 December 2003.
10. Hewson C.J., Baranyiová E., Broom D.M., Cockram M.S., Galindo F., Hanlon A.J., Hänninen L., Hewson C. *et al.* (2005). – Approaches to teaching animal welfare at 13 veterinary schools worldwide. *J. vet. med. Educ.*, **32** (4), 422-437.
11. Instituto Nacional de Estudos e Pesquisas Educacionais (2008). – Cadastro das Instituições de Educação Superior. Ministério da Educação. Available at: www.educacaosuperior.inep.gov.br/funcional/lista_cursos.asp (accessed on 15 October 2008).
12. Levine E.D., Mills D.S. & Houpt K.A. (2005). – Attitudes of veterinary students at one US college toward factors relating to farm animal welfare. *J. vet. med. Educ.*, **32** (4), 481-490.
13. Manteca X., Broom D.M., Knierim U., Fatjó J., Keeling L. & Velarde A. (2005). – Teaching animal welfare to veterinary students. In *Animal bioethics – principles and teaching methods* (M. Marie, S. Edwards, G. Fandini, M. Reiss & E. von Borell, eds). Wageningen Academic Publishers, Wageningen, the Netherlands, 215-243.

14. Ministerio de Educación de Chile (2008). – Directorio de Educación Superior. Ministerio de Educación, Gobierno de Chile. Available at: <http://directorio.educasup.cl/carreras.php> (accessed on 15 October 2008).
 15. Molento C.F.M. (2005). – Brazilian veterinary professors' perception of animal welfare and sentience. In From Darwin to Dawkins: the science and implications of animal sentience – poster abstracts. Compassion in World Farming Trust, London, 31.
 16. Molento C.F.M., Battisti M.K.B. & Rego M.I.C. (2001). – The attitude toward animals: people from the Northwestern region of the State of Paraná, Southern Brazil. In International Conference on Human-animal Interactions: abstracts. ARCA Brasil [Humane Society]/Association Française d'Information et de Recherche sur l'Animal de Compagnie/World Health Organization, 13-15 September, Rio de Janeiro, 75.
 17. Molento M.B. & Molento C.F.M. (2006). – Ensino do diagnóstico do grau de anemia pelo método FAMACHA preservando a integridade dos animais. In I Congresso Internacional de Conceitos em Bem-estar Animal – Teoria, Docência, Aplicação, 16-18 October, Rio de Janeiro. World Society for the Protection of Animals, Rio de Janeiro.
 18. Nordenfelt L. (2006). – Animal and human health and welfare: a comparative philosophical analysis. CABI, Wallingford, United Kingdom, 1-190.
 19. Pan-American Federation of Faculties and Schools of Veterinary Science (FPFECV) (2008). – Miembros. Facultad de Ciencias Veterinarias de La Universidad Austral de Chile. Available at: www.medicinaveterinaria.cl/federacion/miembros.htm (accessed on 15 October 2008).
 20. Paul E.S. & Podberscek A.L. (2000). – Veterinary education and students' attitudes towards animal welfare. *Vet. Rec.*, **146** (10), 269-272.
 21. Pedrazzani A.S. & Molento C.F.M. (2008). – Opinião pública e educação sobre abate humanitário de peixes no município de Araucária, Paraná. *Ciê. anim. bras.*, **9** (4), 976-983.
 22. Quadros J. & Molento C.F.M. (2008). – Ensino de bem-estar animal para médicos veterinários no Brasil: atualização 2008. 35º Conbravet – Congresso Brasileiro de Medicina Veterinária, 19-22 October, Gramado.
 23. Silva R.M. (2003). – Avaliação do método de ensino da técnica cirúrgica utilizando cadáveres quimicamente preservados. MSc Thesis, Universidade de São Paulo, São Paulo, 1-116.
 24. Silva R.M., Matera J.M. & Ribeiro A.A. (2007). – New alternative methods to teach surgical techniques for veterinary medicine students despite the absence of living animals. Is that an academic paradox? *Anatom. histol. embryol.*, **36** (3), 220-224.
 25. Vallat B. (2005). – Preface. In Animal welfare: global issues, trends and challenges (A.C.D. Bayvel, S.A. Rahman & A. Gavinelli, eds). *Rev. sci. tech. Off. int. Epiz.*, **24** (2), 467-468.
 26. Vonesch A. (2005). – Associations are changing public opinion and breeding methods to improve animal well being (M. Marie, S. Edwards, G. Fandini, M. Reiss & E. von Borell, eds). Wageningen Academic Publishers, Wageningen, the Netherlands, 133-155.
 27. Webster J. (2005). – Animal welfare: limping towards Eden, 2nd Ed. Blackwell Publishing Ltd, Oxford.
 28. World Health Organization (WHO) (2005). – WHO Health Organization Expert Consultation on Rabies. *WHO tech. Rep. Ser.*, **931**, 1-88.
 29. World Veterinary Association (WVA) (2008). – Universities, institutions, colleges and schools awarding veterinary degrees. Available at: <http://worldvet.org/docs/GlobalVetSchools.pdf> (accessed on 15 October 2008).
-

