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Developing the basis for an attitude-behaviour training program for sheep handlers in the sheep transport and abattoir sectors

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Executive summary

Our previous research at Australian abattoirs indicates that while there is considerable variation, both between and within abattoirs, pre-slaughter handling of sheep is a significant predictor of the stress state, based on plasma cortisol concentrations, and the metabolic state, based on plasma glucose and lactate, of sheep at slaughter. For example, in our most recent research, higher concentrations of plasma cortisol, glucose and lactate were associated with longer durations of aggressive dog and negative stockperson behaviour and lambs jumping and attempting to escape in the forcing pen and the single file race leading to the stunning area of the abattoir. These relationships indicate that handling stress pre-slaughter has implications for both sheep welfare and meat quality. Furthermore, our research has identified some of the attitudes of abattoir stockpeople that are related to their behaviour during handling, as well as their use of dogs in handling sheep. As we have shown in research on livestock in farm settings, cognitive-behavioural training targeting the key attitudes and behaviour of stockpeople associated with handling stress is successful in improving stockperson attitudes and behaviour, and subsequently reducing handling stress and thus improving livestock productivity and welfare. While the significant stockperson-sheep relationships that we have found at abattoirs suggest the possibility of causality, evidence of causality can only be demonstrated by changes in handling of sheep affecting their stress and metabolic variables at slaughter. Thus, the effectiveness of a behavioural change training programme (based on cognitive-behavioural training) for sheep abattoir stockpeople to reduce handling stress in sheep needs to be evaluated under commercial conditions.

The present project was not a research proposal, but a project collaborating with key sheep-meat stakeholders (1) to review the need for and content of a cognitive-behavioural training programme for sheep transport and abattoir stockpeople designed to safeguard animal welfare and meat quality and therefore (2) to develop and evaluate, in collaboration with sheep-meat industry collaborators, the effectiveness and practicality of this training program in commercial settings (that is to validate this training programme). We therefore, presented the scientific basis for the development and use of this cognitive-behavioural training program to industry stakeholders in a series of workshops. We sought the support of these stakeholders to subsequently collaborate in future research to develop and evaluate in abattoirs the effectiveness and practicality of a cognitive-behavioural training programme in safeguarding sheep welfare and meat quality.

While there are various animal welfare training programmes and courses available to sheep handlers, these programmes/courses do not target the underlying attitudes that need to be changed to achieve sustained change in stockperson behaviour related to sheep stress and thus sheep welfare. These other animal welfare programmes/courses are educational programs that impart skills rather than behaviour change programs, that is, they provide information and advice on handling without targeting the specific attitudes of stockpeople that drive the key behaviours associated with sheep stress (and thus sheep welfare and meat quality). Technical skills and knowledge are important attributes of the work performance of stockpeople and, clearly, training targeting these attributes is important in improving animal welfare and performance via the technical skills and knowledge competencies of stockpeople. Indeed, our research on stockpeople in farm settings shows that both technical and cognitive-behaviour training are necessary to not only reduce the stress associated with handling and husbandry procedures involving humans, but also to improve the motivation in stockpeople to learn new technical skills and knowledge and to apply these competencies to the management of the animals under their care.

Workshops with three Australian sheep-meat export processors were successfully conducted. These workshops in Western Australia and Victoria were attended by senior staff with responsibility for animal welfare and management of sheep in lairage (e.g. QA and training managers, lairage managers

and senior livestock handlers) as well as abattoir and Commonwealth DAF veterinarians. The research team presented the scientific basis for the development and use of this cognitive-behavioural training programme to industry stakeholders in this series of workshops. The results of extensive research both in experimental conditions and on commercial farms and abattoirs demonstrating the impact of stockpeople on animal welfare and productivity were reviewed and discussed. Following this review of the implications of attitude-behaviour training on both livestock in commercial farms and abattoirs, the discussion considered current Pro Hand® programmes (ProHand® Pigs (available in Australia, NZ and USA), ProHand® Dairy (available in Australia and USA), ProHand® Pork Abattoir (available in Australia) and the pig, poultry and cattle programmes in Europe (as part of the European Union Sixth Framework Programme for Research and Technological Development, which were adapted from ProHand.

The general response from workshop attendees was that this interactive, on-line ProHand® training programme would complement the present technical training for abattoir stockpeople. It was generally well accepted and appreciated by the abattoir personnel that attitudes influence not only the manner in which stockpeople handle their animals, but also their management of the animals and their motivation to supervise and attend to issues confronting the animals. There was interest in the versatility of the 'ProHand®' approach: delivered in various modes, for example, delivered to the trainee in small groups facilitated by a trainer using the multi-media programme installed in-house or over the internet or delivered directly to the trainee via the internet without facilitation by a trainer; delivered in its entirety in one sitting or over several sittings in short time blocks; and delivered concurrently to several locations. Furthermore, the programme can be used "on demand" for new employees or where management sees a need for remedial training or the need for a refresher course.

There were no perceived barriers raised by the abattoir personnel to the introduction of this training programme. There was also agreement to collaborate with the researchers in identifying the delivery method(s) for the programme and to participate in a controlled study in abattoirs to examine the effectiveness and practicality of the training programme to improve stockperson attitudes and behaviour and thus reduce fear and stress in sheep at abattoirs and thus risks to sheep welfare and meat quality.

A focus group with Victorian and NSW sheep transport drivers was used to identify the main risks to sheep welfare associated with handling and transporting sheep. Some of the main concerns raised by the participants included difficulty in ease of handling sheep associated with poor previous handling (quantity and quality of a human handling), poor previous dog use (quantity of dog handling) and poor yard and loading facilities; poor and variability body condition in groups of sheep; fit to load sheep; farm compliance with curfews; and mixed age/size groups. As in our discussions with senior staff with responsibility for animal welfare and management of sheep in lairage, transport drivers agreed that training to reduce handling stress in sheep would be valuable for transport drivers.

Furthermore, an attitude questionnaire for transport drivers similar to a questionnaire that has been validated for stockpersons working in sheep abattoirs, was presented to the transport drivers to seek their feedback on the relevance and practicality of the questionnaire in raising questions about routine handling of sheep associated with transport. Statistical analysis of the questionnaire responses of the two groups, abattoir stockpeople and transporters, indicated that, while there were some differences between these two groups of handlers in attitudes to handling, there is considerable overlap in these attitudes. Indeed, some of their concerns about handling sheep are similar. These limited data suggest that some items in sheep abattoir stockperson questionnaire may be predictive of sheep transporters handling of sheep. However, this is an empirical question and further research is required. The imperative for this is the outcome of a behavioural change training programme for transport drivers

that targets their attitudes and behaviour to minimise handling stress and thus safeguard the welfare of transported sheep.

Informal discussions with Mintrac, the national organization that provides services to the meat industry in the areas of education and training development, indicated that they would be interested in participating in this next step of evaluating a cognitive-behavioural training programme in commercial settings in terms of its effectiveness and practicality. However, these discussions highlighted the need to develop a programme that was highly focused, and which could be delivered flexibly to accommodate the constraints of time and co-location that characterised the industry.

Therefore, with this support from the sheep meat-processing and transport sectors, the research team is well positioned to work in collaboration with the sheep meat-processing and transport sectors to seek funding to evaluate the cognitive-behavioural training programme in commercial settings in terms of its effectiveness and practicality in safeguarding sheep welfare and meat quality.

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1 Background

1.1 Stockperson-sheep interactions and sheep welfare and meat quality

Housing and husbandry of farm animals are contentious animal welfare issues for many in the community, but there are also increasing community concerns about the treatment of farm animals post-farm gate, particularly animal transport and slaughter (de Jonge and van Trijp, 2013, Coleman et al., 2015). For example, a survey across seven European countries indicated greater concern about methods of farm animal transport and slaughter than farm animal husbandry (Kjaernes and Lavik, 2008).

Extensive research both in experimental conditions and on commercial farms has shown that handling of livestock, by affecting the animal's fear of humans, can markedly affect the stress physiology and productivity of livestock (see reviews by Waiblinger et al., 2006; Hemsworth and Coleman, 2011). Furthermore, handling of sheep and cattle at abattoirs is related to animal fear and stress (Hemsworth et al., 2011). Stress is an inevitable outcome in the process of transferring animals from farm to slaughter (Ferguson and Warner, 2008; Fisher et al., 2010), however, as with any animal use practice, there is the obligation on the animal users to minimise stress in order to safeguard animal welfare. In addition to handling, several other factors may cause stress to animals at abattoirs, such as the environment, management and facility design (see reviews by Grandin, 2007a,b). Stress in lairage can lead to high pH meat above 5.80, which is classified as dark meat and a risk to the development of degraded meat quality (Ponnampalam et al., 2017).

Our research at Australian abattoirs indicates that while there is considerable variation, both between and within-abattoirs, pre-slaughter handling and sheep behaviour are significant predictors of the stress and metabolic states of sheep at slaughter (Hemsworth et al., 2011, 2018). In our most recent study on 400 lambs sourced from one property and slaughtered at one abattoir, we found that stockperson, dog and sheep behaviours were significant predictors of several measures of the stress and metabolic states of lambs at slaughter. Indeed, 15 to 25% of the variation in plasma cortisol, glucose and lactate concentrations post-slaughter in lambs was best predicted by a mixture of stockperson and dog behaviours as well as lamb behaviours pre-slaughter. For example, higher concentrations of these stress and metabolic measures were associated with longer durations of aggressive dog and negative stockperson behaviour and lambs jumping and attempting to escape in the forcing pen and the single file race leading to the stunning area of the abattoir. The identification of these predictor variables of cortisol, which may be a mixture of independent and mediating variables, supports the well-demonstrated effect of handling on fear and stress responses in livestock (Hemsworth and Coleman, 2011). These relationships between handling and plasma lactate indicate that handling stress may reduce meat quality through meat ultimate pH-mediated effects (see review by Ponnampalam et al., 2017).

Our earlier research on stockperson attitudes and behaviour towards sheep at abattoirs has identified some of the attitudes that are related to stockperson behaviour (Coleman et al., 2012).
Several significant correlations between stockperson attitudes and behaviour were detected. In particular, the perceived pressures imposed by perceived lack of control over their actions, perceived time constraints, perceived effect of poor facilities and inappropriate beliefs about arousing livestock were all associated with frequent use of forceful handling behaviours
by the stockperson. These results were similar to observations in pig abattoirs that have been reported previously (Coleman et al., 2003).

The significant relationships between handling and lamb behaviour and stress and metabolic variables post-slaughter suggest the possibility of causality. It is proposed that stockperson attitudes drive

stockperson behaviour (including dog use) which in turn drives the animal's stress response which in turn affects welfare, and meat quality outcomes. Thus, stockperson behaviour and the animal's stress response mediate the effects of stockperson attitudes on these outcomes. These relationships at sheep abattoirs indicate that there may be an opportunity to improve stockperson behaviour and consequently reduce stress in sheep at abattoirs by targeting attitudes (and behaviour) for improvement, with appropriate educational and training material in a way that is similar to the uses of such training with livestock species in farm settings.

1.2 Cognitive-behavioural training of stockpeople in farm settings and the implications of similar training of abattoir stockpeople

There has been an ever-increasing body of evidence accumulating since the 1980s of the effects of human interactions on farm animal fear and stress responses. This body of research has been recently reviewed by Hemsworth and Coleman (2011) and Coleman and Hemsworth (2014) but is briefly summarized here.

Field studies on farm animals revealed variation in fear of humans by farm animals that could not be explained by farm characteristics or animal genetics. The variation in behavioural fear responses was strongly related to increased stress responses and reduced productivity. This led to the hypothesis that this variation in fear was caused by human factors, giving rise to investigations directed towards identifying the human characteristics responsible for these effects. Laboratory studies and correlational and intervention studies in commercial settings on a number of farm animal species provided consistent evidence of causal relationships between stockperson attitudes (based on beliefs), stockperson behaviour, animal fear responses, animal stress physiology and animal productivity, and provided evidence of causal relationships between these variables (see Hemsworth and Coleman, 2011). A key advance in understanding opportunities to manipulate human–animal relationships in the field is that the antecedents of stockperson behaviour are their attitudes and, in particular, their beliefs about their behaviour, their animals' behaviour, fear and stress, and the effectiveness and appropriateness of specific handling behaviours.

As proposed by Hemsworth and Coleman (2011) and Coleman and Hemsworth (2014), stockperson attitudes towards their animals and working with them (behavioural beliefs), their beliefs about other people's expectations of them (normative beliefs), and their beliefs about the extent to which they have control over their ability to interact appropriately with the animals (control beliefs) determine the nature and extent of their interactions with these animals. In situations in which stockperson interactions are poor, through animal fear and stress, both animal welfare and productivity decrease. The theory underlying this relationship between human attitudes and human behaviour is the Theory of Planned Behaviour (Ajzen and Fishbein, 1980; Albarracín et al., 2005), developed to deal with behaviours that are under the person's control; in other words, volitional behaviours. As demonstrated earlier in this section, an understanding of these stockperson–farm animal relationships provides a strong case for introducing stockperson training courses that target the key attitudes and behaviour of stockpeople, which affect farm animal welfare. The Theory of Planned Behaviour provides a framework to identify the antecedents of stockperson behaviour, and this information can be used to develop the key messages that need to be delivered in any training programme that is designed to improve stockperson behaviour.

In fact, studies in the dairy and pork industries (Hemsworth et al., 1994a, 2002; Coleman et al., 2000) have shown that cognitive behavioural training, in which the key attitudes and behaviour of stockpeople are targeted, can improve the attitudes and behaviour of stockpeople towards their animals successfully, with consequent beneficial effects on animal fear and productivity. Cognitive-

behavioural techniques basically involve retraining people; first, by targeting both the beliefs that underlie their behaviour (attitude) and the behaviour in question; and secondly, by maintaining these changed beliefs and behaviours (Hemsworth and Coleman, 2011). This process of inducing behavioural change is a comprehensive procedure in which all of the personal and external factors that are relevant to the behavioural situation are explicitly targeted. This includes addressing commonly perceived barriers to change, addressing defensiveness about previous behaviour, changing habits, and providing follow-up to reinforce changes, as well as changing the relevant attitudes and behaviour.

Therefore, to improve the stockpersons beliefs about their animals, and particularly their beliefs about handling and working with their animals, stockpeople undertaking this cognitive-behavioural training are provided with key information on their livestock (Coleman and Hemsworth, 2014). This information includes the ease with which livestock can and should be handled, their sensitivity to the range of negative behaviours used by stockpeople (and their sensitivity to stressors in general), and the adverse effects of these negative behaviours on their fear of humans, which in tum can have negative consequences on their welfare, productivity and ease of handling. The training also gives stockpeople information on the positive behaviours which they can use to reduce fear in their animals. Furthermore, explicit attention is given to barriers to change, such as pressure to conform from their co-workers and incorrect beliefs about perceived barriers to change, such as poor facilities, poor animal temperament and lack of time. To address the behavioural aspects of the intervention, stockpeople have the opportunity to rehearse the relevant behaviours, either directly or vicariously. When it is not practical to directly handle animals during training, trainers can use video footage of the behaviour of stockpeople in the industry emphasising those patterns of behaviour that increase the animals' fear of humans. Such video footage can also help stockpeople to recognise and assess fear responses in their animals. In addition, a trainer can assess stockperson responses during training to ensure that defensiveness, misunderstandings and counterarguments can be addressed. To reinforce the information designed to improve both beliefs and behaviours, stockpeople are given continuing follow-up support in the form of written material, including a booklet, posters and newsletters.

In these intervention studies in the dairy (Hemsworth et al., 2002) and pig industries (Hemsworth et al., 1994a; Coleman et al., 2000), targeting the key attitudes and behaviour of stockpeople that were previously found to be correlated with fear responses of cows and pigs to humans resulted in reductions in these fear responses. Furthermore, concurrent improvements in animal productivity were observed: there were improvements in the milk yield of dairy cows and a marked tendency for an improvement in the reproductive performance of sows. These intervention studies demonstrate that this approach to training is practical and effective among a wide range of stockpeople working in a variety of situations. Therefore, there is a strong case for introducing this type of training into the livestock industries. The training programme used as an experimental tool during research in the pig industry has been commercialised and is called 'ProHand®' ('Professional Handling of Pigs Program', Animal Welfare Science Centre, 2011). A similar training programme has been developed for the dairy industry and, after recent research, programmes for pig abattoirs have been developed in Australia. The authors and their European colleagues have also developed training packages for stockpeople in the pig, poultry and cattle industries in Europe (as part of the European Union Sixth Framework Programme for Research and Technological Development) (Ruis et al., 2010). An important characteristic of all of these training programmes is that they are based on scientific research and their effectiveness in improving welfare and productivity has been demonstrated by properly designed intervention studies. Furthermore, because they use a standardised form of presentation, there is a reduced risk that the content will drift over time or that idiosyncratic and possibly unvalidated messages will be conveyed in the training.

While the significant relationships between handling and animal behaviour pre-slaughter and stress and metabolic variables post-slaughter (Hemsworth et al., 2011, 2018; Coleman et al., 2012) suggest the possibility of causality, evidence of causality can only be demonstrated by changes in handling affecting the stress and metabolic variables. Therefore, the effectiveness of a training programme targeting the key attitudes and behaviour of abattoir stockpeople requires validation in commercial settings in order for industry to adopt. While there are various animal welfare training programmes and course available to sheep handlers, these animal welfare programmes/courses do not target the underlying attitudes that need to be changed to achieve sustained change in stockperson behaviour related to sheep stress and thus sheep welfare. These other programmes/courses are educational programs that impart skills, that is, they provide information and advice on handling without targeting the specific attitudes of stockpeople that drive the key behaviours associated with sheep stress (and thus sheep welfare and meat quality). Technical skills and knowledge are important attributes of the work performance of stockpeople and, clearly, training targeting these attributes is important in improving animal welfare and performance via the technical skills and knowledge competencies of stockpeople. Indeed, our research on stockpeople in farm settings shows that both technical and cognitive-behaviour training are necessary to not only reduce the stress associated with handling and husbandry procedures involving humans, but also to improve the motivation in stockpeople to learn new technical skills and knowledge and to apply these competencies to the management of the animals under their care (see reviews by Hemsworth and Coleman (2011) and Coleman and Hemsworth (2014)).

While there are various animal welfare training programmes and courses available to sheep handlers, these animal welfare programmes/courses do not target the underlying attitudes that need to be changed to achieve sustained change in stockperson behaviour related to sheep stress and thus sheep welfare. These other programmes/courses are educational programs that impart skills rather than behaviour change programs, that is, they provide information and advice on handling without targeting the specific attitudes of stockpeople that drive the key behaviours associated with sheep stress (and thus sheep welfare and meat quality). Technical skills and knowledge are important attributes of the work performance of stockpeople and, clearly, training targeting these attributes is important in improving animal welfare and performance via the technical skills and knowledge competencies of stockpeople. Indeed, our research on stockpeople in farm settings shows that both technical and cognitive-behaviour training are necessary to not only reduce the stress associated with handling and husbandry procedures involving humans, but also to improve the motivation in stockpeople to learn new technical skills and knowledge and to apply these competencies to the management of the animals under their care.

Training that successfully minimises risks to animal welfare at abattoirs has obvious implications: it provides assurance to the general community, customers, and government authorities of high standards of animal welfare and improved product quality. Furthermore, monitoring key stockperson characteristics, such as attitudes as well as other job-related variables (knowledge, reliability, commitment and conscientiousness), allows reporting and benchmarking animal welfare risks as well as identifying stockpeople requiring further training.

1.3 Project aims and outcomes

The present project was not a research proposal, but a project aiming to obtain the views of key sheep-meat stakeholders on the need for a behavioural change training programme (cognitive-behavioural training) for sheep transport and sheep abattoir stockpeople designed to safeguard animal welfare and meat quality.

If sheep-meat stakeholders participating in this current project were supportive, a subsequent project proposal to an appropriate funding body would be developed in collaboration with sheep-meat industry to develop and evaluate the effectiveness and practicality of this training programme in commercial settings (that is validate this training programme).

2 Project objectives

The objectives of the project were to collaborate with key sheep-meat stakeholders to (1) review the scientific basis for the development and use of a behavioural change training programme for stockpeople in the sheep transport and abattoir sectors, (2) consider the most practical delivery mode for this training programme and (3) identify potential funders and sheep-meat industry collaborators.

For the sheep-meat processors, these objectives were to be achieved by specifically discussing in workshops with industry stakeholders the scientific basis for the development and use of this behavioural change training programme for stockpeople in the sheep abattoir sectors. To consider the need for a behavioural change training programme for stockpeople in the sheep transport sector (as requested by MLA), a focus group was held with sheep transport drivers. The focus group was used to identify the main risks to sheep welfare associated with handling and transporting sheep. Furthermore, an attitude questionnaire for transport drivers similar to a questionnaire that has been validated for stockpersons working in sheep abattoirs, was presented to the drivers to seek their feedback on the relevance and practicality of the questionnaire in raising questions about routine handling of sheep associated with transport. This information is important in considering whether a similar behavioural change training programme as that proposed for sheep abattoir stockpeople could be used for sheep transporters to minimise risks to sheep welfare associated with handling sheep associated with transport.

3 Methodology

3.1 Sheep-meat processors

Workshops with sheep processors were successfully held in Western Australia and Victoria. A planned workshop for a NSW sheep abattoir was cancelled at the last minute because of a clash with a large-scale abattoir-wide activity planned at the time of the proposed training workshop. These workshops were attended by senior staff with responsibility for animal welfare and management of sheep in lairage (e.g. QA and training managers, lairage managers and senior livestock handlers) as well as abattoir and Commonwealth DAF veterinarians.

The research team presented the scientific basis for the development and use of this cognitive-behavioural training programme to industry stakeholders in a series of workshops and sought the advice of the participants at the workshops. The results of extensive research both in experimental conditions and on commercial farms and abattoirs demonstrating the impact of stockpeople on animal welfare and productivity were reviewed and discussed. Following this review of the implications of cognitive-behaviour training of stockpeople in both in commercial farms and abattoirs, the workshops considered the current 'Pro Hand®' programmes (Pro Hand® Pigs (available in Australia, NZ and USA), Pro Hand® Dairy (available in Australia and USA), Pro Hand® Pork Abattoir (available in Australia) and the pig, poultry and cattle programmes in Europe (as part of the European Union Sixth Framework Programme for Research and Technological Development, which were adapted from Pro Hand®. The research team then proposed the basis of a 'prototype' of a Pro Hand® training program for sheep abattoir stockpeople which targets stockperson attitudes and behaviour to safeguard animal welfare and meat quality. This prototype was based on the approach of the Pro Hand® Pig programme which

is currently offered to all Australian and some USA pig stockpeople over the internet with or without facilitation by a trainer. The general content, the platform and the delivery method(s) of this prototype training programme were discussed. Finally, the research team sought the support of these stakeholders to collaborate in a future project to develop and evaluate in abattoirs the effectiveness and practicality of a cognitive-behavioural training programme to safeguarding sheep welfare and meat quality.

3.2 Sheep road transporters

One focus group with Victorian and NSW transport drivers was successfully conducted in Victoria. Focus groups with sheep transport drivers planned in WA at the time of the WA abattoir workshops could not be arranged at times in which sufficient drivers could attend. Similarly, a focus group planned in western Victoria could not be arranged due to insufficient drivers available at one site on a single date.

The focus group with sheep transport drivers in Victoria was used to identify the main risks to sheep welfare associated with handling and transporting sheep.

There are many features of handling sheep at abattoirs post-slaughter that are similar to those of handling sheep associated with transport. In particular, loading and unloading sheep have similar challenges such as novelty and physical aspects of the facilities for the sheep, sheep of differing genetics, age and handling experience, etc. Therefore, it seems reasonable that the abattoir stockperson attitudes towards handling sheep that are predictive of how the stockperson handles their sheep (Coleman et al., 2012) are likely to be those that are predictive of how transport drivers handle their sheep. To examine the possible usefulness of questions in the sheep abattoir attitude questionnaire that are predictive of sheep abattoir stockperson in predicting sheep transporters handling behaviour, attitudes of both groups of handlers (sheep abattoir stockpeople and sheep transporters) were compared. An attitude questionnaire for transport drivers, similar to a questionnaire that has been validated for stockpersons working in sheep abattoirs, was presented to the drivers at the Bendigo meeting to seek their feedback on the relevance and practicality of the questionnaire in raising questions about routine handling of sheep associated with transport.

3.2.1. Stockperson attitudinal questionnaire

At the completion of the focus group with sheep transport drivers, each driver was asked to answer an attitude questionnaire that was adapted from a questionnaire previously used in sheep abattoirs (Coleman et al., 2012) and more recently revised for our research on sheep abattoir stockpeople (unpublished). The questionnaire consisted of five parts, a section on working with sheep (labelled “Working with sheep” with 47 items), a section on the characteristics of the animals (labelled “Characteristics of sheep” with 33 items), a section on job satisfaction (labelled “Job satisfaction” with 24 items), a section on practices at the abattoir (labelled “Abattoir practices” with 10 items) and a final section on knowledge about sheep (labelled “Knowledge” with 12 items).

Data from 19 sheep abattoir stockpeople (anonymous) that completed this questionnaire in 2016/17 were used in this comparison of the attitudes of abattoir stockpeople and sheep transporters. This sheep abattoir questionnaire was modified to reflect handling situations common to both sheep abattoir stockpeople and sheep transporters. This adapted questionnaire for sheep transporters consisted of four parts, a section on working with sheep (labelled “Working with sheep” with 45 items), a section on the characteristics of the animals (labelled “Characteristics of sheep” with 23 items), a section on job satisfaction (labelled “Job satisfaction” with 23 items) and a final section on

transport practices including loading and unloading (labelled “Transport practices” with 8 items). Seven transport drivers completed this sheep transporters questionnaire.

The attitude sub-scales that have been shown by Coleman et al. (2012) to be predictive of stockperson handling behaviour in abattoirs (the question items in each these four Attitude sub-scales (labelled Control, Pressure, Stimulation and Facilities) are presented in Table 1) were collated for each of the two groups of stockpeople. Each score was analyzed using an analysis of variance.

Table 1. Attitude sub-scales (and their subjective labels (from Coleman et al., 2012)) studied in the two groups – sheep abattoir stockpeople and sheep transporters.

Attitude subscales	Items (examples of items identified in each subscale)
Control (high score reflects disagreement with statements)	The use of dogs is the most effective method for moving sheep. I decide how quickly the sheep move sheep (in loading and unloading/in to forcing pen and up race). I have control over how many times I work with sheep (transporting/in forcing pen and race).
Pressure (high score reflects disagreement with statements)	Time constraints mean that stock handlers do not have time to correctly handle livestock. If co-workers are poor at handling livestock it means more work for others. There is no relief for stock handlers if they are under time pressure.
Stimulation (high score reflects disagreement with statements)	The use of electric goads does not stress sheep The use of dogs does not affect sheep meat quality Stirring up sheep makes handling easier
Facilities (high score reflects disagreement with statements)	Previous handling has a big effect on ease of handling Poor facilities make sheep hard to handle

4 Results

4.1 Sheep-meat processors

The general response from workshop participants was that the Pro Hand® training programme would complement the present technical training for abattoir stockpeople. The discussion focused on the need for a cognitive-behavioural training programme, its relationship to technical skills and training, its delivery mode and content, how individualised feedback from the attitude questionnaire in the programme was provided to trainees, and the opportunity to use participation in this cognitive-behavioural training as recognition of a specific competency. It was generally well accepted and appreciated by the abattoir personnel that attitudes influence not only the manner in which stockpeople handle their sheep, but also their management of their sheep and their motivation to supervise and attend to issues confronting the sheep.

There was considerable interest in the versatility available in delivering this ProHand® programme. A significant advantage of the ‘ProHand®’ approach is that the programme can be delivered in various modes, for example, delivered to the trainee in small groups facilitated by a trainer using the multi-media programme installed in-house or over the internet or delivered directly to the trainee via the internet without facilitation by a trainer. Furthermore, the programme can be used "on demand" for

new employees or where management sees a need for remedial training or the need for a refresher course.

It was also interesting that while workshop attendees considered that previous handling (both on-farm and handling associated with transport) and handling facilities in lairage as the main determinants of ease of handling sheep in abattoirs, they were interested in how well sheep were handled at their abattoir and the consequent stress responses relative to other abattoirs. Indeed, it appeared that there was some uncertainty about whether their abattoir was achieving best handling practice.

There was broad agreement to collaborate in the next step, that is, working with the researchers in identifying the delivery mode(s) for the programme and to participate in a controlled study in abattoirs to examine the effectiveness and practicality of the training programme to improve stockperson attitudes and behaviour and thus, reduce fear and stress in sheep at abattoirs and thus risks to sheep welfare and meat quality.

Informal discussions with Mintrac, the national organization that provides services to the meat industry in the areas of education and training development, indicated that they would be interested in participating in this next step of evaluating a cognitive-behavioural training programme in commercial settings in terms of its effectiveness and practicality. However, these discussions highlighted the need to develop a programme that was highly focused, and which could be delivered flexibly to accommodate the constraints of time and co-location that characterised the industry.

4.2 Sheep road transporters

Some of the main concerns raised by the focus group participants about the sheep welfare associated with handling and transporting sheep included:

- difficulty in ease of handling sheep associated with poor previous handling (quantity and quality of a human handling), poor previous dog use (quantity of dog handling) and poor yard and loading facilities;
- poor and variability body condition in groups of sheep;
- fit to load sheep;
- farm compliance with curfews;
- mixed age/size groups.

Other concerns raised included:

- poor communication with farmers/agents in terms of variation in reported sheep numbers for transport and on-site presence farmers/agents;
- road conditions and car drivers (particularly with caravans);
- abattoir reception, especially out-of-hours.

As in our discussions with senior staff with responsibility for animal welfare and management of sheep in lairage, transport drivers agreed that training to reduce handling stress in sheep would be valuable for transport drivers.

4.2.1. Stockperson attitudinal questionnaire

The Control sub-scale includes items such as “the use of dogs is the most effective method for moving sheep”, “I decide how quickly the sheep move (in loading and unloading/in to forcing pen and up race)”, and “I have control over how many times I work with sheep (transporting/in forcing pen and race)”. A high score for the Control sub-scale indicates strong disagreement with the statement that

they have control over their behaviour and activities, while a low score for the Facilities sub-scale indicates strong agreement that poor previous handling and poor handling facilities make sheep harder to handle. As shown in Table 2, the two groups of handlers, sheep abattoir stockpeople and sheep transporters, differed (P<0.05) in relation to the two sub-scale scores, Control and Facilities: transport drivers had a higher score for the Control sub-scale and a lower score for the Facilities score than abattoir stockpeople, which may indicate that they believe that they need to push sheep harder and/or excessively use dogs.

Table 2. Handler group (sheep abattoir stockpeople and sheep transporters) and the four attitude sub-scale scores.

Measurement	Means (& SE)		P value
	Abattoir	Transporters	
Control score	1.97 (0.292)	3.32 (0.442)	0.019
Pressure score	2.09 (0.184)	1.96 (0.279)	0.702
Stimulation score	3.50 (0.160)	3.04 (0.209)	0.096
Facilities score	1.84 (0.125)	1.36 (0.188)	0.043

Furthermore, while there are some differences between these two groups of handlers in attitudes to handling, as shown in Table 3, there is considerable overlap in these attitudes.

Table 3. Handler group (sheep abattoir stockpeople and sheep transporters) and 95% confidence interval in the four attitude sub-scale scores.

Measurement	Handler type	Mean	95% confidence interval	
Control score	***Abattoir***	1.97	1.36	2.58
	Transporter	3.32	2.40	4.24
Pressure score	***Abattoir***	2.09	1.71	2.48
	Transporter	1.96	1.39	2.54
Stimulation score	***Abattoir***	2.09	1.71	2.48
	Transporter	1.96	1.39	2.54
Facilities score	***Abattoir***	1.84	1.59	2.10
	Transporter	1.36	0.97	1.75

Thus, these limited data suggest that some items in the sheep abattoir stockperson questionnaire may be predictive of sheep transporters handling of sheep. However, this is an empirical question and further research is required. The imperative for this is the outcome of a behavioural change training programme that targets the attitudes and behaviour of transport drivers to safeguard handling stress and thus welfare in transported sheep.

5 Discussion

5.1 Sheep-meat processors

These workshops were attended by senior staff with responsibility for animal welfare and management of sheep in lairage (e.g. QA and training managers, lairage managers and senior livestock handlers) as well as abattoir and Commonwealth DAF veterinarians, and were very well-received. The

general response from the workshop attendees was that this attitude-behaviour change training program would complement the present technical training for stockpeople. There was agreement to collaborate with the researchers in identifying the delivery method(s) for the programme and to participate in a future controlled study in abattoirs to examine the effectiveness of the training programme to improve stockperson attitudes and behaviour and thus reduce fear and stress in sheep at abattoirs and thus risks to sheep welfare and meat quality.

5.2 Sheep road transporters

While it was not possible to coordinate the timing of the abattoir workshops in WA with the major sheep sales at saleyards and the second focus group with sheep transporters in Victoria at a time and place for a sufficient number of transport drivers to attend, the focus group in Bendigo with Victorian and NSW drivers was successful. Seven transport drivers (employees and owner/driver) participated in an informative discussion on the issues and challenges in handling (at both farm and abattoirs) and transporting sheep, as well as the benefits of the job. Some obvious problems, but also some unexpected ones, were raised providing a good insight into some of the main welfare risks for sheep post-farm gate (from farm pen to unloading at lairage).

The attitude and work-related questionnaire (see Appendix 5.1) was completed by all participants.

The Control sub-scale included items such as 'the use of dogs is the most effective method for moving sheep', 'I decide how quickly the sheep move (in loading and unloading/in to forcing pen and up race)', and 'I have control over how many times I work with sheep (transporting/in forcing pen and race)'. Because the items in the Control sub-scale related to moving sheep quickly, it may be that the speed of the chain/need to load or unload the truck and the behaviour of the sheep may make handlers feel they have less control over what they do or what they would like to do. This may lead to pushing sheep harder using frequent shouting, artificial noise and hits and/or excessive use of dogs. Similarly, for the Facilities subscale, which includes items such as 'previous handling has a big effect on ease of handling' and 'poor facilities make sheep hard to handle', if handlers believe that facilities and previous handling makes sheep difficult to handle, they may push sheep harder using frequent shouting, artificial noise and hits and/or excessively use dogs.

A high score for the Control sub-scale indicates strong disagreement with the statement that they have control over their behaviour and activities, while a low score for the Facilities sub-scale indicates strong agreement that poor previous handling and poor handling facilities make sheep harder to handle. Transport drivers had a higher score for the Control sub-scale and a lower score for the Facilities score than abattoir stockpeople, indicating that they may believe that they need to push sheep harder and/or excessively use dogs. However, care is required in interpreting these results because of the small sample size of transport drivers.

While there were some differences between sheep abattoir stockpeople and sheep transporters in attitudes to handling, there was considerable overlap in these attitudes. These limited data suggest that some items in sheep abattoir stockperson questionnaire may be predictive of the handling behaviour of sheep transporters. However, this is an empirical question and further research is required. The imperative for this is the outcome of a behavioural change training programme that targets key attitudes and behaviour of transport drivers to safeguard handling stress and thus welfare in transported sheep.

6 Conclusions/recommendations

As in discussions with senior abattoir staff with responsibility for animal welfare and management of sheep in lairage, transport drivers agreed that training to reduce handling stress in sheep would be valuable for transport drivers. Therefore, with this support from the sheep meat-processing and transport sectors as well as Mintrac, the research team is well positioned to work in collaboration with Mintrac and the sheep meat-processing and transport sectors to seek funding to evaluate the cognitive-behavioural training programme in commercial settings, in terms of its effectiveness and practicality in safeguarding sheep welfare and meat quality. Informal discussions with Mintrac, the national organization that provides services to the meat industry in the areas of education and training development, indicated that they would be interested in participating in this next step of evaluating a cognitive-behavioural training programme in commercial settings in terms of its effectiveness and practicality. However, these discussions highlighted the need to develop a programme that was highly focused, and which could be delivered flexibly to accommodate the constraints of time and co-location that characterised the industry.

A cognitive-behavioural training programme would complement the current training programmes/courses that are available to the meat-industry sector. These current programmes are educational programs that impart skills rather than behaviour change programmes, that is, they provide information and advice on handling without targeting the specific attitudes of stockpeople that drive the key behaviours associated with sheep stress (and thus sheep welfare and meat quality). Technical skills and knowledge are important attributes of the work performance of stockpeople and, clearly, training targeting these attributes is important in improving animal welfare and performance via the technical skills and knowledge competencies of stockpeople. Indeed, our research on stockpeople in farm settings shows that both technical and cognitive-behaviour training are necessary to not only reduce the stress associated with handling and husbandry procedures involving humans, but also to improve the motivation in stockpeople to learn new technical skills and knowledge and to apply these competencies to the management of the animals under their care.

7 Key messages

7.1 The need for a behavioural change training programme for sheep handlers in the sheep-meat processing and sheep transport sectors

Support in these meat sectors for training to reduce handling stress in sheep in transport and lairage.

7.2 The value of a behavioural change training programme for sheep handlers in the sheep-meat processing and sheep transport sectors

Research has shown the potential of this training to safeguard sheep welfare and meat quality.
This behaviour change programme would complement and strengthen the benefit of existing skills programmes.

7.3 Flexible delivery mode available for this training programme.

As shown in other livestock sectors this training programme can be delivered in various modes: delivered to the trainee in small groups facilitated by a trainer using the multi-media programme

installed in-house or over the internet or delivered directly to the trainee via the internet without facilitation by a trainer.

The training programme can be used "on demand" for new employees or where management sees a need for remedial training or the need for a refresher course.

8 Bibliography

1. Ajzen I and Fishbein M 1980. Understanding Attitudes and Predicting Social Behaviour. Prentice-Hall Inc, Englewood Cliffs, New Jersey.

2. Albarracín D, Zanna MP, Johnson BT and Kumkale GT 2005. Attitudes: Introduction and Scope. In: Albarracín, D., Johnson, B.T. and Zanna, M.P. (eds) The Handbook of Attitudes. Psychology Press, New York, pp. 3–19.

3. Animal Welfare Science Centre (2011). Training programs: targeting human-animal interactions to improve animal welfare and productivity, Available: http://www.animalwelfare.net.au/article/training-programs

4. Coleman GJ and Hemsworth PH 2014. Training to improve stockperson beliefs and behaviour towards livestock enhances) welfare and productivity. Scientific and Technical Review of the Office International des Epizooties (Paris) 33(1), 131–7.

5. Coleman GJ, Hemsworth PH, Hay M and Cox M 2000. Modifying stockperson attitudes and behaviour towards pigs at a large commercial farm. Applied Animal Behaviour Science 66, 11-20.

6. Coleman GJ, McGregor M, Hemsworth PH, Boyce J and Dowling S 2003. The relationship between beliefs, attitudes and observed behaviours of abattoir personnel in the pig industry. Applied Animal Behaviour science 82, 189-200.

7. Coleman GJ, Rice M and Hemsworth PH 2012. Human-animal relationships at sheep and cattle abattoirs. Animal Welfare 21, 15-21.

8. Coleman G, Rohlf V, Toukhsati S and Blache D 2015. Public attitudes relevant to livestock animal welfare policy. Farm Policy Journal 9, 45-57.

9. De Jonge J and van Trijp HCM 2013. Meeting heterogeneity in consumer demand for animal welfare. A reflection on existing knowledge and implications for the meat sector. Journal of Agricultural and Environmental Ethics 26, 629–661.

10. Ferguson DM and Warner RD 2008. Have we underestimated the effect of pre-slaughter stress on meat quality in ruminants? Meat Science 80, 12–19.

11. Fisher AD, Niemeyer DO, Lea JM, Lee C, Paull DR, Reed MT and Ferguson DM 2010. The effects of 12, 30, or 48 hours of road transport on the physiological and behavioural responses of sheep. Journal of Animal Science 88, 2144 – 52.

12. Grandin T 2007a. Introduction: effect of consumer requirements, international standards and marketing structure on the handling and transport of livestock poultry. In Livestock Handling and Transport (ed. T Grandin), pp. 1–18. CAB International, Oxon, UK.

13. Grandin T 2007b. Handling and welfare of livestock in slaughter plants. In Livestock Handling and Transport (ed. T Grandin), pp. 329–354. CAB International, Oxon, UK.

14. Hemsworth PH and Coleman GJ 2011. Human–Livestock Interactions: The Stockperson and the Productivity and Welfare of Farmed Animals, 2nd ed. CAB International, Oxon UK.

15. Hemsworth PH, Coleman GJ and Barnett JL 1994. Improving the attitude and behaviour of stockpeople towards pigs and the consequences on the behaviour and reproductive performance of commercial pigs. Applied Animal Behaviour Science 39, 349–362.

16. Hemsworth PH, Coleman GJ, Barnett JL, Borg S and Dowling S 2002. The effects of cognitive behavioral intervention on the attitude and behaviour of stockpersons and the behavior and productivity of commercial dairy cows. Journal of Animal Science 80, 68–78.

17. Hemsworth PH, Rice M, Karlen MG, Calleja L, Barnett JL, Nash J and Coleman GJ 2011. Human- animal interactions at abattoirs: Relationships between handling and animal stress in sheep and cattle. Applied Animal Behaviour Science 135, 24-33.

18. Hemsworth PH, Rice M, Borg S, Edwards LE, Ponnampalam, EN and Coleman GJ 2018. Relationships between handling, behaviour and stress in lambs at abattoirs. Animal (in press).

19. Kjaernes, U., Lavik, R., 2008. Opinions on animal welfare and food consumption in seven European countries. In: U. Kjaernes, B.B. Bock, E. Roe and J. Roex (Ed.), Consumption, distribution and production of farm animal welfare – Opinions and practices within the supply chain, Welfare Quality® Reports No. 7, Cardiff University, Cardiff, UK, pp. 1-126.

20. Ponnampalam EN, Hopkins DL, Bruce H, Li D, Baldi G, Bekhit AE 2017 Causes and contributing factors to "dark cutting" meat: current trends and future directions: a review. Comprehensive Reviews in Food Science and Food Safety 16, 400-430.

21. Ruis M, Coleman GJ, Waiblinger S, Windschnurer I and Boivin X 2010. A multimedia-based cognitive-behavioural intervention program improves attitudes and handling behaviours of stockpeople in livestock farming. Advances in Animal Biosciences 1, 175.

22. Waiblinger S, Boivin X, Pedersen V, Tosi M-V, Janczak AM, Visser EK and Jones RB 2006. Assessing the human–animal relationship in farmed species: A critical review. Applied Animal Behaviour Science 101, 185–242.

9 Appendix

9.1 Stockperson questionnaire for sheep transport drivers

Stockperson questionnaire for sheep transport drivers.

Dear Participant,

We wish to ask you a series of questions about various aspects of your working conditions in handling and transporting sheep. The aim is to understand your opinion of how different aspects of your work affect ease of handling sheep, your working comfort and sheep meat quality.

What we are going to do is ask you to answer a series of questions based on your own experience and expertise. We are particularly interested to get your personal opinions so that we can collate all of the responses from a sample of transport drivers to get an idea of industry-wide practices and outcomes. The long term objective of this research is an education or training package to safeguard your working conditions, and the welfare and meat quality of sheep.

It is important that you give us your frank opinions. Your answers will be kept entirely confidential. All of the results will be coded before being entered into a computer and your name will not appear on the data sheets. When we have collated the data, we will give you feedback on the results.

These questions ask you about yourself and your current job

What is your age? …….

What is your gender? Male Female (circle one)

Are you an owner-driver or an employee for a livestock transport company? ……

How many years have you driven sheep transport vehicles? ……..

Have you driven other livestock transport vehicles? ……..

Have you previously worked with livestock on farms? (If yes, please list species)…….

Have you previously worked with livestock at saleyards? (If yes, please list species)…….

Have you previously worked with livestock at abattoirs? (If yes, please list species)
……

The following statements relate working with sheep in your present job.

For these statements, the answer scale ranges from: Disagree Strongly to Agree Strongly.

Please tick the response that best applies to you.

Key points to remember

- Remember that you are responding in relation to your actual experience, not the way you would like things to be.
- Answer as honestly as possible
- There are no right or wrong answers
- There is no time limit, however you should work as quickly as you can without thinking over any one question at length

The following answers may be different for different kinds of sheep, so you need to answer for ewes, wethers, rams and lambs separately.

Statement					
1. Relative to other sheep, the following sheep require more physical effort to move than do others	**Strongly Agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

2. Relative to other sheep, the following sheep require more use of a handling aid	**Strongly Agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly disagree**
Ewes	☐	☐	☐	☐	☐

Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

3. When loading/unloading it is often necessary to use a handling aid to make them go faster	**Strongly Agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

4. An electric prodder or goad is the most effective tool to get sheep to move	**Strongly Agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

5. It is best to move the following sheep quickly	**Strongly Agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

6. Flappers or rattlers are the most effective tools for moving sheep quickly	**Strongly Agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

7. The use of dogs is the most effective method for moving the following sheep	**Strongly Agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly disagree**
Ewes	☐	☐	☐	☐	☐

Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

8. The use of dogs with the following sheep does not negatively affect stock behaviour	**Strongly Agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

9. Once the following sheep are moving it is best to keep them moving quickly	**Strongly Agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

The following are questions about sheep in general because we are interested in your general impression of handling sheep.

	Strongly agree	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly Disagree**
10. The size of the mob determines the rate at which I move the sheep to load and unload them	☐	☐	☐	☐	☐
11. It is easier to treat all sheep of the same breed in the same way when moving them, than to be selective.	☐	☐	☐	☐	☐
12. I decide how quickly the sheep are loaded.	☐	☐	☐	☐	☐
13. I decide how quickly the sheep are unloaded.	☐	☐	☐	☐	☐
14. To keep the sheep moving I have to keep the sheep close together.	☐	☐	☐	☐	☐
15. I choose how often I transport sheep	☐	☐	☐	☐	☐
16. I must keep sheep as near to the entrance of the loading ramp as possible when loading	☐	☐	☐	☐	☐

17. It is important to move the sheep up the loading ramp as quickly as possible.	☐	☐	☐	☐	☐
18. How the sheep are handled by me when waiting to be loaded does not affect their behaviour	☐	☐	☐	☐	☐
19.I decide how quickly I load the sheep on to the truck	☐	☐	☐	☐	☐
20. I decide how quickly I unload the sheep off the truck	☐	☐	☐	☐	☐
21. I move the sheep when loading at the same speed as other drivers	☐	☐	☐	☐	☐
22. I prefer to transport sheep rather than cattle	☐	☐	☐	☐	☐

	Strongly agree	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly Disagree**
24. Running sheep over uneven/changes in flooring can cause them to be uncertain of their footing.	☐	☐	☐	☐	☐
26. If others are poor at handling sheep, it means more work for me.	☐	☐	☐	☐	☐

27. There is no relief for transport drivers if they are under time pressure.	☐	☐	☐	☐	☐
28. Previous handling on farm has the biggest effect on ease of loading and unloading sheep	☐	☐	☐	☐	☐
29. Poor facilities make sheep hard to handle when loading.	☐	☐	☐	☐	☐
30. Sheep handling during transport affects meat quality.	☐	☐	☐	☐	☐
31. Working with difficult sheep can be annoying.	☐	☐	☐	☐	☐
32. Differences between breeds make some sheep more difficult to handle	☐	☐	☐	☐	☐
33. Wool blindness makes sheep hard to handle	☐	☐	☐	☐	☐
34. Sheep with horns are hard to handle	☐	☐	☐	☐	☐
35. Smells from other sheep make sheep difficult to handle	☐	☐	☐	☐	☐

Here again your answers may be different for different kinds of sheep, so you need to answer for ewes, wethers, rams and lambs separately.

36. The use of electric goads does **not** stress	**Strongly Agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

37. The use of electric goads with sheep does **not** affect meat quality	**Strongly Agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

38. The use of dogs with sheep does not affect meat quality	**Strongly Agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

39. Allowing dogs to briefly manage sheep on their own (without commands) makes handling easier for the handler	**Strongly Agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

40. Talking to sheep when the opportunity arises, makes handling easier.	**Strongly Agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

41. Positive contact with sheep (touching, etc) makes handling more difficult	**Strongly Agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

42. Whistling to move sheep makes handling easier	**Strongly Agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

43. Stirring up sheep makes handling easier	**Strongly Agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

	Strongly Agree	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly disagree**
44. I can’t wait too long for flighty sheep to settle down before moving them	☐	☐	☐	☐	☐

	Strongly Agree	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly disagree**

45. I do not use dogs to load sheep if the sheep are flighty.	☐	☐	☐	☐	☐

These questions ask you about handling stock and the animals themselves. There are no right or wrong answers. Just give your opinion.

The following are statements about ewes, wethers, rams and lambs and their characteristics. For these statements the answer scale ranges from: Agree Strongly to Disagree Strongly. Please tick the response which best applies to your opinion regarding each animal.

46. The following sheep are easy to work with	**Strongly agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly Disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

47. The following sheep are intelligent	**Strongly agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly Disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

48. The following sheep are stubborn	**Strongly agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly Disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

49. Little experience is required to work with the following sheep	**Strongly agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly Disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐

Lambs	☐	☐	☐	☐	☐

50. The following sheep are easily frightened when handled forcefully	**Strongly agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly Disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

51. The following sheep are smelly	**Strongly agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly Disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

52. The following sheep are energetic	**Strongly agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly Disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

53. The following sheep are likely to approach humans	**Strongly agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly Disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

54. The following sheep are aggressive to their own kind	**Strongly agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly Disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐

Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

55. The following sheep are frustrating to work with	**Strongly agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly Disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

56. The following sheep are stimulating	**Strongly agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly Disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

57. The following sheep are ugly in appearance	**Strongly agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly Disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

58. The following sheep would make good pets	**Strongly agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly Disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

59. The following sheep feel pain like humans	**Strongly agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly Disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

60. The following sheep are simple minded	**Strongly agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly Disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

61. The following sheep are entertaining to watch	**Strongly agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly Disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

62. The following sheep are noisy	**Strongly agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly Disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

63. The following sheep are cunning	**Strongly agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly Disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

64. The following sheep require respect	**Strongly agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly Disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐

Lambs	☐	☐	☐	☐	☐

65. The following sheep have a gentle nature	**Strongly agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly Disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

66. The following sheep display curiosity	**Strongly agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly Disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

67. Little knowledge is required to handle the following sheep	**Strongly agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly Disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐
Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

68. The following sheep are aggressive to humans	**Strongly agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly Disagree**
Ewes	☐	☐	☐	☐	☐
Wethers	☐	☐	☐	☐	☐

Rams	☐	☐	☐	☐	☐
Lambs	☐	☐	☐	☐	☐

These questions are about your job. There are no right or wrong answers. Just give your opinion.

The following are statements about job characteristics (Note that some of the following statements in this section do not apply to owner-drivers and so owner-drivers do not need to answer these).

For the statements the answer scale ranges from: Very Satisfied to Very Dissatisfied. Please tick the response which best applies to your opinion in relation to:

	Very Satisfied	Satisfied	Neither satisfied nor dissatisfied	Dissatisfied	Very Dissatisfied
69. The way company policies are put into practice	☐	☐	☐	☐	☐
70. The working conditions	☐	☐	☐	☐	☐
71. The freedom to use my own judgement	☐	☐	☐	☐	☐
72. The praise I get for doing a good job	☐	☐	☐	☐	☐
73. My pay and the amount of work I do	☐	☐	☐	☐	☐
74. The chance for advancement in this job	☐	☐	☐	☐	☐
75. The chance to work alone on the job	☐	☐	☐	☐	☐
76. Being able to keep busy all the time	☐	☐	☐	☐	☐

For the following statements the answer scale ranges from Strongly agree to Strongly disagree. Please tick the response which best applies to your opinion in relation to:

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
77. I contribute to improving the workplace.	☐	☐	☐	☐	☐

78. Regular and effective communication with handlers on farms and at the abattoir is very important.	☐	☐	☐	☐	☐
79. I am the type of person who gets over-involved with my job.	☐	☐	☐	☐	☐
	Strongly agree	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly disagree**
80. It is more important to be liked than to do the 'right' thing	☐	☐	☐	☐	☐
81. I enjoy working in teams rather than on my own	☐	☐	☐	☐	☐
82. I prefer to be told exactly what to do at work.	☐	☐	☐	☐	☐
83. I have a lot of confidence in the team I work with.	☐	☐	☐	☐	☐
84. If I see an animal injure itself I know how it feels.	☐	☐	☐	☐	☐
85. When I see farm animals having fun I feel really happy.	☐	☐	☐	☐	☐
86. When I see an unhappy farm animal it upsets me more than it would upset most people.	☐	☐	☐	☐	☐
87. I try to understand animals by imagining how things look from their point of view.	☐	☐	☐	☐	☐
88. Imagining how an animal feels is something I do often.	☐	☐	☐	☐	☐
89. Farm animals act like individuals.	☐	☐	☐	☐	☐
90. Farm animals generally aren't affected by the way they are treated	☐	☐	☐	☐	☐
91. Farm animals are affectionate.	☐	☐	☐	☐	☐

Now, here are some questions about practices in which sheep are loaded and unloaded.

92. What aids do you use to move animals?	**Tick or name aids used**
Electric prod	
Canvas flapper	
Goad, stick or cane	
Tin dog, Rattler or other noise maker	
Plastic (poly) pipe	
Dog	
Other (please name)	
Other (please name)	

93. Tick the things that different kinds of sheep find aversive (that is, things that they try to avoid or that make them upset)

	Ewes	**Wethers**	**Rams**	**Lambs**
Isolation	☐	☐	☐	☐
Holding yards	☐	☐	☐	☐
Hot weather	☐	☐	☐	☐
Cold weather	☐	☐	☐	☐
Dogs	☐	☐	☐	☐
Being indoors	☐	☐	☐	☐
People	☐	☐	☐	☐
Loud noise	☐	☐	☐	☐
Shadows	☐	☐	☐	☐
Handling	☐	☐	☐	☐

Stress from other animals	☐	☐	☐	☐
Aggression from other animals	☐	☐	☐	☐
Rough driving techniques	☐	☐	☐	☐
Steep loading ramps	☐	☐	☐	☐

94. Rate the extent to which the following are responsible for stress in sheep.

	Not at all	A little	Moderately	Very stressful
Breed (genetics**)**				
Temperament				
Loud noise				
Time spent in transport				
Overcrowding				
New or unexpected surroundings				
Poor handling				
Barking dogs				
Dogs in the pen with sheep				
Other (please specify)				

95. To what extent do the following cause sheep to baulk or escape (tick as many as you like)?

	Not at all	A little	Moderately	A major cause
Messy floor				
Smells from other sheep				
Dogs				
Crowding when entering the forcing pen				
Poor handling				
Bright lights				

Shadows				
People nearby				
Other (please specify)				

96. At which area of transport are sheep most difficult to handle? *Rank from 1 (most difficult) to 4 (easiest)*

During loading	
During unloading	
When down in the truck	
Moving into lairage	

97. How important are the facilities when moving sheep (rate from Not at all to very important)	**Not at all**	**Somewhat important**	**important**	**Very important**
During loading	☐	☐	☐	☐
During unloading	☐	☐	☐	☐
Moving into lairage	☐	☐	☐	☐

98. Which features of the facilities cause sheep to be more difficult to handle? (rate from Not at all to A major cause)

	Not at all	**A little**	**Moderately**	**A major cause**
Floors				
slippery				
uneven				
Dirty slats				
Transition from one flooring to another				
Gates				
Narrow gates				
Ease of opening/closing				
Solid gates (not see-through)				
Holding pens				
Large pens				
Long pens				
Crowded pens				
Laneways				
Narrow laneways				
Pens used as laneways				
Tight corners				
Round corners				

Shadows				
Light				
Ramps and slopes				
Concrete flooring				
Slats				
Steep angle				
Flat area top and bottom				

99. If there was one design feature you could change when loading or unloading sheep what would that be?

_____

_____

_____

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Thank you for your time!

Guidelines (please don't type in this section, guidelines must be removed before submission by highlighting this section and then deleting): Should include the location of any metadata.