



Ciência Rural

ISSN: 0103-8478

cienciarural@mail.ufsm.br

Universidade Federal de Santa Maria
Brasil

Tamioso, Priscilla Regina; Bittencourt Guimarães, Paulo Ricardo; Forte Maiolino Molento, Carla

Attitudes of South Brazilian sheep farmers to animal welfare and sentience

Ciência Rural, vol. 47, núm. 12, diciembre, 2017, pp. 1-6

Universidade Federal de Santa Maria

Santa Maria, Brasil

Available in: <http://www.redalyc.org/articulo.oa?id=33153635020>

- How to cite
- Complete issue
- More information about this article
- Journal's homepage in redalyc.org

redalyc.org

Scientific Information System

Network of Scientific Journals from Latin America, the Caribbean, Spain and Portugal

Non-profit academic project, developed under the open access initiative

Attitudes of South Brazilian sheep farmers to animal welfare and sentience

Priscilla Regina Tamioso^{1*} Paulo Ricardo Bittencourt Guimarães² Carla Forte Maiolino Molento¹

¹Laboratório de Bem-estar Animal (LABEA), Departamento de Zootecnia, Universidade Federal do Paraná (UFPR), 80035-050, Curitiba, PR, Brasil. E-mail: priscillatamioso@gmail.com. *Corresponding author.

²Departamento de Estatística, Universidade Federal do Paraná (UFPR), Curitiba, PR, Brasil.

ABSTRACT: We investigated self-reported attitudes of 148 South Brazilian sheep farmers to animal welfare and sentience. Many farmers (73.0%) knew animal welfare superficially. Farmers that worked for longer in the sheep industry and that raised sheep for commercial purposes mentioned more commonly that they had knowledge about animal welfare ($P<0.05$). Terms related to freedom from hunger, thirst and malnutrition were the most used to define animal welfare, cited 24.9% of the times. The majority claimed that their animals experience good levels of welfare (93.2%), especially farmers that kept bigger flocks ($P<0.05$). However, many respondents believed that sheep welfare could be improved on their farms (71.6%), mainly farmers with less experience in the sheep industry ($P<0.01$). High scores of sentience were attributed to sheep by farmers with frequent contact with their animals ($P<0.05$). According to the farmers, castration causes the highest levels of suffering to sheep (32.4%) and shearing, the lowest (50.0%). South Brazilian farmer knowledge about animal welfare, attitudes to sentience and recognition of suffering need improvement.

Key words: animal welfare, emotions, opinion, perception.

Atitudes de ovinocultores do sul do Brasil em relação a bem-estar e sentiência animal

RESUMO: Objetivou-se estudar as atitudes de 148 ovinocultores do sul do Brasil em relação a bem-estar e sentiência animal. A maioria dos produtores (73,0%) conhecia bem-estar animal superficialmente. Produtores que trabalhavam mais tempo na indústria ovina e que criavam ovinos para fins comerciais mencionaram mais comumente que tinham conhecimento sobre bem-estar animal ($P<0,05$). Termos relacionados à liberdade de fome, sede e desnutrição foram os mais usados para definir bem-estar animal, citado 24,9% das vezes pelos produtores. A maioria afirmou que seus animais possuem níveis adequados de bem-estar (93,2%), especialmente produtores que mantinham rebanhos maiores ($P<0,05$). No entanto, muitos respondentes acreditavam que o bem-estar dos ovinos poderia ser melhorado em suas fazendas (71,6%), principalmente produtores com menos experiência na indústria ovina ($P<0,01$). Altos escores de sentiência foram atribuídos a ovinos por produtores com contato frequente com seus animais ($P<0,05$). De acordo com os produtores, a castração causa os maiores níveis de sofrimento aos ovinos (32,4%) e a tosquia, os menores (50,0%). O conhecimento de produtores do sul do Brasil sobre bem-estar animal, as atitudes em relação à sentiência e o reconhecimento do sofrimento precisam ser melhorados.

Palavras-chave: bem-estar animal, emoções, opinião, percepção.

INTRODUCTION

Investigations about the perception and attitude of farmers to animal welfare have been reported in the literature and revealed important views about the subject. TE VELDE et al. (2002) observed that farmers showed some knowledge about policies and regulation in animal welfare, although they were not prone to alternative ways of farming with special attention to animal welfare. Farmers' perceptions and attitudes may also be directly and

strongly associated with their behaviour towards animals and subsequent behaviour of the animals and their production (HEMSWORTH et al., 2002).

Attribution of sentience to animals may also affect human-animal relationships and attitudes toward animals. A positive relation between the recognition of an animal mind, i.e., the extent to which animals have awareness, thoughts and emotions, and animal welfare has been reported (MORRIS et al., 2012). HILLS (1993) noted that Australian farmers supported human dominance over animals and

showed lower levels of empathy towards animals that had lower instrumental significance for them, when compared to animal rights supporters and members of the urban public. As attitudes are learnt and changed with experience (AJZEN, 2005), we believe that positive attitudes to welfare and sentience in animals may subsequently influence the behaviour of farmers toward the animals. Thus, our research aimed to investigate the attitudes of sheep farmers to animal welfare and sentience.

MATERIALS AND METHODS

The total number of sheep in Brazil was estimated at 18 410 551 animals, being the Northeast region the greatest sheep producer (60.6%), followed by the South region (26.5%) (IBGE, 2015). In the state of Parana, the total number of sheep was estimated at 614 749 animals; i.e., 3.3% of the total number of sheep in Brazil (IBGE, 2015). In Brazil, the number of sheep farms was estimated at 438 623, from a total of 365 754 owners (IBGE, 2006). In the state of Parana, there were 17 434 sheep farms and 15 960 owners (IBGE, 2006). Data provided by the Sheep Breeders Associations of Parana contained 312 contacts of sheep farmers. From these, 78 did not raise sheep in Paraná anymore, 48 could not be contacted through telephone or email, 24 did not want to participate in the survey and 14 contacts were duplicated from the same farmers. In total, 148 sheep farmers were successfully interviewed by telephone. The interviews comprised a sample with a margin of error equal to 8% and confidence level of 95%. The study was conducted from December 2014 to May 2015.

The questionnaire consisted of 19 questions; the first section was composed of demographic and general data on gender, age, education, flock size, sheep breed, farming system, experience in the sheep industry, contact with sheep and purpose of production ($n=9$). The interview then proceeded with a section on questions about animal welfare ($n=4$). Then, the farmers were asked to respond questions about sheep welfare and sentience ($n=5$). The last section covered one question on levels of emotions in different species of animals. The interviews lasted on average 30 minutes, ranging from 20 to 40 minutes.

Descriptive analysis was conducted in Excel, where absolute and relative frequencies were plotted against some variables of interest, as gender, education, flock size, experience in the sheep industry, contact with sheep and purpose of production. After, data were analyzed using Statistica Software, version 7.0. Chi-square or

Fisher's exact tests were used to verify significant associations between the variables of interest for each question. Statistical significance level was set to $P<0.05$. Open questions on the definition of animal welfare, the most important aspects of animal farming that contribute to good animal welfare and the most difficult welfare aspects to improve on the farm were categorized according to the perspective of the Five Freedoms (FAWC, 1992). For example, "sheep must be fed and have water ad libitum, and veterinary care", from a male farmer aged at 52 years-old, was categorized in both freedom from hunger, thirst and malnutrition and freedom from pain, injury and disease. Answers that could not be included in the Five Freedoms, as "the animals must be far from the human being", from a male farmer aged at 49 years-old, were categorized as Other.

RESULTS AND DISCUSSION

Demographic data

The majority (84.5%; 125/148) was male farmers and 15.5%, female farmers (23/148). The age of the study population ranged from 40-49 (27.7%; 41/148), 50-59 (25.7%; 38/148) and 60 years-old or more (22.9%; 34/148); most farmers (41.9%, 62/148) completed higher education; flock sizes were mainly less than 100 sheep (40.5%, 60/148). Sheep breeds raised on the farms were mainly Texel (41.2%, 61/148), Santa Inês (22.3%, 33/148) and Île-de-France (16.2%, 24/148). One hundred and twenty eight farmers (86.5%) kept their sheep in semi-intensive systems. Most of the farmers (35.9%, 53/148) had more than 20 years of experience with sheep. Eighty three (56.1%) respondents had daily contact with their animals. Sixty-five (43.9%) and 61 (41.2%) farmers raised sheep for commercial purposes and for both own consumption and commercial purposes, respectively.

Animal welfare

Most of the farmers responded that they had superficial knowledge about animal welfare (73.0%; 103/148). Farmers who worked for longer in the sheep industry ($P=0.045$) and those who raised sheep for commercial purposes ($P=0.0035$) had more knowledge about animal welfare. Therefore, we detected that knowledge on animal welfare was higher among farmers that probably had more monetary gains, the opposite as reported by KILIÇ & BOZKURT (2013). However, further studies are necessary to understand the relation between knowledge of animal welfare and different factors of sheep farming.

The respondents that claimed to know animal welfare, defined the subject using terms related to freedom from hunger, thirst and malnutrition (24.9%; 71/285), freedom from pain, injury and disease (23.2%; 66/285) and freedom from discomfort (22.1%; 63/285). TE VELDE et al. (2002) observed that farmers defined animal welfare in terms of physical health, i.e., if an animal eats well, it is healthy and it has a good level of welfare. Farmers answered that the most important aspects of animal farming that contribute to good animal welfare comprised freedom from hunger, thirst and malnutrition (33.4%; 109/326) and freedom from discomfort (24.8%; 81/326). VANHONACKER et al. (2008) also reported that dimensions associated with feed and water and animal health were considered to be the most important by citizens and farmers when obtaining a suitable level of farm animal welfare. Our study showed that the perception of important aspects of animal farming may be associated with the terms used by the farmers to define animal welfare.

When asked if welfare is considered for livestock species, different responses were given: for 27.0% (40/148) of the farmers, animal welfare is considered a few times, for 24.3% (36/148) animal welfare is considered half of the times and for 20.3% (30/148), it is never taken into consideration. The plurality of opinions given by farmers did not allow any guidance on their attitudes. It appears that the superficial knowledge about animal welfare contributed to the limited view on how it may be applied to the livestock scenario.

Sheep welfare and sentience

One hundred thirty-eight (93.2%) believed that sheep on their farms had a good level of welfare, as also observed by farmers in a study by TE VELDE et al. (2002). We also noted that the bigger the flock size, the higher was the level of welfare attributed by farmers to sheep on their farms ($P=0.04$). KILIÇ & BOZKURT (2013), however, reported a negative correlation between animal welfare and farm size. As animal welfare was defined mostly in terms of health and nutrition by the farmers in our study, it is evident that farmers' perception of animal welfare was deficient and, thus, it is impossible to estimate whether sheep experienced adequate degrees of welfare. A total of 71.6% (106/148) responded that the level of welfare of their animals could be improved. Higher number of farmers with less experience in sheep industry responded that animal welfare could be improved on their farms ($P=0.008$), pointing to the recognition of better levels of farm animal welfare by such respondents.

For the farmers, the most difficult aspects to be improved were related to the freedom from discomfort (28.3%; 47/166) and freedom from hunger, thirst and malnutrition (27.1%; 45/166). Australian sheep farmers also reported that poor nutrition was considered the biggest welfare issue on their farms, followed by fly strike, drinking water availability, intestinal parasites, among others (PHILLIPS & PHILLIPS, 2010). Experience in the sheep industry was associated with specific welfare aspects to be improved; for example, the majority of respondents who included aspects related to freedom from pain, injury and disease (13.3%; 22/166) were farmers with less experience ($P=0.04$), which suggested higher perception of presence of diseases and pain in sheep by farmers that work with sheep for shorter periods of time. On the opposite, more farmers with more experience reported that no welfare aspect needed to be improved ($P=0.0095$). Such result indicated that farmers with more experience may not perceive welfare problems, which requires special attention.

Seventy-five (50.7%) and 58 (39.2%) farmers agreed and strongly agreed, respectively, that sheep that are healthy and grow well have their welfare guaranteed. It is interesting to note that agreement with this statement was mainly given by farmers that raised sheep for commercial purposes ($P=0.02$). PHILLIPS & PHILLIPS (2010) also reported that several sheep farmers related animal welfare to productivity, mentioning that happy sheep produce more. Results from both studies reinforce a recurring idea that welfare is mainly related to physical health, fast growth and food conversion; thus, it is necessary that the farmers be clearly explained that animal welfare comprises different factors.

When asked if sheep that are raised indoors, under intensive management systems, have low levels of welfare, different answers were observed: 45.9% (68/148) agreed, 20.9% (31/148) disagreed and 16.2% (24/148) were unsure. It is known that extensive farming provides the animals the opportunity to engage in natural behaviour, despite exposing them to more environmental challenges; on the opposite, confinement systems enable farmers to protect their animals from predation, some parasites and harsh weather. It seems necessary to promote thinking on different aspects and restrictions of indoor and outdoor systems in order to provide improved levels of welfare to the animals.

On sheep sentience, 78 (52.7%) and 54 (36.5%) agreed and strongly agreed, respectively, that sheep clearly distinguish between handler and other people. A higher level of perception regarding

the cognitive abilities of sheep was scored by farmers that had frequent contact with their animals ($P=0.003$). The literature reports evidences of sheep complex recognition skills (KENDRICK et al., 2001). The majority of farmers agreed (54.7%; 81/148) and strongly agreed (33.8%; 50/148) that sheep are able to feel emotions; 6.8% (10/148) of the farmers were unsure, pointing to a high perception of sheep sentience by the studied farmers.

A total of 51.4% (76/148) and 29.7% (44/148) agreed and strongly agreed, respectively, that sheep clearly express how they feel, that is why it is easy to identify if they are in positive or negative situations. Most of Turkish farmers also believed that sheep are sentient beings (KILIÇ & BOZKURT, 2013). Recognition that sheep feel emotions has a very important application, since it may contribute to a positive behaviour of the farmers towards sheep management. Higher scores of perception of sentience were rated by farmers that had frequent contact with sheep ($P=0.02$). It is documented that familiarity with animals strongly influences people's beliefs about animal sentience (MORRIS et al., 2012).

On animal suffering generated by management procedures performed in sheep farming, 39.2% (58/148) and 28.4% (42/148) responded that identification through methods regularly employed, as ear tattooing and tagging, cause mild and moderate suffering to sheep respectively (Figure 1). Welfare problems related to the use of ear tags have been reported in the literature. EDWARDS & JOHNSTON (1999) examined 1040 sheep ears with tag and reported that only the plastic ear tags caused slight to moderate ear damage to approximately 28% of the studied sheep. Alternative methods to metal and plastic tags, as the electronic tags, should be further studied and encouraged as they might cause less suffering to sheep.

Regarding castration, 32.4% (48/148) and 31.8% (47/148) reported that sheep experience severe and very severe levels of suffering, respectively (Figure 1). Different methods of castration can be applied, but the most used technique includes the application of an elastrator ring. There is strong evidence that castration through such technique induces acute and chronic pain in lambs. In a review study, STAFFORD & MELLOR (2005) suggested that surgical castration should be preferred to the ring method if management permits, and the use of local anaesthetic should be encouraged.

In relation to tail docking, the majority (31.8%; 47/148) attributed moderate suffering to sheep

(Figure 1). Suffering caused by castration was rated higher than that caused by tail docking, as also observed by DWYER (2009) in a study with British sheep farmers. It is clear that tail docking, as well as castration, causes suffering to the animals involved, so it is necessary to invest in more studies to find other alternatives.

Fifty-one percent (75/148) of farmers responded that sheep do not suffer when sheared (Figure 1). Nine farmers mentioned that shearing is beneficial to sheep welfare at the start of hot seasons. However, if not conducted properly, shearing may cause injuries to sheep; some authors also reported that shearing may cause stress to sheep (SANGER et al., 2011). In cases that wool production is not viewed as a financial resource for farmers, raising woolless sheep breeds or genetic selection to reduced fleece may be interesting strategies to be considered.

Reproductive techniques were perceived as attached to different levels of suffering: 24.5% (36/147) attributed moderate suffering, 23.8% (35/147) no suffering and 21.1% (31/147) mild suffering (Figure 1). Variety of responses indicates that many farmers did not know about the impact of the techniques on sheep welfare. The use of breeding techniques in sheep industry has grown significantly; however, the impact on animal welfare has not been adequately discussed. MURRAY & WARD (1993) reviewed the welfare implications of available breeding technologies and concluded that while laparoscopic techniques can be effective in reducing timescales for breeding rates, adverse experiences for females may impact negatively on animal welfare. It seems that more studies are necessary to evaluate the real effect of reproductive techniques on sheep welfare.

When questioned about weaning, 31.8% (47/148) responded that sheep suffer moderately (Figure 1). Different ages to wean lambs and its behavioural and physiological consequences to ewes and lambs are reported in the literature (SEVI et al., 2003). As weaning is a regular management procedure, it seems mandatory to find new strategies to avoid suffering. Higher level of suffering in weaning was attributed by farmers that had bigger sheep flocks ($P=0.01$). Farmers that raised sheep for commercial purposes believed that animals experience higher levels of suffering than farmers that raised sheep for their own consumption during weaning ($P=0.02$). Relation between higher levels of suffering, bigger flocks and commercial view on the production is an interesting result that has not been reported in the literature and demands further investigations.

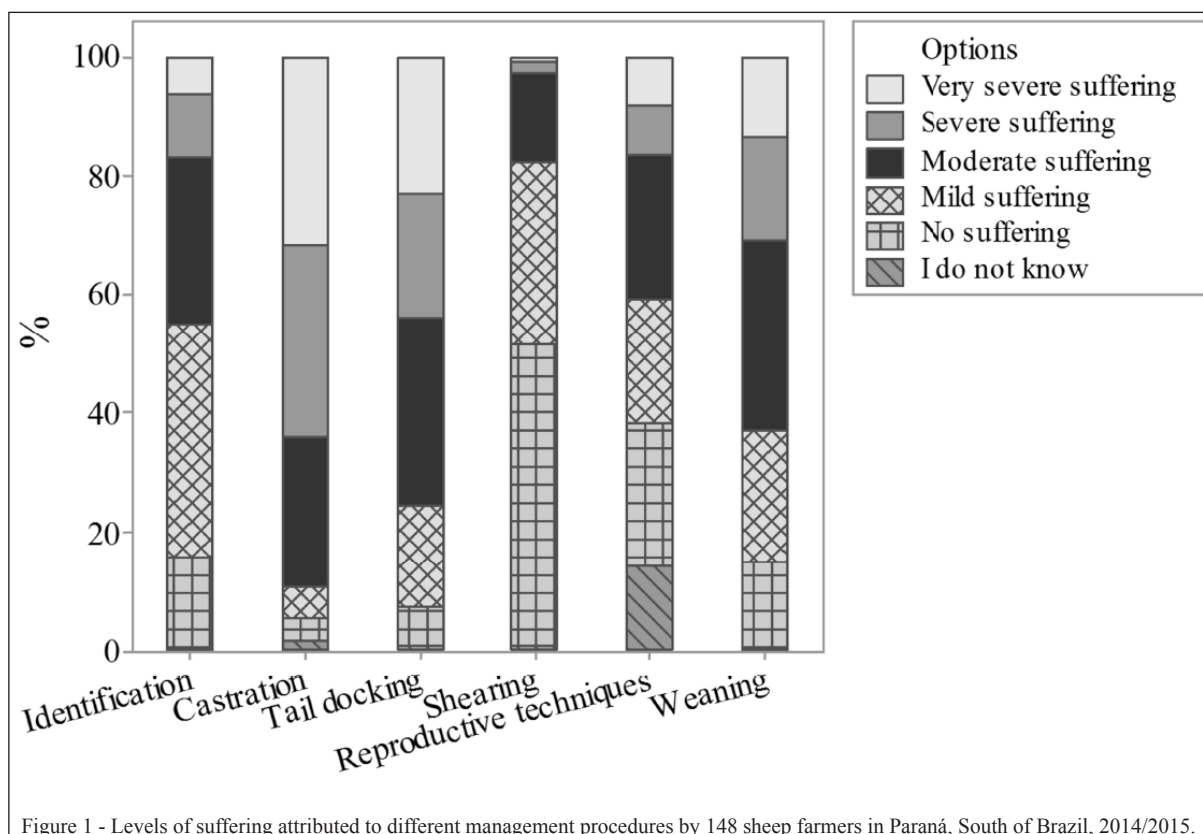


Figure 1 - Levels of suffering attributed to different management procedures by 148 sheep farmers in Paraná, South of Brazil, 2014/2015.

Emotions in different species of animals

The majority of farmers claimed that they did not know about the emotional capacities of pigeon (48.0%; 71/148), butterfly (56.1%; 86/148), fish (29.7%; 44/148) and cockroach (42.6%; 63/148). Uncertain opinions might be considered a negative attitude or feeling towards these animals. The human baby and dog were scored the highest emotional capacities by 92.6% (137/148) and 82.4% (122/148) of farmers, respectively. Thirty-nine (26.4%) scored the highest rate and 32 (21.6%) did not know about sentience of rats. Chicken was rated different levels of sentience abilities: 26.4% (39/148) for the highest level and 25.7% (38/148) for moderate levels of sentience. For both sheep and cattle, similar emotional capacities were observed: 58.1% (86/148) and 53.4% (79/148) of the respondents, respectively, scored the highest level of sentience. It is noteworthy saying that no farmer scored the lowest rate for sheep (i.e. sheep do not experience emotions). Wolves were rated the highest capacity of sentience by 38.5% of the farmers (57/148). A hierarchy of sentience was observed, being the mammals the highest scored animals, followed by birds, pigeons, fish, and invertebrates. Literature data show that humans usually prefer

animals that are more phylogenetically, behaviourally or physically close to humans (SERPELL, 2004).

Females attributed higher levels of emotions to chicken ($P=0.01$) and sheep ($P=0.03$) than male farmers. Women are generally reported to be more sensitive and emphatic towards animals than men (TAYLOR & SIGNAL, 2005). Results may be explained by the fact that the female farmers were probably responsible for taking care of the animals raised on the farm, and, consequently, they have more familiarity to them. It is the first time that the position of farmers concerning the sentience of different species is reported, providing additional support for actions aiming to include them in welfare legislations.

CONCLUSION

Our results indicated that Brazilian sheep farmer knowledge of animal welfare, attitudes to sentience and recognition of suffering due to specific procedures need improvement. As arguments for animal protection are founded on evidences and beliefs that animals have emotions, it is hoped that farmers' recognition of sentience helps both modifying practices that generate low welfare and applying legislation to promote sheep welfare.

ACKNOWLEDGMENTS

The authors acknowledge Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) for funding and supporting the project. The authors are grateful to the sheep farmers, as well as Adapar, Ovinopar and Cooperaliança which kindly helped with the farmers' contacts. Special acknowledgment is extended to Daniel Santiago Rucinque and Janayna Navroski who kindly helped with the interviews.

BIOETHICS AND BIOSSECURITY COMMITTEE APPROVAL

The study was approved by the Human Research Ethics Committee of the Universidade Federal do Paraná (CEP/SCS/UFPR), under protocol number 814 835/2014.

REFERENCES

- AJZEN, I. **Attitudes, personality, and behavior**. United Kingdom: McGraw-Hill Education, 2005. 192p.
- DWYER, C.M. Welfare of sheep: Providing for welfare in an extensive environment. **Small Ruminant Research**, v.86, p.14-21, 2009. Available from: <<http://www.sciencedirect.com/science/article/pii/S0921448809001680>>. Accessed: Apr. 21, 2016. doi: 10.1016/j.smallrumres.2009.09.010.
- EDWARDS, D.S.; JOHNSTON, A.M. Welfare implications of sheep ear tags. **Veterinary Record**, v.144, p.603-606, 1999. Available from: <<https://www.ncbi.nlm.nih.gov/pubmed/10390799>>. Accessed: Mar. 16, 2016. doi: 10.1136/vr.144.22.603.
- FARM ANIMAL WELFARE COUNCIL FAWC updates the five freedoms. **Veterinary Record**, v.17, p.357, 1992. Available from: <<http://ci.nii.ac.jp/naid/10029401612>>. Accessed: Mar. 16, 2016.
- HEMSWORTH, P.H. et al. The effects of cognitive behavioral intervention on the attitude and behavior of stockpersons and the behavior and productivity of commercial dairy cows. **Journal of Animal Science**, v.80, p.68-78, 2002. Available from: <<https://www.ncbi.nlm.nih.gov/pubmed/11831530>>. Accessed: Apr. 21, 2016. doi: 10.2527/2002.80168x.
- HILLS, A.M. The motivational bases of attitudes toward animals. **Society & Animals**, v.1, p.111-128, 1993. Available from: <<http://booksandjournals.brillonline.com/content/journals/10.1163/156853093x00028>>. Accessed: Mar. 16, 2016. doi: 10.1163/156853093X00028.
- IBGE (INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA). **Censo agropecuário 2006**, 2006. Available from: <<https://sidra.ibge.gov.br/tabela/966>>. Accessed: Feb. 10, 2016.
- IBGE (INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA). **Banco de dados agregados**. Efetivo dos rebanhos, por tipo de rebanho, 2015. Available from: <<https://sidra.ibge.gov.br/tabela/3939>>. Accessed: Feb. 10, 2016.
- KENDRICK, K.M. et al. Sheep don't forget a face. **Nature**, v.414, p.165-166, 2001. Available from: <<https://www.nature.com/nature/journal/v414/n6860/abs/414165a0.html>>. Accessed: Apr. 21, 2016. doi: 10.1038/35102669.
- KILIÇ, I.; BOZKURT, Z. The relationship between farmers' perceptions and animal welfare standards in sheep farms. **Asian-Australasian Journal of Animal Science**, v.26, p.1329-1338, 2013. Available from: <<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4093410>>. Accessed: Mar. 16, 2016. doi: 10.5713/ajas.2013.13124.
- MORRIS, P. et al. Belief in animal mind: does familiarity with animals influence beliefs about animal emotions? **Society & Animals**, v.20, p.211-224, 2012. Available from: <<http://booksandjournals.brillonline.com/content/journals/10.1163/15685306-12341234>>. Accessed: Apr. 21, 2016. doi: 10.1163/15685306-12341234.
- MURRAY, R.D.; WARD, W.R. Welfare implications of modern artificial breeding techniques for dairy cattle and sheep. **Veterinary Record**, v.133, p.283-286, 1993. Available from: <<http://europepmc.org/abstract/med/8236655>>. Accessed: Apr. 21, 2016. doi: 10.1136/vr.133.12.283.
- PHILLIPS, C.J.C.; PHILLIPS, A.P. Attitudes of Australian sheep farmers to animal welfare. **Journal of International Farm Management**, v.5, p.1-26, 2010. Available from: <<http://www.ingentaconnect.com/content/iagrm/jifm/2010/00000005/00000002/art00006>>. Accessed: Mar. 16, 2016.
- SANGER, M.E. et al. Sheep exhibit a positive judgement bias and stress-induced hyperthermia following shearing. **Applied Animal Behaviour Science**, v.131, p.94-103, 2011. Available from: <<http://www.sciencedirect.com/science/article/pii/S0168159111000505>>. Accessed: Apr. 21, 2016. doi: 10.1016/j.applanim.2011.02.001.
- SERPELL, J.A. Factors influencing human attitudes to animals and their welfare. **Animal Welfare**, v.13, p.145-151, 2004. Available from: <<http://www.ingentaconnect.com/content/ufaw/aw/2004/00000013/a00101s1/art00021>>. Accessed: Mar. 16, 2016.
- SEVI, A. et al. The effect of a gradual separation from the mother on later behavioural, immune and endocrine alterations in artificially reared lambs. **Applied Animal Behaviour Science**, v.83, p.41-53, 2003. Available from: <<http://www.sciencedirect.com/science/article/pii/S0168159103000881>>. Accessed: Mar. 16, 2016. doi: 10.1016/S0168-1591(03)00088-1.
- STAFFORD, K.J.; MELLOR, D.J. The welfare significance of the castration of cattle: a review. **New Zealand Veterinary Journal**, v.53, p.271-278, 2005. Available from: <<http://www.tandfonline.com/doi/abs/10.1080/00480169.2005.36560>>. Accessed: Mar. 16, 2016. doi: 10.1080/00480169.2005.36560.
- TAYLOR, N.; SIGNAL, T.D. Empathy and attitudes to animals. **Anthrozoös**, v.18, p.18-27, 2005. Available from: <<http://www.tandfonline.com/doi/abs/10.2752/089279305785594342>>. Accessed: Apr. 21, 2016. doi: 10.2752/089279305785594342.
- TE VELDE, H. et al. Dealing with ambivalence: farmers' and consumers' perceptions of animal welfare in livestock breeding. **Journal of Agricultural and Environmental Ethics**, v.15, p.203-219, 2002. Available from: <<https://link.springer.com/article/10.1023%2FA%3A1015012403331?LI=true>>. Accessed: Mar. 16, 2016. doi: 10.1023/A:1015012403331.
- VANHONACKER, F. et al. Do citizens and farmers interpret the concept of farm animal welfare differently? **Livestock Science**, v.116, p.126-136, 2008. Available from: <<http://www.sciencedirect.com/science/article/pii/S1871141307004830>>. Accessed: Apr. 21, 2016. doi: 10.1016/j.livsci.2007.09.017.