Attitudes of Australian sheep farmers to animal welfare

CJC and AP Phillips

Centre for Animal Welfare and Ethics, School of Veterinary Science, University of Queensland, Gatton 4343, Australia

Abstract

Previous research has indicated that Australian sheep farmers believe that long-term welfare issues, such as parasite control and poor stockmanship, are more important welfare problems for sheep than short-term painful procedures, such as castration, whereas the reverse was true for animal welfare activists. There is therefore an incongruity between the welfare issues that Australian livestock farmers believe to be most serious on their properties and those that are the focus of activist campaigns. This could either be due to farmers becoming desensitized over time to the exhibition of pain by their stock following invasive procedures or because of their better understanding of the factors affecting their animals' welfare. A nominated sample of 22 Australian sheep farmers were visited to conduct semi-structured interviews on the major welfare problems on their properties and those facing the industry, as well as factors influencing their sensitivity to animal welfare issues and how these had changed over time.

Responses were examined for themes, and a report was circulated to the farmers with mean responses and anonymised common viewpoints in a Delphi process. Sheep farmers reported that poor nutrition was considered the biggest welfare issue on their farms, but public opposition to the mulesing operation was recognised as the biggest challenge for the industry. Farmers proclaimed a caring attitude towards their animals, which they believed was mostly self generated, influenced in part by their spouse and father. Most farmers thought that their sensitivity to welfare was unchanged over time. They also considered that husbandry advances had improved the welfare of their animals over the course of their involvement in the industry. Farmers made little use of pain control, mainly because of the cost and time required to administer it. The importance of long term welfare issues, in particular nutrition, was confirmed in interviews with the sheep farmers. There was little evidence of farmers becoming desensitized to pain responses in their sheep, although they did not generally seek to mitigate these with pain relief.

Keywords: Animal welfare, Attitude, Australia, Farmer, Sheep

Implications

This research found that Australian sheep farmers had concern for the welfare of their animals and that their sensitivity was believed to be largely self-generated and constant over time. Their belief that inadequate nutrition was the most serious welfare issue on their farms confirms a recent survey finding that farmers view long term husbandry issues as their most serious welfare problems, but it conflicts with the previously recorded views of activist groups, who tend to regard invasive practices and mutilations as the major

issues. Activist groups may be influenced by this in their choice of campaign focus. The lack of use of pain relief is a source of concern given the previously-reported view in Australia that it could play a major role in improving the welfare impact of potentially aversive procedures.

Introduction

The Australian sheep industry contains many extensive farms, which are acknowledged to have different welfare issues compared to intensive sheep production farms (Goddard et al., 2006). The public perception that extensive farms are naturally better for animals may be driven by media misconceptions and be inaccurate (Goddard et al., 2006). In a review of sheep welfare issues in Australia conducted by scientists and industry/welfare groups' representatives in 2002, it was reported that the industry had received little attention from animal welfare groups, but that this was likely to change (Cronin et al., 2002). Five priority welfare issues were identified: land transport; emergency planning during live export; mortality of lambs, and adults post-shearing and during transport; mulesing and stockmanship. Of less importance were environmental planning (for drought, fire and flood); disease control; mortality during live export as a result of salmonellosis, inanition, etc; feedlots; predation; and husbandry procedures: castration, shearing, dipping and tail docking. A subsequent review conducted in 2005 of welfare priorities for sheep production in Australia compared the views of seven stakeholder groups identified for the industry: farmers, livestock transportation representatives, veterinarians, meat processors, animal welfare advocates, animal welfare scientists and government officers (Phillips et al., 2009). Differences in opinion were evident between

respondent groups, with animal welfare advocates tending to focus more on painful procedures more than those with direct involvement in the industry. Mulesing (surgical removal of loose skin on the hindquarters of sheep) was rated as the most serious issue by animal welfare advocates, whereas other groups all rated parasite control highest, supporting the view of British hill sheep farmers that ectoparasites are the most serious health issue that impacts on welfare (Waterhouse et al., 2003). The use of pain relief during routine aversive husbandry procedures, rather than the method, was believed to have significant influence on the welfare impact. As evidence of the impact of activist groups on painful procedures, a recent campaign by the activist group, People for the Ethical Treatment of Animals, resulted in a decision by the Australian wool industry representative body to terminate mulesing in Australia by the end of 2010. The focus of activists' attitudes on painful procedures is also evident in Europe. In a survey of Belgian citizens and farmers on their beliefs about contributors to animal welfare one of the biggest differences was the citizen's much stronger belief than farmers that avoidance of pain is essential for good welfare of farm animals (Vanhonacker et al., 2008).

This incongruity between the perceptions of the major welfare issues by members of the welfare groups (painful procedures) and livestock farmers (long-term husbandry issues) (Phillips et al., 2009) could derive from several factors. Farmers could have become desensitized to exhibitions of pain by their animals. Alternatively welfare advocates could focus on painful procedures because of their appeal to the public, who may have little understanding of husbandry systems, or they themselves may lack an adequate understanding of the welfare implications of different husbandry practices or they may

view painful procedures as easier to change than long term issues. A series of interviews with Australian sheep farmers was conducted to explore their attitudes to the welfare of sheep on their farms, how their sensitivity to welfare issues, and in particular painful procedures, had changed over time, how it was influenced, and their attitude to the use of pain relief during husbandry procedures.

Materials and Method

A sample of Australian sheep farmers was selected for on-farm interview, in order to determine their attitudes to welfare issues. The sample was obtained using contact details of suitable farmers provided by the main industry body, Meat and Livestock Australia (MLA), and also through personal contacts. Farmers were chosen by MLA on the basis of their leadership in livestock production, their geographic distribution and their willingness to receive a visit. MLA staff sent out an explanatory, supportive letter to 22 farmers identified as suitable, requesting that those who did not want to receive a visit should notify them. No responses were received. Farmers were told that the study aimed firstly to investigate attitudes of sheep farmers to animal welfare and secondly to learn more about how sheep were managed in their production system, the latter being necessary for the research team to adequately interpret the former. Care was taken to ensure that farmers were not aware of any preconceived hypotheses about the major welfare concerns. Following receipt of the contact details from MLA the research team sent an e-mail to 19 farmers outlining the study and proposing a date for the visit, with three farmers being considered unsuitable because of their location. Five farmers did not reply to this e-mail and were not contactable by phone. All other farmers indicated that

they were willing to receive a visit, with a follow-up phone call made where necessary. Two farmers wanted to be visited but it was impossible to arrange a mutually acceptable time. Twelve farmers from the original MLA list were therefore visited. In addition, 11 farmers were added following personal recommendations by other farmers or government officers, making 23 in total. One farmer was visited but not interviewed due to time constraints. The final nominated sample was therefore 22 farmers, including seven from New South Wales, one1 from Victoria, eight from South Australia and six from West Australia (approximately representing the national distribution of sheep farmers [AWI, 2006]). In all cases the oldest male member of the household, who actively managed the farm, had been identified as 'the farmer' and was interviewed, except for two instances of joint management by father/son and brothers, who were separately interviewed, and two instances where the identified 'farmer' was female. To preserve anonymity, all respondents are referred to as masculine.

Visits were conducted from January to April 2008. They usually commenced in the late afternoon/evening, spending time with the farmer and his family in the evening to gain their confidence, seeing the farming operations the following morning and finally conducting the interview. Prior to each interview the interviewee was provided with an information sheet concerning the survey, which detailed the objectives, informed them that they could withdraw at any time and who they could complain to in the event of dissatisfaction. Interviewees signed a disclaimer to acknowledge that they had read the information sheet and confirming that the results would remain confidential, that they waived the right to any payment and that they could withdraw at any time. The survey

method was approved by the University of Queensland Human Ethics Committee (license number 2007001754). Each interviewee was provided with a T-shirt from the Centre for Animal Welfare and Ethics, University of Queensland.

During the interview a semi-structured questioning procedure was followed, with initial questions obtaining background information from the farmer: the size of the breeding ewe flock and its genotype, land area, length of involvement in the industry and extent of training. Subsequent questions addressed the interviewees' sources of information about animal welfare issues[1], the major welfare issues on their property (farmers were not asked to prioritise these in their answer, but the first mentioned was treated as the most important if they did not specifically mention that it was), major welfare issues for the Australian sheep industry, changes in their attitude over time and the reasons for this, external influences on their attitude, such as their partner, father or children, the impact of husbandry and other changes on animal welfare, and their attitude towards pain control for invasive procedures. The majority of the farmers answered the questions in approximately this order, but given the semi-structured nature of the questionnaire, deviations were permitted as considered expedient by the interviewer (CJCP). Questions were open-ended and sometimes participant-driven. The interviews lasted on average 45 minutes, range 30 to 90 minutes, and were recorded in note form by one of us (APP) and later transcribed *verbatim* into electronic form using voice-to-text software, with additional notes and recollections from the interviewer. Following the interviews, farmers were anonymised in a report and given pseudonyms using a list of common names of

[1] Where necessary, welfare issues were defined as events which could adversely affect sheep at any stage in their life.

boys born in Australia in the 1960s (Anon, 2008a), which were randomized using a random number generator. The interview records were examined by the project team for themes pertaining to the farmers' interpretation of the major issues, values and influences on attitudes of the farmers. Responses were coded, often qualitatively. The report was then circulated to each farmer, who were informed of their pseudonym and given the opportunity to change any comments attributed to them, or to make further comment if they wished. Three farmers clarified their comments and no farmers offered new comments.

Results and Discussion

Background information

Mean farm size was 4370 (SEM 450.0) ha and total number of breeding ewes 3044 (SEM 436.7), indicating that the sample was of relatively large Australian farms (Anon, 2009). All were privately owned. The mean duration of time spent by the farmer in livestock farming was 31 (SEM 2.88) years. Most of the farmers (88%) had been brought up on a farm. Regarding training in livestock production after leaving school, the most common form of education was short courses, which was the highest level of training achieved for 47 % of farmers. The highest level for 18% of farmers was a diploma, 12 % a first degree, 6 % a Master's degree and 6% a PhD. The remainder, 12%, had only learnt about livestock on farms, with no formal training. The sample population was therefore of similar age (47, assuming a mean entry age of 16, compared to a mean of 54 for sheep farmers in Australia, [Anon 2008b]) but was better educated than the average Australian sheep farmer (42% being tertiary qualified, compared to 23% of Australian sheep farmers

[Anon, 2008b]). This was believed to increase the reliability of the survey, with interviewees likely to be more knowledgeable about the industry.

Sources of information about animal welfare

The main sources of information on animal welfare and the proportion of farmers citing them were: radio (76 %), newsletters from the industry body (65 %), rural newspapers (53 %), popular press (29 %), consultation with other farmers (18 %), television (12 %), workshops and courses (6 %), consulting services (6 %) and their own experience (6 %). In relation to discussions with other farmers, Graham believed that "there is more communication between farmers nowadays, there used to be more competition and rivalry and now people help each other. In the past you didn't tell people if things went wrong". However, Ian found sharing information with farmers who had problems difficult. There was an acknowledgment by many farmers that the 'bottom 5%' of farmers brought the industry into disrepute, and discussion about how they could be encouraged to manage their sheep better. Some favored talking to them, recognizing that peer pressure may be most effective, but others, such as Ian, thought that they were reluctant to learn in this way; a small minority favored reporting them to the RSPCA. Both Peter and Mark commented that bad farmers leave the industry. Tom believed that the availability of advice had increased considerably. Jason thought that it was important to use the information on animal welfare to predict what the market would require in ten years time.

Welfare issues on interviewees' farms

The most serious animal welfare issues on the interviewees' farms, as judged by the number of farmers nominating them were nutrition, fly strike, drinking water availability and intestinal parasites, followed by mulesing, general health issues and low management input, with stress, footrot, lamb survival, long distance transport and predation nominated by one farmer (Table 1).

Table 1. Reported major welfare issues on sheep farmers' own farms and for the Australian sheep industry, with number (and %) of respondents

	Own farm	Australian sheep industry
Nutrition	13 (59)	8 (41)
Mulesing	3 (14)	10 (45)
Health	3(14)	0 (0)
Stress	1 (5)	0 (0)
Low management input	3(14)	0 (0)
Intestinal parasites	7 (32)	5 (23)
Flies	8 (36)	4 (18)
Water	7 (32)	0 (0)
Footrot	1 (5)	0 (0)
Lamb survival	1 (5)	2 (9)
Long distance transport	1 (5)	5 (23)
Predation	1 (5)	1 (5)
Slaughter	0 (0)	1 (5)

A mean of 2.1 issues was raised by each farmer. Bias in this result is considered minimal because farmers had no incentive to emphasize any particular issue, other than perhaps to minimize the importance of issues that would be expensive to address. Nutrition is a much greater expense on farms and would therefore be more expensive to change compared with, for example, pain relief for invasive procedures. Therefore the suggestion that nutrition was the biggest welfare issue demonstrates that it was possible in the

interviews to obtain an accurate understanding of farmers' beliefs. Any bias that emphasized low cost solutions to welfare issues was not evident.

Nutrition was the most common primary welfare issue for 37 % of farmers. Four farmers believed that by lowering stocking rates at pasture, they could reduce the risk of undernutrition caused by drought and avoid having to purchase expensive concentrate feed. Overstocking moved them "out of their comfort zone", according to Geoffrey. However, Tom, recognizing the delicate balance between stocking density and profitability, believed that "if you are not worrying about feeding your sheep, then you probably don't have enough". For wool farmers the restriction in wool diameter when sheep are in drought (Thompson and Hynd, 1998), resulting in potential downgrading of the wool because of reduced staple strength, encouraged them to mitigate the nutritional effects of drought. Stephen favoured running a prolific flock to enable him to build stock numbers up rapidly after destocking during a drought. A recent survey of major sheep welfare issues in Australia found that food supply was rated important but not in the top five issues (Phillips et al., 2009). A high mortality in a live export shipment just before that survey may have influenced reported priorities, just as the on-going drought in many of the sheep production regions of Australia may have influenced findings in this survey. However, the prevalence of nutrition as a major welfare issue has been recognized elsewhere. In a review of the welfare of sheep in extensive British farms, Goddard et al. (2006) identified nutrition of the pregnant ewe as a major concern.

Many farmers emphasized the close link between welfare and productivity, commenting that happy sheep are productive and farmers didn't want to see them suffer. In a survey of Scottish sheep farmers there was broad agreement in the ranking of perceived welfare and productivity impacts from ectoparasites (Morgan-Davies et al., 2006). Productivity impacts were generally rated as less severe than the welfare impacts, demonstrating that most farmers could distinguish between the two. However, in this survey Jason had difficulties understanding the term 'poor welfare' which he associated directly with unproductive sheep. The close link between farm profit and maintaining Australian sheep in optimum body condition, neither too fat nor thin, has been demonstrated in a comprehensive simulation model (Kingwell, 2002).

General health issues varied and were specific to the farm in question. They included intestinal parasites, flies, pneumonia, joint ill and seed penetration into the skin, each stated by one or two farmers. In total, these comprised 41 % of the primary welfare issues nominated by farmers. The importance of health issues has also been reported by Scottish sheep farmers (Waterhouse et al., 2003).

Mulesing received limited support as a welfare issue, and farmers generally believed that its importance had been exaggerated by the public. For example, John said that "mulesing is only an issue because of public pressure; and sheep have got a lot more serious issues in life, especially in the last few years when nutrition has been important". Anthony believed that "the pain and suffering in fly strike[2] is much worse than the short-term pain that I see due to mulesing and tail docking". Hence several farmers, including Philip,

[2] Authors' note: cutaneous myiasis

believed that sheep welfare would be worse without mulesing, not only because of increased breech strike, but also because of a greater number of skin cuts at shearing. Anthony thought that tail docking was more painful than mulesing, especially if the rubber ring was used. However, several farmers reported that they disliked mulesing their sheep and in some cases their wives or children refused to do it.

Some farmers were trying to breed sheep that did not require mulesing, with bare and wrinkle-free breeches. Both Gregory and Stephen focused on bare breeches, in the latter case because he found it difficult to get shearers to shear sheep with wrinkles on their hind quarters. He was breeding sheep with loose skin on their brisket, since the shearers' blade could follow a wrinkle if the skin was loose. However, he was trying to avoid wrinkles on the shoulders because they retain moisture easily, whereas wrinkles on the side of the sheep allowed water to run off. Although he still mulesed his sheep, he was taking much less skin off, perhaps 40 % less than when he had sheep with many breech wrinkles. He believed that it would take ten years of breeding before farmers had sheep that were sufficiently bare in the breech to enable them to stop the operation. However, Neil believed that farmers would not wait for welfare problems to happen, they would leave the industry. Colin and Philip were both aiming to reduce the suint content of wool, by reducing the sweat to grease gland ratio, although they conceded that sheep in hotter parts of Australia would need to maintain sweating capacity. Colin admitted to feeling "a sense of hopelessness if I cannot conduct the mulesing operation because some of my flock will get fly strike". He did not want to use fly-controlling chemicals because it would tarnish the 'clean, green' image of wool and the possible buildup of resistance.

Similarly two farmers cited the buildup of resistance as the major concern in relation to intestinal parasites. However, several farmers had bred sheep with good worm resistance, which they believed to be due mainly to a better immune reaction. Many were now using a less radical mulesing operation, and anticipated reducing the amount of skin removed over the next few years as they moved towards wrinkle-free sheep.

Most farmers emphasized feeling a strong empathy with their stock. At least two admitted to being considerably stressed themselves by welfare issues. Mostly the stress was generated on the farm, for example Barry said that “if animals are suffering you agonize about them and worry”. Sometimes the stress came from pressure from government officials, for example in the case of David, whose farm was quarantined because of suspected footrot. Perhaps because of this stress, Anthony believed that “If an animal is severely sick I believe that the kindest thing to do is to kill it, I would rather put it down and not see it suffer any more. Farmers feel for their animals and when they find an animal that has been suffering for some time they feel bad.” He acknowledged, with some apparent regret, that he breeds lambs just so that they can be killed, but he also said that he felt a sense of wonder at God's creation every time he saw newborn lambs. There was evidence of the sensitivity of some farmers to ethical as well as welfare issues, for example slaughter of lambs for meat production caused concern for Robert, who therefore preferred to look after sheep for wool production rather than prime lamb production. Robert was particularly concerned about predation of lambs, chiefly by foxes and birds (wedge-tailed eagles, ravens and crows).

Increasingly low management inputs, necessitated by a competitive industry, were a concern for some. Jason had a policy of breeding an easy care flock, which he acknowledged may challenge sheep, because it is based on survival of the fittest. Because of this, he believed that to improve welfare it is necessary to pay more attention to the selection of individual sheep and not just the whole flock. Conversely, Anthony believed that in relation to lambing, intruding often did more harm than good: “I'm not a midwife and it is best to let the ewes do their work”.

Welfare issues for sheep farmers in Australia

The most serious animal welfare issues for Australian sheep farms, as judged by the number of farmers’ responses, were mulesing and nutrition, followed by intestinal parasites and long distance transport, then flies, lamb survival, predation and slaughter (Table 1). Of these flies and mulesing were mentioned as the most serious issue the most times (29 % of farmers). A mean of 1.9 issues were raised by each farmer.

Although many farmers raised the issue of mulesing and fly strike, most talked about their own farm experiences, and many emphasized that mulesing was a welfare issue primarily because it was the focus of public attention. Several commented that the clips that were being developed as an interim measure by Australian Wool Innovation (AWI, undated) were not believed to be successful by farmers, falling off in the fields, requiring extra handling of the sheep and creating a problem of plastic remaining on fields. There was also concern that more chemical treatments would be necessary after mulesing was discontinued, and this would tarnish the chemical-free image of wool and lead to the

development of resistance. The discomfort caused to sheep by faecal contamination of the breech area was a concern, as well as the accidental cutting off of the wrinkles by shearers. At a time when shearers were hard to recruit, the difficulty and longer time required to shear unmulesed sheep was a concern. Similar concerns about the availability of labour on British sheep farms have been reported recently (Morgan-Davis et al., 2006).

One farmer, Jason, believed that the primary problem was that Australian environmental conditions predisposed sheep to welfare issues, such as flystrike and predation, and that the control measures themselves, such as mulesing, were not welfare problems. However, the general perception was that mulesing and flystrike were the most serious issues facing the Australian sheep industry. Barry added that he liked keeping animals in a natural environment and would not like to work in a pig or poultry farm. Although reported by only a single individual, this view is at odds with the common perception that farmers are not interested in their animals' ability to live a natural life (Vanhonacker et al., 2008).

Fluctuating food supplies and the risk of undernutrition were perceived as major issues for the Australian sheep industry, especially at lambing time according to Robert. Neil was concerned that undernutrition was often very evident to the public, for example if the farm was near a busy road. Being easily avoided by purchasing feed, even if this was uneconomic, made some farmers, such as Neil, deplore those that allowed their stock to become undernourished. John added that supplementary feeding had the added benefit that sheep are regularly inspected. David thought that market pressures sometimes had adverse effects on sheep welfare and could, for example, prevent supplementary feed

being purchased. Several farmers repeated that it was the bottom 5% of farmers who brought the industry into disrepute. Stephen felt so strongly that he was prepared to report farmers with sick and dying sheep to the RSPCA; others believed peer pressure to be preferable.

The primary long distance transport problem was believed to be shipping sheep from Australia to the Middle East, supporting the survey of Cronin et al. (2002), with long distance vehicular transport within Australia a secondary issue. The major problem with sea transport, according to Peter, was the different culture in the Middle East, which did not require the animals to be handled as well as in Australia. The solution, he believed, lay in research and development of the transport process. Colin believed that inanition on the ship was the biggest problem, which could be overcome by effective training of sheep to consume pellets prior to embarkation. This demonstrates a good understanding by some farmers of the problems that sheep experience in long distance sea transport (Pines et al., 2007). Jason pointed out that the mortality rates had fallen in recent years.

Lamb mortality was only nominated by 12% of farmers as a welfare issue for sheep farmers in Australia, but for these it was the most serious issue. Currently indicators of welfare on extensive livestock farms are based on mortality and morbidity but this is believed to be because they are easily measured rather than their importance (Turner and Dwyer 2005). In relation to lamb mortality Anthony believed that genetic selection for maternal influence on weaning weight would be advantageous, which would bring benefits in terms of good growth rates and ewes keeping their lambs close to them.

Barry did not believe that there were any major welfare problems in Australia because of the numerous checks in place. In this respect he believed that there were far fewer bad farmers today than previously.

Changes in sensitivity over the period of time that farmers had been working with livestock

When asked whether their sensitivity to animal welfare had changed during their period of involvement with livestock, 37 % of farmers said that it had not, with 21 % commenting that they had always had a strong empathy with their stock, or similar sentiments. Eleven percent commented that it had only changed (increased) because they had gained more knowledge. Sixteen percent believed that their sensitivity had definitely increased and 11% commented that it had definitely decreased. Thus there was little evidence that farmers believed they had become desensitized to pain and other welfare issues over time. However, both John and Ian mentioned that they became hardened to the impact of drought after a very bad year, and had learnt how to cope better, and one farmer, Neil, believed that with painful procedures such as mulesing, “the more you do it, the more you become steeled to it”. When he was young he remembered mulesing as being “gruesome, awful”, and couldn't even watch animals being killed, then when he was dealing with these issues all the time he got conditioned to it because he had to. “If you're a farmer you have to deal with dying animals and doing things that are best for them. People in industry are good shepherds; if they can't mules they will leave the industry”. Robert believed that his sensitivity had increased from when he was a teenager,

but that it had been quite constant throughout his adult life. The possibility of bias in the level of sensitivity of the sample farmers is real, because they were of above average education level which has been shown in other countries to increase concern for animal welfare (Keller, 1994). However, farmers were not being asked how sensitive they were, rather whether their sensitivity had changed over time. In addition they were able on most occasions to qualify their answers with reasons and elaborate on particular changes at specific times of their lives, e.g. following a severe drought.

Several farmers commented on their close contact with their animals. Michael said that although he was not necessarily religious he believed that he had a close contact with nature and its cycles. Tom believed that his sensitivity to animal welfare was in part because he had grown up with stock and it was his passion. Barry believed that over time he had come to work in closer harmony with all the animals' instincts, which he called a holistic approach, for example by reducing stress in handling and allowing animals to move at their own pace.

How changes in husbandry over time influenced welfare

Most farmers believed that husbandry developments had improved welfare over the time that they had been farming. Michael believed that welfare issues had not changed, but there was now greater public awareness, and Richard thought that the introduction of codes of practices and other methods of regulating husbandry standards were potent forces for change. Robert believed that stockpeoples' attitudes had remained the same, but the techniques for sheep production had improved considerably. Only in the area of chemical use had progress in improving production been limited, because many of the

most effective chemicals had been banned due to human safety concerns. Addressing welfare issues may therefore conflict with environmental and human health concerns and a holistic approach is necessary (Milne et al., 2008). However, Colin believed that there were other ways to address infectious disease challenges, in particular by creating flocks that are closed to the importation of live animals.

Even though nutrition was identified as a major welfare issue on most farms, it was generally acknowledged that improvements in nutrition still represented the biggest husbandry advance. Most improvement in knowledge was attributed to supplementation (especially during pregnancy), climatic and parasitic challenges, as well an improved understanding of trace element requirements. The identification of trace element deficiencies had been essential to enable several of the interviewees' farms to be used for livestock at all. Pasture quality was believed to have improved, in some cases through soil improvements but mostly through the introduction of more valuable pasture species, such as clovers. Philip believed there was generally a better awareness of the impact of seasonal climatic changes and the challenges that these present to the sheep's digestive system, which can precipitate scouring and attractiveness of the sheep to flies. Barry also believed there was greater recognition that gradual changes in the diet were important in maintaining productivity and that differential feeding of single and twin bearing ewes could improve ewe reproduction. David thought that improvements in facilities had been a major factor in improving welfare, for example the advent of mobile handling yards and covered races to encourage the easy movement of sheep. He also believed that increased competition had been a major driving force, with inefficient farmers no longer able to

generate an income. Tom thought that improvements in veterinary advice had been particularly useful. Peter believed that there was now a more preventative approach to welfare issues. As a result of competition and contraction in the industry, only those that were passionate about their work could develop an efficient production system and survive, whereas previously the majority of the Australian population was involved in livestock farming. The wool industry was challenged more than the meat industry in this respect, because people were more likely to avoid using wool than consuming meat. Colin, a prime lamb producer, had found it profitable to increase his ewe surveillance at lambing time. Peter commented that increasingly farms were managed by large corporations, which could access resources more easily and maintain high standards of welfare. Such economies of scale have also been demonstrated for the treatment of ectoparasites in large Scottish sheep flocks (Milne et al., 2007).

Influences on farmers' attitudes towards sheep welfare issues

When asked who had been an important influence on their attitude to animal welfare, 50% of farmers nominated their partner, but 20 % commented that she had not been an influence, perhaps because she was present at the interview. Many of the farmers' partners undertook some work off farm, and in some cases outside the agricultural industry, to provide additional income. Women naturally have a more caring attitude to animals (Phillips and McCulloch, 2005), and John thought that their declining involvement in sheep farming could reduce welfare standards. They clearly provided little support to their husbands in several cases, not understanding the work that he was engaged in and being fully occupied with children or other activities. Anthony's wife

commented that “she was not a farmer’s wife, she married a farmer”, so close involvement with the farming operations was rare in some instances. This is in line with changes in women’s expectations of marriage, which have been transformed from an economic provision to an emotional relationship, recognizing the benefits of such (Weston, 1999). The lack of involvement of women on sheep farms is not necessarily just the product of female emancipation, since women’s efforts on farms diminish in value over the early stages of agricultural industrialization (Rau and Wazienski, 1999). Sheep farming, being less adaptable to industrialization than other forms of farming, is probably still in the early stages. Later a more egalitarian structure may emerge, but the strong gender bias towards male sheep farmers suggests that this has not yet been achieved.

Approximately 20% of farmers believed that their father had had a major influence on their attitude to animal welfare. John believed that inter-generational transfer of husbandry skills was important in maintaining high welfare standards, and that this could be threatened by the flexibility in jobs that exists today. Animal husbandry was a lifelong learning process, and both Geoffrey and Ian commented that the knowledge required by farmers was much greater than previously. Several farmers commented that there had not been any external influence on their attitude to animal welfare, that they had developed it themselves.

Attitudes towards the use of pain relief

There was a general recognition that pain relief was beneficial, confirming the belief espoused recently by stakeholders in the Australian sheep industry that use of pain relief

with invasive procedures was more important than the method employed (Phillips et al., 2009). John even believed pain relief was the major aim of all sheep farmers, however, 50 % had never used it, 33 % had tried it, and only 17 % used it routinely. Several farmers sedated their rams before shearing and their ewes before artificial insemination. Some farmers commented that they would use pain relief if it was cheaper or took less time, but Colin believed it would eventually become mandatory, because the public wanted it. In this respect, several farmers expressed concern that animal welfare advocates' activities, although well intentioned, were not always focused on the right issues. They were often anthropomorphic, according to Geoffrey, and demonstrated a lack of understanding of farming systems held by city dwellers, according to Gregory. The survey of Vanhonacker et al (2008) supports this contention, finding that citizens had little understanding of the animal welfare issues associated with certain husbandry operations. Philip believed that the problems that necessitated painful operations, such as tail docking or mulesing, should be tackled by genetic change, not pain relief.

Acknowledgements

The authors are grateful to the University of Queensland for supporting the study and the sheep farmers visited for interviews and hospitality.

References

Anon, 2008a. Hudson at Murtoa -- Past Links Revealed.

http://home.vicnet.net.au/~murtoa/names.htm. Accessed 2 May, 2008.

Anon, 2008b. What are the key characteristics of Australian sheep and wool farmers and farms? http://www.anra.gov.au/topics/agriculture/sheep-wool/index.html/ Accessed October, 2008.

Anon 2009. Australian Lamb. 08.01. Financial performance of slaughter lamb farms, 2005-06 to 2007-08. http://www.mla.com.au/NR/rdonlyres/656B9F80-9E9F-43CD-AF17-268078AF2E93/0/Slaughterlambreport08.pdf. Accessed 21 May, 2009.

Australian Wool Innovation (AWI) Ltd Undated. Insight: Clip alternatives to mulesing. http://www.wool.com.au/mediaLibrary/attachments/Publications/Insight_Clip_211106.pdf. Accessed August 2007.

Australian Wool Innovation (AWI), 2006. Australia-wide drought results in further decline in production. 8 December, 2006. http://www.wool.com.au/Trade_News_and_Media_Releases/Media_Releases/page__7197.aspx. Accessed 21 May, 2009.

Goddard P, Waterhouse T, Dwyer, C and Stott, A 2006. The perception of the welfare of sheep in extensive systems. Proceedings of the 55th Annual Meeting of the European-Association-of-Animal-Production, September 2006, Bled, Slovenia. Small Ruminant Reseach 62, 215-222.

Keller S.R 1994. Attitudes, knowledge and behaviour toward wildlife among the industrial superpowers, The United States, Japan and Germany. In Animals and

human society: changing perspectives (eds A Manning and JS Serpell), pp 166-187. Routledge, New York.

Kingwill R 2002. Sheep animal welfare in a low rainfall Mediterranean environment: a profitable investment? Agricultural Systems 74, 21-240.

Milne CE, Dalton GE, Stott AW 2007. Integrated control strategies for ectoparasites in Scottish sheep flocks. Livestock Science 106, 243-253.

Milne CE, Dalton GE, Stott AW 2008. Balancing the animal welfare, farm profitability, human health and environmental outcomes of sheep ectoparasite control in Scottish flocks. Livestock Science 118, 20-33

Morgan-Davies C, Waterhouse A, Milne CE and Stott AW 2006. Farmers' opinions on welfare, health and production practices in extensive hill sheep flocks in Great Britain. Livestock Science 104, 268-277

Phillips CJC and McCulloch S 2005. Attitudes of students of different nationalities towards animal sentience and the use of animals in society, with implications for animal use in education. Journal of Biological Education 40, 17-24.

Phillips CJC, Wojciechowska J, Meng J and Cross N 2008. Perceptions of the importance of different welfare issues in livestock production in Australia. Animal (in press)

Pines M, Petherick JC, Gaughan JB and Phillips CJC 2007. Stakeholders' assessment of welfare indicators for sheep and cattle exported by sea from Australia. Animal Welfare 16, 489-498.

Rau W and Wazienski R 1999. Industrialization, female labor force participation, and the modern division of labor by sex. Industrial Relations 38, 504-521.

Thompson AN and Hynd PI 1998. Wool growth and fibre diameter changes in young Merino sheep genetically different in staple strength and fed different levels of nutrition. Australian Journal of Agricultural Research 49, 889-898.

Turner SP and Dwyer CM, 2007. Welfare assessment in extensive animal production systems: challenges and opportunities. Proceedings of the 3rd International Workshop on Assessment of Animal Welfare at Farm and Group Level, Vienna, Austria, 2005. Animal Welfare 16, 189-192.

Vanhonacker F, Verbeke W, Van Poucke E, and Tuyttens FAM 2008. Do citizens and farmers interpret the concept of farm animal welfare differently? Livestock Science 116, 126-136.

Waterhouse A, Colgrove P, Vipond J and Goddard P 2003. Identification of key issues—a summary of the final group session. In Improving sheep welfare on extensively managed flocks: economics, husbandry and welfare, Proceedings of a Workshop Held in Aberdeen, Scotland on 24–25 February 2003 (ed PJ Goddard), pp. 73–77. The Macaulay Institute, Aberdeen.

Weston RE 1999. Finding happiness: Factors contributing to personal wellbeing. Family Matters 52, 54–61.