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Prepared by: Samantha Bickell

The University of Western Australia

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Investigating the effects of stock-handling training in sheep feedlots

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Abstract

Currently, livestock handling training programs that claim to improve animal productivity and handling are not scientifically justified. This pilot project with a limited number of animals aimed to determine the effects of stock-handling training in three sheep feedlots on animal productivity, welfare and behaviour as well as the effects on the stockperson behaviour, physiological stress and attitudes. Sheep productivity increased by 33% and 34% at two of the feedlots and sheep stress, behaviour and ease of handling, as well as the stockperson's physiological stress improved after stock-handling training at all three feedlots. Although these improvements were variable within and across the feedlots, the promising nature of the results from this preliminary study strongly suggest that there are positive animal and human benefits of stockperson training and thus further research is required to fully understand the impact that stockperson training can have on the animals and the stockpeople.

Executive Summary

Currently, the limited livestock handling training programs available are not scientifically justified or quantified. Despite receiving high recommendations from producers, there are only anecdotal accounts of the improvements in animal productivity and handling, so there is a need for a rigorous quantification of the benefits that stock-handling training can bring to the stockperson and animals. This pilot research project aimed to determine the effects of stock-handling training in three sheep feedlots on the productivity, behaviour and welfare of the animals as well as the effects on stockperson behaviour, physiological stress and attitudes.

Three sheep feedlots, where the stockpeople had no formal stock-handling training, were recruited to participate in the study. Stockpeople at each feedlot participated in a two-day stock-handling training program delivered by commercial training companies Stress Free Stockmanship and ProHand. Before stockpeople participated in the stock-handling training program, animal behaviour, stress and productivity were measured on 50 sheep at each feedlot to obtain pre-stock-handling training measurements. Additionally, the stockperson's behaviour and physiological stress while weighing the 50 sheep before introducing the sheep into the feedlot was also measured at each feedlot to obtain pre-stock-handling training measurements. After the stock-handling training course, animal behaviour, welfare and productivity as well as stockperson behaviour and physiological stress was measured again on another 50 sheep at each feedlot to obtain post-stock-handling training measurements.

In brief, after the stock-handling training:

- Average daily gain (ADG) increased by 33% and 34% at two of the feedlots, while no significant improvements in ADG were found at the third feedlot
- Sheep stress, indicated by the concentration of the stress hormone cortisol, was reduced at all the feedlots
- Stockpeople decided against the use of dogs
- The health of the animals, as assessed by immunoglobulin G concentrations, was not influenced at all of the feedlots
- Flight speed, commonly used as a measure of the fear response of an animal to human handling, reduced at two of the feedlots
- The effort required by stockpeople to weigh the sheep reduced at two of the feedlots
- The time required to weigh the sheep decreased at one of the feedlots
- The level of stress experienced by the stockpeople during sheep weighing decreased at all feedlots
- There were slight positive changes in the attitudes and beliefs of the stockpeople

These results suggest that there are positive animal and human benefits of stock-handling training immediately prior to sheep entering feedlots. There is the potential for an increase in profit due to the significant improvements in ADG. The improvements in animal behaviour, fear and stress levels possibly contributed to the reduction in effort and time required by the stockpeople as well as their stress levels and thus there is the potential for labour saving. In addition, reducing the stress and fear of the animals improves their level of welfare which has ethical and social benefits and implications.

However, these improvements in animal productivity, welfare and behaviour were variable within and across a small number of feedlots and sheep and thus other factors, such as the history of the sheep and the use/non-use of dogs, not assessed within the scope of this project, could have interacted and influenced the results. In addition, the degree by which the new handling techniques were adopted seemed to influence the degree to which animal productivity improved. The promising nature of the results indicates that this pilot study was successful in demonstrating that there are improvements to be made in animal productivity, welfare and behaviour in sheep feedlots and thus further research, with more feedlots/farms with replicates pre- and post-stockhandling training, is required to fully understand what factors affect the adoption of the training and the impact that stockperson training can have on the animals and the stockpeople.

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1. Background

An animal's fear of humans is a major source of stress and the basis of the welfare and productivity problems in the livestock industry (Rushen et al., 1999). High stress levels result in the release of hormones that can disrupt an animal's metabolism which can have adverse effects on growth, health and reproduction, therefore, reducing animal welfare, productivity and product quality (Broom and Johnson, 1993; Ferguson and Warner, 2008). For example, fear of humans has been found to reduce the growth and reproductive performance of pigs (Hemsworth et al., 1987), reduce weight gain and meat quality in cattle (Ferguson and Warner, 2008), reduced feed conversion and egg production in poultry (Barnett et al., 1992; Hemsworth et al., 1994b and reduce milk production in dairy cows {Hemsworth, 2000). Most of the animal's fear of humans results from negative handling by the stockperson which, in addition to reducing the welfare and productivity of the animal, can make handling difficult and dangerous to both the animal and the handlers (Hemsworth and Coleman, 1998).

A solution for reducing an animal's fear of humans is to train stockpeople to handle their animals in an appropriate manner and according to an animal's natural behaviour so husbandry practices become less fearful (Grandin, 1993). The traditional motivation used to move sheep is the repeated application of fear-inducing stimuli (Hutson, 2007). Stockpeople usually use dogs, the natural predators of sheep, or auditory and visual signals, such as shouting and waving, to frighten sheep to move (Hutson, 2007). Thus the aim is to frighten the animals and stimulate the flight response. However, using fear-inducing stimuli to move animals does not always work effectively or achieve the desired movement (McCutchan et al., 1992). Alternative techniques based on the animal's natural behaviour and motivations, such as the flocking/following response or positive rather than negative reinforcement, using the animals flight zone and point of balance, can be used to achieve the desired movement without activating the animals stress responses (Grandin, 1984).

Stockpeople usually have little, if any, formal stockmanship training (Hemsworth and Coleman, 1998). Inexperienced stockpeople usually obtain their handling skills by learning from their peers, who have also learnt from their peers and are usually using the traditional fear-inducing techniques to move animals. In order to achieve improvements in livestock handling, animal productivity and animal welfare, stockpeople need to be aware of these alternative methods and be trained in using these low-stress stock-handling techniques.

Through the use of cognitive-behavioural modification techniques (Hemsworth et al., 2002) designed to improve stockmanship and handling, attitudinal and behavioural changes in stockpeople and subsequently improvements in welfare and productivity (Hemsworth et al., 1994a; Hemsworth et al., 1994b; Coleman et al., 2000; Hemsworth, 2003) have been demonstrated in the pig, dairy and poultry industries. It is surprising that despite stockmanship being identified as a major welfare priority of the sheep industry' there is limited, if any, research on the effect of stockmanship on the welfare and productivity of sheep.

Currently, the limited livestock handling training programs available, Stress Free Stockmanship for example, are not scientifically justified or quantified. Despite receiving high recommendations from producers, there are only anecdotal accounts of the improvements in animal productivity and handling, so there is a need for a rigorous quantification of the benefits that stock-handling training can bring to the stockperson and animals. In addition, research has shown that for broad-scale (across stockpeople) and sustained improvements in stockperson behaviour, changes in the stockpersons attitudes towards animals is also required in combination with behavioural changes (Hemsworth and Coleman, 1998). Therefore technical stockmanship training should also be complemented with cognitive-behavioural modification training to obtain long-lasting behavioural and attitudinal changes.

This pilot research project aimed to determine the effects of stock-handling training in sheep feedlots on animal behaviour, welfare and productivity as well as the behaviour, physiological stress and attitudes of stockpeople towards sheep.

2. Project objectives

- Recruit three sheep feedlots to participate in the study
- Design stockperson attitude questionnaire
- Conduct pre-stock-handling behaviour, physiology and attitudinal assessments
- Laboratory work on assaying and extracting behavioural and physiological variables
- Deliver stock-handling training
- Conduct post-stock-handling behaviour, physiology and attitudinal assessments
- Laboratory work on assaying and extracting behavioural and physiological variables
- Publication and communication of results
- Development of stockperson training manual

3. Methodology

Three sheep feedlots, where the stockpeople had no formal stock-handling training, were recruited to participate in the study.

Feedlot 1 was a large indoor housed system (Figure 1) managed by a sole operator. The capacity of the shed is 10,000 sheep, with up to 1,000 sheep per pen. The feedlot is in operation for approximately 10 months of the year. Sheep of mixed breeds, ages and backgrounds are bought from saleyards and farms and lot fed for a period of 5 weeks on a pelleted diet. During the study, SAMM x White Suffolk lambs were fed the same formulated diet and were handled by one stockperson.

Figure 1: Photo of Feedlot 1

Feedlot 2 is part of a mixed farming operation (Figure 2) that specialises in meat market animals, stud farm, piggery and grain and export hay production. The feedlot is in operation for approximately 6 months of the year. Poll Dorset cross lambs born on farm are lot fed on a total mixed ration diet for a period of 3 weeks prior to slaughter. During the study, all lambs at this feedlot were fed the same formulated diet and were handled the same two stockpeople.

Figure 2: Photo of Feedlot 2

Feedlot 3 is a small-scale sheep meat operation (Figure 3) which produces approximately 1000 SAMM x White Suffolk x lambs per season for market. Lambs are born on farm and are lot fed on a mixed grain diet supplemented with hay for a period of 3 weeks prior to slaughter. During the study, all sheep at this feedlot were fed the same formulated diet and were handled the same two stockpeople.

Figure 3: Photo of Feedlot 3

The use of animals and the procedures were approved by the University of Western Australia Animal Ethics Committee.

3.1 Pre-stock-handling training measurements

Before stock-people participated in the stock-handling training program, animal behaviour, stress and productivity were measured on 50 sheep at each feedlot to obtain pre-stock-handling training measurements. Sheep at feedlots 1 and 3 were randomly selected while sheep at feedlot 2 were selected based on falling within the weight range of 42-46 kg. Additionally, the stockperson's behaviour and physiological stress while weighing the 50 sheep before introducing the sheep into the feedlot was also measured at each feedlot to obtain pre-stock-handling training measurements. At Feedlot 2 and 3 there were two stockpeople weighing the sheep and at Feedlot 1 there was one person.

Animal productivity, ease of handling and stress measurements

Animal productivity is determined by average daily gain (ADG) of the sheep during the feed-lotting period. Sheep are individually weighed before being introduced into the feedlot and weighed again when they exit the feedlot. Individual weight gain during the feed-lotting period is divided by the numbers of days in the feedlot to obtain ADG values for each animal.

Ease of handling is determined from the behaviour of the 50 sheep when they are being weighed into the feedlot. Video cameras recorded the behaviour of the animals when they were in the race leading up the scales and when they were in the weighing scales. The behaviours that contribute to the ease of handling and were thus determined from the video recordings were:

- Number of sheep walking backwards in the race
- Time spent walking backwards in the race
- Number of incidences of sheep turning around in the race
- Number of sheep needing physical assistance into the scales
- Number of sheep that head-butt the scales when they enter the scales
- Number of sheep that back-up in the scales
- Number of sheep attempting to turn around in the scales
- Agitation score while in the scales. Agitation score is a subjective score of 1 to 5 (1 being docile and 5 wild) given to sheep while in the weigh scales.

The flight speed of the sheep when they exited the scales was also recorded using a flight speed meter which uses infrared sensors that determine the time taken for the animal to transverse a fixed distance after exiting the weighing scales.

Animal stress due to the handling and the feed-lotting procedure was determined from the concentration of cortisol metabolites in faecal samples taken on the day of the handling and approximately 24 hours after the handling and feedlot introduction. The samples taken on the day of handing reflect that animal's cortisol concentrations and level of stress 8 -14 hours earlier (Morrow et al., 2002) and so provide a baseline level of stress. The samples taken after handling and introduction into the feedlot reflect the animal's level of stress due to the handling and feed-lotting process. Cortisol was determined from faecal samples as overall cortisol concentrations can be determined, rather than a spot cortisol concentration obtained from plasma cortisol at that time where concentrations can be influenced by the sampling procedure (Cook, 2012).

The health of the animals was also assessed at the end of the feed-lotting period from plasma immunoglobulin G (IgG) concentrations. IgG is the main antibody found in blood and protects the body from infections and is considered to be indicative of an individual's immune status. A blood sample was obtained from each animal when they were weighed out of the feedlot and concentrations of IgG were analysed from the plasma samples.

Stockperson behaviour and stress measurements

Stockperson behaviour while the sheep were being weighed into the feedlot was determined from video recordings. The time taken for 50 sheep to be weighed was recorded as well as the 'effort' required by each stockperson during the weighing process. Effort was determined by:

- Number of steps taken by each stockperson
- Number of times the stockpeople touch the sheep
- Number of vocalisations used towards the sheep
- Number of vocalisations used towards the dogs
- Number of arm movements used towards the sheep to get them to move
- Number of times the stockpeople prod/poke the sheep with an implement.

An effort score was attributed to each feedlot by the summation of all the effort behaviours from each stockperson into one overall score.

Stockperson stress while handling sheep was determined from cortisol concentrations in saliva. Saliva samples were obtained from each stockperson within five minutes after the weighing procedure.

3.2 Stock-handling training

A two-day stock-handling training course was delivered to all five stockpeople at the three feedlots. The first day of the training course comprised of the cognitive-behavioural modification training of ProHand (www.animalwelfare.net.au/comm/prohand.html), targeting the stockpeople's attitudes and beliefs, followed by some theory on the practical aspects of stock-handling and was delivered to all stockpeople together. The second day of the training course comprised the hands-on practical stock-handling training which was delivered separately at each of the feedlots by Stress Free Stockmanship (SFS) (www.stressfreestockmanship.com.au). Based on the practical stock-handling principles delivered by SFS, a practical stock-handling training manual was drafted (Appendix 7.1).

Before and after the training, stockpeople completed a questionnaire designed to assess their attitudes (affective feeling towards something that has an influence on behaviour) and beliefs (a principle accepted as true or real without proof) about sheep.

3.3 Post-stock-handling training measurements

After the stock-handling training, animal behaviour, welfare and productivity as well as stockperson behaviour and physiological stress was measured again on another 50 sheep, of similar age and breed as the sheep in the pre-stockhandling training measurements, at each feedlot to obtain post-stock-handling training measurements. Pre- and post-stockhandling training measurements were conducted on days when the weather conditions were not extreme. The number of vocalisations used towards the dogs were not included within the effort score as all feedlots decided not to use their dogs after the training.

3.4 Statistical analyses

Analyses on numerical data within feedlots to determine the effect of the stock-handling training were conducted with Student's T-test. Analyses on numerical data across feedlots were conducted with a two-factorial (feedlot, training) unbalanced ANOVA or three-factorial (feedlot, training, sample) unbalanced ANOVA for the faecal cortisol concentrations. Analyses on categorical data within and across feedlots were conducted with Fisher's exact test.

4. Results

4.1 Animal behaviour, welfare and productivity

4.1.1 Sheep behaviour in the race

Overall, the behaviour of the sheep in the race improved after the training. The number of sheep needing assistance into the scales decreased by 25% ($p < 0.001$), the number of sheep that turned around in the race and walked backwards in the race decreased by 13 % ($p = 0.012$) and 22% ($p = 0.002$).

Feedlot 1
There was a 32% reduction ($p < 0.01$) in the number of sheep needing assistance into the scales (Table 1). Before the training 36% of the sheep needed physical assistance into the scales while after the training only 4% needed assistance.

The number of times sheep turned around in the race reduced by 18% ($p = 0.04$). Before training there were 26 incidences of sheep turning around in the race while after the training there were 15. The number of times sheep backed up in the race tended to decrease by 18% ($p = 0.07$) and consequently the time the sheep spent walking backwards reduced after the training. Before training the incidence of backing up in the race occurred 18 times while weighing 50 sheep, while after training it only occurred 9 times while weighing 50 sheep. Before the training, sheep backing up in the race accounted for 7.4% of the time it took to weigh the sheep. After the training the time it took to weigh the sheep was only 1.6% longer due to the sheep backing up in the race.

Feedlot 2
There was a 16% reduction ($p = 0.027$) in the number of sheep needing assistance into the scales after the training (Table 1), and the number of times sheep attempted to turned around in the race reduced by 16% after the training, but this was not a significant reduction ($p = 0.1$). Before training there were 17 incidences of sheep attempting turning around in the race while after the training there were 9. The number of times sheep attempted to back up in the race reduced by 26% ($p < 0.001$). Before training the incidence of backing up in the race occurred 41 times while weighing 50 sheep, while after training it only occurred 28 times while weighing 50 sheep.

Feedlot 3
There was a 28% ($p = 0.005$) reduction in the number of sheep needing assistance into the scales (Table 1). Before the training the stockpeople had to physically move 46% of the sheep into the scales while after the training they only had to move 18%.

The number of times sheep backed up in the race reduced by 20% ($p = 0.01$) and consequently the time the sheep spent walking backwards reduced after the training. Before training the incidence of backing up in the race occurred 14 times while weighing 50 sheep, while after training it only occurred 4 times while weighing 50 sheep. Before the training, sheep backing up in the race accounted for 1.4% of the time it took to weigh the sheep. After the training the time it took to weigh the sheep was only 0.4% longer due to the sheep backing up in the race.

Table 1: Behaviour in the race of 50 sheep at each feedlot

Feedlot	Time	Assistance into scales (n)	Turned around in race (n)	Walked backwards in race (n)	Time walking backwards (s)
1	Pre training	18/50 (36%)	26/50 (52%)	18/50 (36%)	30.88
	Post training	2/50 (4%)	15/50 (30%)	9/50 (18%)	7.87
2	Pre training	10/50 (20%)	*17/50 (34%)	*41/50 (82%)	NA*
	Post training	2/50 (4%)	*9/50 (18%)	*28/50 (56%)	NA*
3	Pre training	23/50 (46%)	0/50 (0%)	14/50 (28%)	14.88
	Post training	9/50 (18%)	0/50 (0%)	4/50 (8%)	2.97

* The set-up of the race meant sheep could not physically turn around or walk backwards so the number of times sheep attempted to turn around or walk backwards was recorded.

4.1.2 Sheep behaviour in the scales

Overall, the flight speed and agitation score did improve after the training, however there were interactions between feedlots and the time (pre- or post-training) which are discussed below.

Overall, the behaviour of the sheep in the scales did not differ after the training. The number of sheep that head-butt the scales when entering was similar before (12%) and after (6%) the training ($p = 0.216$). There were similar numbers of sheep that would attempt to back out of the scales before (61%) after (48%) the training ($p = 0.88$) and similar number of sheep that attempted to turned around in the scales before (6%) after (2%) the training ($p = 0.28$).

Feedlot 1

Flight speed, the speed at which the sheep exit the scales was significantly ($p < 0.001$) reduced by 0.15 seconds, indicating that sheep exited the scales at a slower speed after the training. Before the training, sheep took 0.12 seconds to move 1m, while after the training they took 0.27 seconds to move 1m.

Agitation score is a subjective score of 1 to 5 (1 being docile and 5 wild) given to sheep while in the weigh scales. Agitation score was significantly lower ($p < 0.001$) after the training (Table 2).
Behaviour of the sheep while in the scales was similar ($p = 0.2$) before and after the training (Table 2). Before the training, only 1 sheep was observed to head-butt the scales when entering, but after the training 5 sheep were observed to head-butt the scales.

While the sheep were in the scale, 42% of them would attempt to back out of the scales before the training and after the training 40% attempted to back out ($p = 1$).

Feedlot 2

The flight speed when the sheep exited the scales was similar before and after the training ($p = 0.50$, Table 2).

The agitation score was based on the struggle behaviour of the sheep while in the squeeze of the scales and was similar ($p = 0.89$) before and after training (Table 2). The set-up of the scales meant sheep were squeezed while in the weigh scale and were unable to move forwards, backwards or turn around, thus there are no results for behaviour in the scales.

Feedlot 3

Flight speed was significantly ($p = 0.002$) reduced by 0.12 seconds, indicating that sheep exited the scales at a slower speed after the training. Before the training, sheep took 0.27 seconds to move 1m, while after the training they took 0.39 seconds to move 1m (Table 2).
There were no differences in the agitation score ($p = 0.88$) given to the sheep pre- or post-training (Table 2).

Before the training, sheep entered the scales at such speed that 22% of them head-butted the scales (Table 2). After the training only 2% of the sheep head-butted the scales suggesting that the speed at which they entered the scales was reduced ($p = 0.004$).

While the sheep were in the scale 80% of them would attempt to back out of the scales before the training but after the training only 56% attempted to back out ($p = 0.02$). Before the training, two sheep needed assistance out of the scales, while after the training none needed assistance.

Table 2: Behaviour in the scales of 50 sheep at each feedlot

Feedlot	Training	Average agitation score (1-5)	Head-butt scales (n)	Backs-up in scales (n)	Attempts to turn around (n)	Flight speed (s/m)
1	Pre-training	2.71	1/50 (2%)	21/50 (42%)	1	0.12
	Post-training	2.14	5/50 (10%)	20/50 (40%)	2	0.27
2	Pre-training	2.82*	NA*	NA*	NA*	0.22
	Post-training	2.80*	NA*	NA*	NA*	0.21
3	Pre-training	1.96	11/50 (22%)	40/50 (80%)	5	0.27
	Post-training	1.94	1/50 (2%)	28/50 (56%)	0	0.39

* The set-up of the scales meant sheep were squeezed and were unable to move forwards, backwards or turn around. The agitation score was based on the struggle behaviour of the sheep while in the squeeze.

4.1.3 Sheep faecal cortisol concentrations

Overall, the cortisol concentrations of the sheep decreased after the training, however there were interactions between feedlots samples (pre-handling or handling) and the time (pre- or post-training) which are discussed below.

Feedlot 1

Before the training, cortisol concentrations were 34.8% and 133% higher ($P < 0.01$) before and after handling compared with concentrations after the training (Figure 4). However, before the training, cortisol concentrations significantly increased ($p < 0.001$) after the handling by 92.7%, while after the training, cortisol concentrations were not significantly higher ($p = 0.11$) after the handling.

Feedlot 2

Before the training, cortisol concentrations were 41.7% and 44.9% higher ($P < 0.01$) before and after handling compared with concentrations after the training (Figure 4). However, before the training, cortisol concentrations significantly increased ($p < 0.001$) after the handling by 17%, while after the training, cortisol concentrations were not significant higher ($p = 0.08$) after the handling.

Feedlot 3

Before the training, cortisol concentrations were 46.8% and 44.8% higher ($P < 0.01$) before and after handling compared with concentrations after the training (Figure 4). However, cortisol concentrations pre- and post-training were significantly higher ($p < 0.001$) in the second faecal sample, after handling, than during the first faecal sample, pre-handling. Before the training, there was 9.7% increase in cortisol concentration after the handling, while after the training there was still an 11% increase in cortisol concentration after the handling.

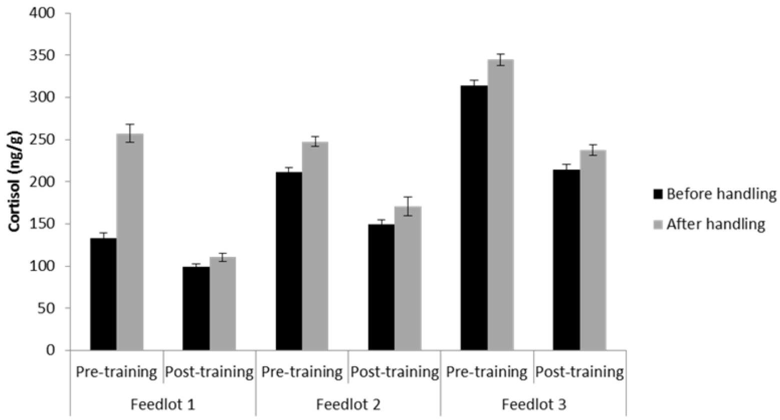

Figure 4: Cortisol concentrations in faecal samples from 50 sheep sampled before (Pre-handling) and after handling before stock-handling training (Pre-training) and from 50 sheep sampled before and after handling after stock-handling training (Post-training). Standard errors are shown as bars.

4.1.4 Sheep immunoglobulin concentrations

Overall, the immunoglobulin G (IgG) concentrations did not differ before or after the training ($p = 0.562$). There was also an effect of Feedlot ($p < 0.001$), where the IgG concentration was higher at Feedlot 3 than at Feedlots 1 and 2.

Feedlot 1

IgG concentrations were similar before and after the training ($P = 0.09$). Before training the mean concentration of IgG was 8.02 ± 0.75 mg/ml, while after the training mean concentration were 6.58 ± 0.40 mg/ml.

Feedlot 2

IgG concentrations were similar before and after the training ($P = 0.13$). Before training the mean concentration of IgG was 6.49 ± 0.71 mg/ml, while after the training mean concentration were 5.23 ± 0.45 mg/ml.

Feedlot 3

IgG concentrations were similar before and after the training ($p = 0.34$). Before training the mean concentration of IgG was 10.93 ± 1.04 mg/ml, while after the training mean concentration were 12.41 ± 1.13 mg/ml.

4.1.5 Sheep weight gain and performance

Overall, ADG increased ($p < 0.001$) after the training (Mean = 277.7 ± 16.0 g/day) compared with ADG before the training (Mean = 222.3 ± 16.0 g/day). Assigning an approximate gross dollar value to this 55g/day increase in ADG gives an increase of $2.43/sheep (based on a $3.70/kg carcass weight value, assuming carcass weight is 46% of liveweight and an average feedlotting period of 26 days).
There was also an effect of Feedlot ($p < 0.001$), where the ADG was higher at Feedlot 3 than at Feedlots 1 and 2 (Table 3).

Feedlot 1

Average daily gain did not significantly increase ($p = 0.56$) after the stock-handling training (Table 3). Before the training, ADG was 211g/day with 35% of the animals reaching the industry target ADG of at least 250g/day (for cross bred lambs – (Milton, 2001)). After the training, ADG was 223g/day with 31% of the animals gaining at least 250g/day. However, the number of animals that performed poorly (gained less than 100g/day) decreased from 13% to 4% after the training, with no animals losing weight compared to 6.5% of animals losing weight before the training.

Feedlot 2

Average daily gain significantly increased by 34% (p=0.049) after the stock-handling training from 184g/day to 247g/day (Table 3). Before the training, 28% of the animals reached the industry target ADG of 250g/day, while after the training 55% of the animals were gaining at least 250g/day. However, the number of animals that lost weight as well as the number of animals that performed poorly (gained less than 100g/day) did not significantly improve after the training.

Feedlot 3

Average daily gain significantly increased by 33% (p = 0.002) after the stock-handling training from 271g/day to 360g/day (Table 3). Before the training, 66% of the animals reached the industry target ADG of 250g/day, while after the training 82% of the animals were gaining at least 250g/day. However, the number of animals that performed poorly (gained less than 100g/day) increased from 4% to 6% after the training.

Table 3: Average weight gain and performance of sheep at each feedlot

Feedlot	Training	Mean average daily gain (ADG) (g)	Animals that lost weight	Poor performance (< 100g/day)	Desirable performance (>250g/day)
1	Pre training	211	6.5% (3/46)	13% (6/46)	35% (16/46)
	Post training	223	0% (0/49)	4% (2/49)	33% (15/49)
2	Pre training	184	10% (5/50)	22% (11/50)	28% (14/50)
	Post training	247	12% (6/49)	20% (10/49)	55% (27/49)
3	Pre training	271	2% (1/50)	4% (2/50)	66% (33/50)
	Post training	360	2% (1/50)	6% (3/50)	82% (41/50)

4.2 Stockperson behaviour, stress, attitudes and beliefs

4.2.1 Stockperson behaviour

At all feedlots, after the training, stockpeople decided not to use their dogs to bring the sheep into the yards as well as within the yards. Before the training, all feedlots used dogs to bring sheep to the yards, while Feedlots 1 and 2 also used dogs to help move sheep within the yards. In addition, after the training, Feedlots 1 and 2 also decided not to use an implement to assist in handling the sheep (Table 4).

Feedlot 1

After the training, the time it took to weigh 50 sheep increased by 1 minute (Table 5). However, the 'effort' required to weigh the 50 sheep reduced after the training indicated by an 'effort' score of 457 before the training to an 'effort' score of 253 after the training (Table 5). The 'effort' score for each feedlot includes the measures; number of steps taken by each stockperson, the number of times the stockpeople touches the sheep, number of vocalisations used towards the sheep and the dogs, number of arm movements used towards the sheep to get them to move and the number of times the stockpeople prod/poke the sheep with an implement (Table 4).

Feedlot 2

After the training, the time it took to weigh 50 sheep increased by 10 minutes (Table 5).

The 'effort' required to weigh the 50 sheep by the stockpeople also increased after the training indicated by an 'effort' score of 525 before the training to an 'effort' score of 622 after the training (Table 5).

Feedlot 3

After the training, the time it took to weigh 50 sheep was reduced by 5 minutes (Table 5). The 'effort' required to weigh the 50 sheep by the stockpeople also reduced after the training indicated by an 'effort' score of 271 before the training to an 'effort' score of 163 after the training (Table 5).

Table 4: Stockperson behaviour while weighing 50 sheep at each feedlot, pre- and post-stock-handling training

Feedlot	Time	Steps (n)	Sheep touches (n)	Vocals to sheep (n)	Vocals to dogs (n)	Arm movement (n)	Prod/ poke (n)
1	Pre training	327	11	22	54	0	43
	Post training	172	50	22	NA#	9	0
2	Pre training	189	20	NA*	30	0	182
	Post training	432	69	NA*	NA#	3	0
2	Pre training	63	9	NA*	0	32	0
	Post training	77	3	NA*	NA#	38	0
3	Pre training	26	31	4	0	7	0
	Post training	16	8	4	NA#	0	0
3	Pre training	139	37	24	0	7	0
	Post training	132	2	1	NA#	0	0

N.B. One stockperson at Feedlot 1 and two stockpeople at Feedlots 2 and 3.

* The vocalisations towards the sheep were not available because they could not be heard above the noise of the generator used for the weighing scales.

The vocalisations towards the dogs were not available as dogs were not used during the post-training measurements.

Table 5: The time and effort required by each feedlot to weigh 50 sheep, pre- and post-stock-handling training. Effort score is the count of steps, touches, vocalisations, arm movements and use of an implement by each stockperson while weighing 50 sheep.

Feedlot	Time	Time to weigh 50 sheep (s)	Effort score
1	Pre training	420	457
	Post training	480	253
2	Pre training	607	525
	Post training	1200	622
3	Pre training	1080	271
	Post training	780	163

4.2.2 Stockperson stress

Overall, stockperson stress, as measured by cortisol concentrations, decreased after the training at all feedlots (Figure 5).

Feedlot 1
Cortisol concentrations, while weighing 50 sheep, decreased after the stock-handling training (Figure 5). Cortisol concentrations were 15% lower after the stock-handling training compared to concentrations before training.

Feedlot 2
Cortisol concentrations, while weighing 50 sheep, decreased after the stock-handling training for both of the stockpeople (Figure 5). Stockperson 1, showed a 75% decrease in cortisol concentrations after the stock-handling training compared to concentrations before training. In stockperson 2, cortisol concentrations were 32% lower after the stock-handling training compared to concentrations before training.

Feedlot 3
Cortisol concentrations, while weighing 50 sheep, decreased after the stock-handling training for one of the stockpeople (Figure 5). In stockperson 1, cortisol concentrations were 31% lower after the stock-handling training compared to concentrations before training. While in stockperson 2, concentrations were similar before and after the training.

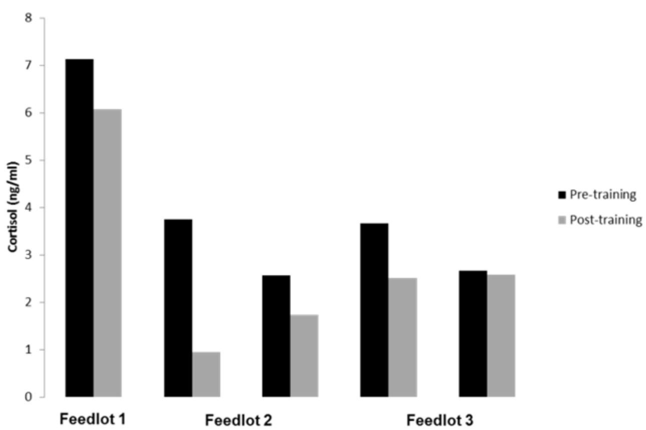

Figure 5: Salivary cortisol concentrations from stockpeople at each of the 3 feedlots after they weighed 50 sheep before (Pre-training) and after (Post-training) stock-handling training. Feedlot 2 and Feedlot 3 both had two stockpeople, while Feedlot 1 had one stockperson.

4.2.3 Stockperson attitudes and beliefs
Overall, the attitudes and beliefs of the stockpeople at all three feedlots showed some positive changes after the training (Figures 6-8).

Feedlot 1
Attitudes towards the amount of physical and verbal effort the stockpeople used to move lambs changed positively by 42.8% (Figure 6). Before the training the stockpeople held the attitude that physical and verbal effort was required often to move animals, but after the training their attitude was that a little physical and verbal effort was required to move animals.

Training did not influence the attitudes towards petting (scratch, stroke, pat) sheep and the ability of their sheep to recognise them compared with strangers. After the training the attitudes towards how difficult sheep are to handle improved by 14.3%.

After the training there were few changes in the beliefs about working with sheep (Figure 6). Stockpeople increased their beliefs about the fear responses of sheep (e.g. *sheep can learn* *from past experiences to be fearful of humans*) by 15%. Beliefs about the influence of negative handling improved by 17.8% (e.g. *sheep that are not a bit fearful are hard to handle*). Beliefs about sheep and their capabilities did not change (e.g. *sheep can't learn a routine*) while the importance of peer influence on their handling of sheep reduced by 6.7% (e.g. *it is important to me to handle sheep the way other farmers do*).

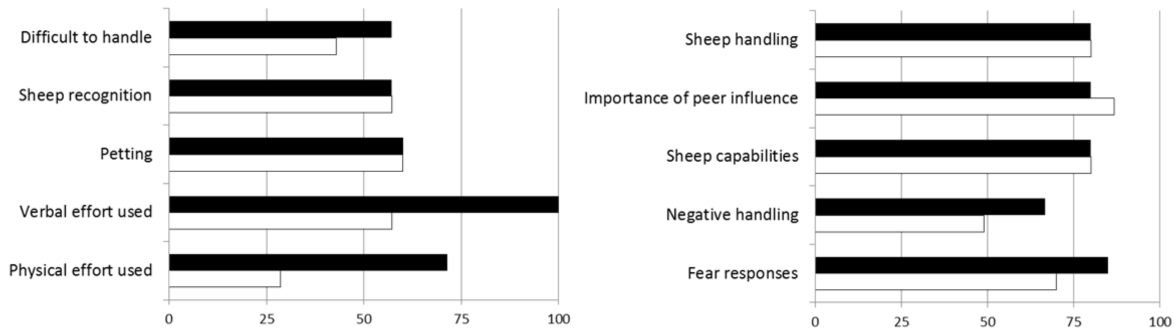

Figure 6: **Attitudes (left) and beliefs (right) of the one stockperson at Feedlot 1 pre- (white bars) and post- (black bars) stock-handling training. The higher the score, the more positive the belief/attitude**.

Feedlot 2

Attitudes towards the amount of physical effort the stockpeople used to move lambs, ewes and hoggets changed by 7.9% (Figure 7). While the attitudes towards the amount of verbal effort used did not change.

Attitudes towards petting their sheep reduced after the training by 6.7%. After the training the attitudes towards the ability of their sheep to recognise them compared with strangers improved by 25.4% and attitudes towards how difficult sheep are to handle improved by 13.1%.

The stockpeople at the feedlot showed small changes in their beliefs about working with sheep (Figure 7). The beliefs about the fear responses of sheep reduced by 5%(e.g. *sheep can learn from past experiences to be fearful of humans*). Beliefs about the influence of negative handling improved by 15.6% (e.g. *sheep that are not a bit fearful are hard to handle*). Beliefs about sheep and their capabilities did not change (e.g. *sheep can't learn a routine*) while the importance of peer influence on their handling of sheep increased by 7.8% (e.g. *it is important to me to handle sheep the way other farmers do*).

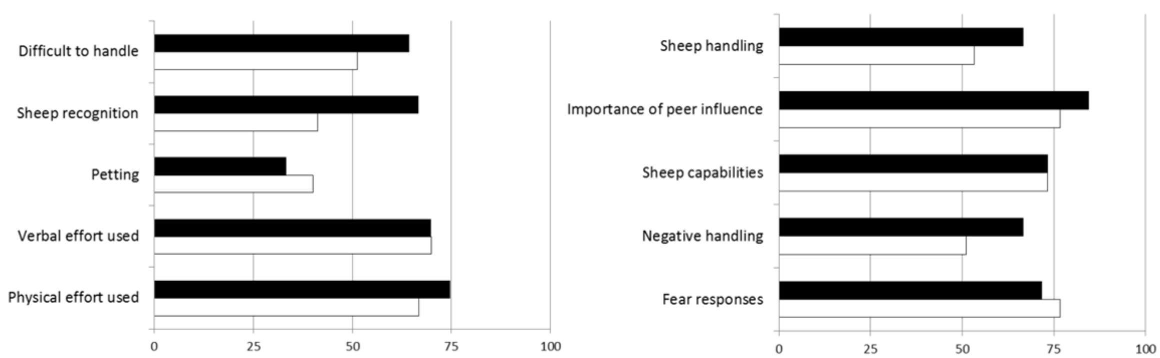

Figure 7: **Attitudes (left) and beliefs (right) of the two stockpeople at Feedlot 2 pre- (white bars) and post- (black bars) stock-handling training. The higher the score, the more positive the belief/attitude.**

Feedlot 3

Attitudes towards the amount of physical and verbal effort the stockpeople used to move lambs, ewes and hoggets changed by 33.3% and 15.5% (Figure 8). Before the training the stockpeople believed that they used very little physical effort and little verbal effort, but after the training the believed they used physical and verbal effort moderately often to move animals.

Attitudes towards petting their sheep improved after the training by 20%. After the training the attitudes towards the ability of their sheep to recognise them compared with strangers improved by 16.7%. Training did not influence the attitudes on how difficult sheep are to handle.

The stockpeople at the feedlot showed small positive changes in their beliefs about working with sheep (Figure 8). Stockpeople increased their beliefs about the fear responses of sheep (e.g. *sheep can learn from past experiences to be fearful of humans*) by 4%. Beliefs about the influence of negative handling improved by 2.2% (e.g. *sheep that are not a bit fearful are hard to handle*). Beliefs about sheep and their capabilities improved by 3.4% (e.g. *sheep can't learn a routine*) while the importance of peer influence on their handling of sheep reduced by 13.3% (e.g. *it is important to me to handle sheep the way other farmers do*).

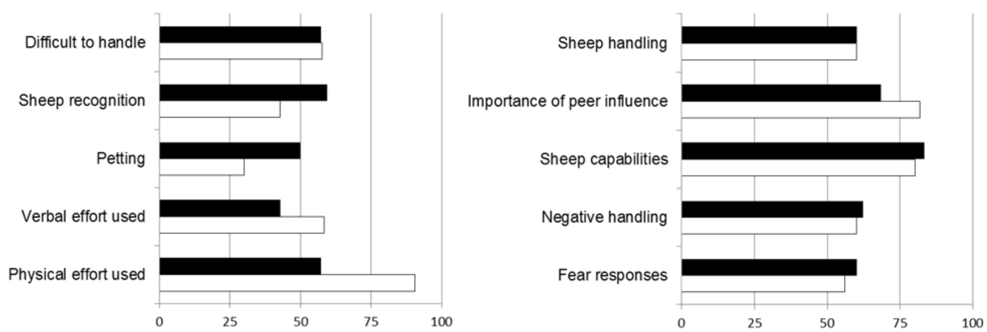

Figure 8: **Attitudes (left) and beliefs (right) of the two stockpeople at Feedlot 3 pre- (white bars) and post- (black bars) stock-handling training. The higher the score, the more positive the belief/attitude.**

5. Discussion

Although only three feedlots and limited sheep numbers were included in this study, sheep productivity, welfare, behaviour and ease of handling, as well as the stockpeople's physiological stress and some attitudes and beliefs towards sheep improved after stock-handling training. However, these improvements were variable within and across the feedlots. As a pilot study, these results are promising and demonstrate the efficiency of the study design but only the results of a larger scale study will convince the sheep industry of the value of training to improve productivity, animal handling and welfare.

Animal productivity increased by 33% and 34% at two of the three feedlots, while no significant improvements were found at the third feedlot. Before the training, it was surprising that the industry expected ADG of at least 250g/day (Milton, 2001) was not achieved in the majority of the animals at all the feedlots, but after the training the two feedlots that showed significant improvements in ADG, also improved in the number of animals that reached the industry expected gain. Improvements in animal productivity following stockperson training have been found in the pig (Hemsworth et al., 1994a) and dairy (Hemsworth et al., 2002) industries, however this is the first time it has been demonstrated in the sheep industry. This study was unique in that the direct effects of stockperson training were investigated with pre- and post-training measurement conducted on the same feedlots while other studies have indirectly determined the effects of training by detecting differences between trained and un-trained groups.

Improvements in sheep performance may have been due to a reduction in the level of stress the animals experienced during handling, prior to entering into the feedlot. At all the feedlots, the concentration of the stress hormone, cortisol, was reduced in the animals after the training. Cortisol has been found to negatively impact on growth rates (Purchas et al., 1980) due to the effects of the stress hormones altering metabolic functions (Sapolsky et al., 2000). While stress negatively impacted sheep performance, it did not impact on the animal's immunological functions (Webster Marketon and Glaser, 2008), which can also impact performance, indicated by the similar levels of IgG before and after the training.

The reduced concentrations of cortisol indicate that the level of stress the animals were experiencing were less after the training, thus suggesting that animal welfare had improved. The assessment of animal welfare generally involves physiological and behavioural measurements with the glucocorticoid, cortisol, commonly used as a physiological measurement (Moberg, 2000). The reduction in the level of cortisol may have been due to the fact that at all feedlots, dogs were not used to bring the sheep into the yards, or used within the weighing yards after the training, while they were used before the training. Dogs, being a known predator of sheep, induce stress in sheep as indicated by increases in cortisol concentrations (Cook, 1996). Thus it is possible that the lower levels of cortisol found at all feedlots could have been due to dogs not being used, therefore demonstrating the indirect effects of the stock-handling training on animal welfare as all stock-people decided against dog use after the training.

Another indication that sheep welfare was improved after the training was the improvement in the behaviour of the sheep in the race at all feedlots. While improvements in flight speed and agitation score were not apparent at all the feedlots, it is interesting that the improvements in stockperson effort and time were at feedlots 1 and 3 and the flight speeds of these sheep were also improved. Flight speed is commonly used as a measure of the fear response of an animal to human handling (Burrow et al., 1988; Petherick et al., 2002), where the higher the fear level the faster the animal will move (indicated by a lower flight speed score). These results support the notion that a reciprocal relationship exists between the behaviour of the stockperson towards the animal and the fear and behavioural response of the animal towards the stockperson (Hemsworth and Coleman, 1998). Whereby animals that are not fearful are easier to handle, resulting in handling that is not fear inducing and thus the human and animal behaviours are reinforcing the human-animal behavioural interactions.

While improvements in the stockperson effort and time were seen at two of the feedlots, it is interesting that the increases in ADG were not at both of these feedlots. The increases in

ADG were at the 2 feedlots where the lambs were born on-farm, while the third feedlot (Feedlot 1) sourced animals from off-farm locations. The stressors encountered by the animals at Feedlot 1 are more abundant (transport, novel environment, novel food, mixing with unfamiliar conspecifics, novel people) and thus adjustment and acclimation to the feedlot may take longer due to these stressors (Fell et al., 1999) and hinder their productivity gains more than the other feedlots. Therefore, even though stockperson behaviour and the animal's cortisol levels had improved at Feedlot 1, more work with the animals may have been required to help them in their acclimation to the feedlot.

Even though the effort and time did not improve at all feedlots, there were some improvements in stockperson behaviours at all the feedlots after the training, particularly in the use of an implement to prod or poke the sheep and the use of a dog within the yards. The fact that there could be further improvements in stockperson behaviour, as well as animal productivity, indicates that the stockpeople were not completely proficient in the new handling techniques. Just like any newly learnt skill, competency comes with practise. The degree to which the stockperson accomplishes the new handling techniques depends on many factors such as the stockpersons experiences, knowledge and available time for practise. The behaviour and background of the animals will also impact on the success of the new handling techniques because the animals need to be in a calm state to respond to the new techniques. Thus there are different degrees by which the new handling techniques are adopted and therefore there will also be different degrees by which there are improvements in animal productivity.

Although the time and effort required to weigh the sheep improved at only two of the feedlots, the level of stress experienced by the stockpeople during weighing of the sheep decreased after the training at all the feedlots. While this reduction in stockperson stress may have been due to the sheep work being less stressful, it should be noted that the higher levels of cortisol before the training could also have been due to the stockpeople feeling anxious about participating in the study. The uncertainty of what was required and the presence of the researchers and their equipment (video camera, flight speed meter, clipboards) would have added a source of stress to the stockpeople which they may not have experienced the second time the measurements were conducted, after the stockperson training.

It was expected that if there were changes in the behaviour of the stockpeople, there would also be changes in the attitudes and beliefs of the stockpeople since behaviour of stockpeople towards animals has been shown to be strongly influenced by their attitudes towards animals (Hemsworth et al., 1994a; Hemsworth et al., 2002; Boivin et al., 2003). However, only slight positive changes in the attitudes and beliefs of the stockpeople were apparent in this study. The lack of changes may have been due to the fact that the stockpeople that agreed to participate in the study already showed positive attitudes and beliefs towards animals which is why they were interested in participating and perhaps the room for improvements in their attitudes and beliefs were small. In addition, the sample size of the stockpeople was small as well as skewed (as described above) and thus differences are hard to detect in small sample sizes (de Winter, 2013).

6. Conclusion

The results from this preliminary study suggest that there are positive animal and human benefits of stockperson training in sheep feedlots. We found that sheep productivity, welfare, behaviour and ease of handling, as well as the stockperson's physiological stress and some attitudes and beliefs towards sheep improved after stock-handling training. However, these improvements were variable within or across the feedlots and thus other factors, such as the history of the sheep and the use/non-use of dogs, not assessed within the scope of this project, could have interacted and influenced the results. In addition, the degree by which the new handling techniques were adopted seemed to influence the degree to which animal productivity improved. However, the promising nature of the results indicates that this pilot study was successful in demonstrating that there are improvements to be made in animal productivity, welfare and behaviour in sheep feedlots and thus further research, with more feedlots/farms with replicates pre- and post-stockhandling training, is required to fully understand what factors affect the adoption of the training and the impact that stockperson training can have on the animals and the stockpeople.

7. Appendices

7.1 Stockperson training manual - Practical sheep handling principles

An animal's fear of humans is a major source of stress and the basis of the welfare and productivity problems in the livestock industry. High stress levels result in the release of hormones that can disrupt an animal's metabolism which can have adverse effects on growth, health and reproduction, therefore, reducing animal welfare, productivity and product quality.

A solution for reducing an animal's fear of humans is to train stockpeople to handle their animals in an appropriate manner and according to an animal's natural behaviour so husbandry practices become less fearful. The traditional motivation used to move sheep is the repeated application of fear-inducing stimuli (dogs, shouting and waving) with the aim to frighten the animals and stimulate the flight response. Alternative techniques based on the animal's natural behaviour and motivations, such as the flocking/following response or positive rather than negative reinforcement, using the animal's flight zones, can be used to achieve the desired movement without activating the animals flight responses.

Objectives

Understanding the sensory abilities of sheep

Understanding the cognitive abilities of sheep

Understanding how the cognitive and sensory abilities of sheep influence response to handling

Learning to adjust handling technique to the cognitive and sensory abilities of sheep

Sensory and cognitive abilities of sheep

Understanding the cognitive (intellectual) and sensory abilities (vision, hearing and smell) of sheep helps explain why sheep behave the way they do and is the primary step in understanding the sheep handling principles.

As sheep are prey animals, their only real defence is safety in numbers and thus their biological make-up and behavioural instincts are hard-wired for flight when faced with potential threats.

Vision

- As a prey animal, their eyes are on the sides of their head so that they have a wide angle of vision, about 290 degrees. This means they also have a blind spot directly behind them (Figure 1) and thus are unable to see anything located in their blind spot.

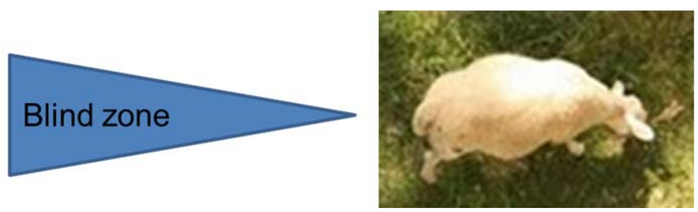

Figure 1: Diagram indicating the animal's blind zone. The animal is unable to see anything located in their blind zone.

- Sheep have low acuity (sharpness) in their periphery. They have 20:60 vision, compared with humans who have 20:20 vision (they must be at 20 feet to see what a human can see at 60 feet). They may have a wide angle of vision but can only distinguish movement on the edge of their vision, and so as a prey animal their instinct is to flee when they detect this movement rather than wait to check what it is.
- Sheep have binocular vision (vision using two eyes with overlapping fields of view) and therefore have depth perception. But, they have poor ability to perceive depth a ground level while they are moving, possibly due to their poor acuity in their periphery.
- Dichromatic vision (two-colour vision), which is best for detecting movement (Figure 2). Sheep see things in the yellow-green blue portion of the colour spectrum, similar to red-green colour blind humans. (Humans usually have trichromatic vision: three-colour). Dichromatic vision may explain why sheep balk at things that have a high contrast of light and dark (shadows, drain grates etc.).

Figure 2: Photos indicating dichromatic vision (left) with 20:60 vision and trichromatic vision with 20:20 vision. Note the different colouring of the dichromatic vision and the slight blurring effect, especially of the human face, with 20:60 vision. Figure modified from Kendrick 2008.

Hearing

- Sheep are more sensitive to high frequency noise than humans. Sheep perceive sounds in the 42KHz range and can thus hear ultrasound which humans cannot (humans perceive sounds in the 20 KHz range, dogs in the 50KHz range).

Smell

- Sheep have a very good sense of smell, their range is on par with rodents and dogs.
- Their sense of smell enables ewes to recognise their lamb within 1-2 hours after birth. They are so selective that a ewe will reject a twin if it is removed from her at birth and reintroduced to her later.

Recognition

- Sheep have excellent recognition abilities.
- Sheep can recognise up to 50 different sheep faces and up to 10 different human faces (possibly more as these were the numbers used in the experiment) and can still remember these faces up to 2 years later.
- Sheep will choose the familiar over the unfamiliar
- Sheep can recognise emotions in the faces of humans and sheep. They show a preference for smiling human faces as opposed to angry versions of the same face. They will also choose the face of a calm looking sheep over a stressed sheep, even if the calm sheep is unfamiliar to them.
- Sheep use visual cues from the head region for recognition (that’s why sheep that are familiar with you may react differently to you if you wear a hat).

Relationship between sensory abilities and response to handling

Pressure & flight zone

- The animal's pressure and flight zones are like their 'personal space' and are irregular in shape and vary between individuals (Figure 3).
- Entering the animals 'pressure' zone will cause the animal to move away from you calmly
- Entering the animals 'flight' zone will cause the animal to move away from you with speed as you have triggered their flight response
- These zones can change in size immediately in response to either positive or negative stimulus or by your speed and directness of approach
- These zones can also change in size due to the animals past experiences. Positive experiences will reduce the size of the zones and make handling easier and more controlled because you will activating the animal's flight zones less often.

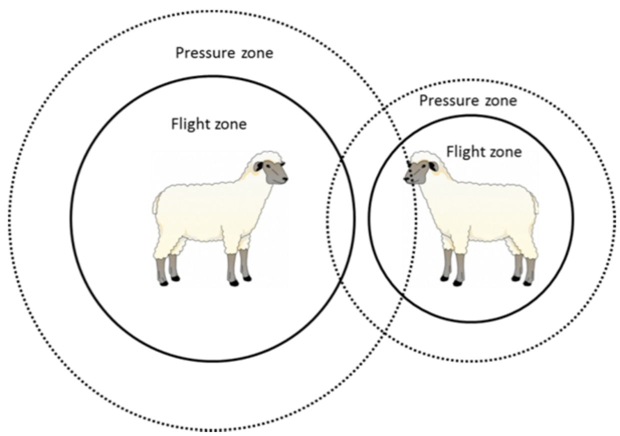

Figure 4: Diagram depicting the pressure and flight zones, notice that the size of the zones are different between individuals.

Adjust handling techniques to the cognitive and sensory abilities of sheep

Principles of sheep handling

Stockpeople are the custodians of their sheep, however their behaviour is usually more like a predator towards their sheep, rather than a protector, and thus sheep respond to their stock-handler with predatory escape behaviours. The foundation of these sheep handling principles is for the stock-handler to act more like a protector and less like a predator so that the sheep look towards the stock-handler for instructions rather than escape. Therefore these stock-handling principles rely on using the animal's natural behaviour and motivations, such as the flocking/following response, and positive rather than negative reinforcement, to achieve movement in the desired direction rather than using fear-inducing stimuli, such as shouting and waving, with the aim to frighten the animals and stimulate the flight response.

1. Don’t work directly behind sheep in their blind spot

Sheep always want to know where you are so if you are behind them they will turn their heads so that you are in their field of vision. If you want sheep to be going straight, you need their heads pointing straight.

Try to work on the side of the animals so that they can always see you.

If you must work from behind, keep moving from side to side so that the sheep can see you and keep you in their line of sight

2. Apply pressure but always release it

The correct way to move an animal is to enter the pressure zone, where they can see you, and allow the animal to move off. Your position will determine which way the animal moves off.

Make sure you release the pressure and do not keep pressuring the animal when they have moved off. If you do not reward the animal by releasing the pressure, even if it’s for an instant, you are confusing the animal. By allowing the animal the release from the pressure, you are sending the message that they are doing what you want.

If the animal moves off in the wrong direction, it’s not the animals fault, it’s your positioning that is wrong and has indicated the wrong direction that the animal should go.

If you do not release the pressure you run the risk of entering the animal’s flight zone and causing the animals to flee.

3. Pressure from the side

The side of the animal is anything from the tip of the nose to the hip. Once you have the animals in a calm state and responding to your ‘instructions’ you can apply pressure to the sides of the animals to steer and direct their movements.

If you pressure the side of an animal at the head region, the animal’s head will turn away from you and the animal will move away in the direction their head is facing. The animal’s body will follow where the head goes. If you pressure the side of the animal in the hip/rump region, the animal’s rump will turn away from you while the head will turn towards you and the animal will move away in the direction their head is facing (Figure 5).

The speed at which the animal moves away will depend on how much pressure you apply. A focused stare directed at the animals head may be enough pressure to make the animal move off in the desired direction away from you.

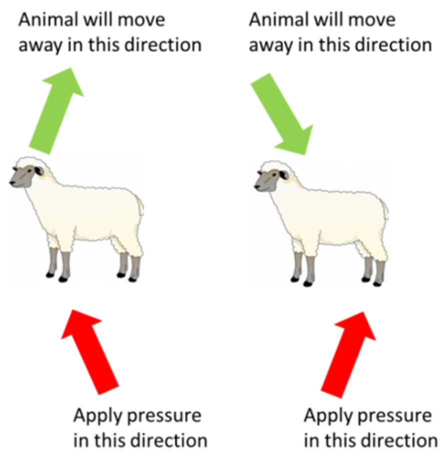

Figure 5: Diagram indicating that when pressure is applied to the head or rump region, the animal will move away in different directions. Using these principals enables stock-handlers to steer their animals in the desired direction.

4. Move in straight lines, not curves

Predators walk in curves and so you do not want the animals to think of you as a predator.

When approaching a group of sheep walk in straight lines and in a zig-zag motion so that if you continue approaching on that path it would take you past the animals, not directly into the mob (Figure 6). This approach will ensure you will not apply pressure to certain animals accidentally as you will not be applying pressure directly onto any one animal, your pressure will be applied past the animal.

Working in curves is an instinctive behaviour and you will need to consciously think about not doing it.

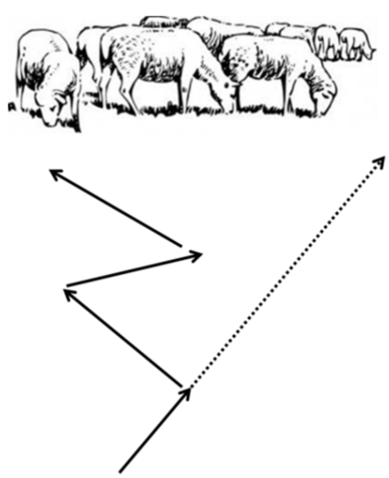

Figure 6: Diagram indicating when you approach a group of sheep walk in straight lines and in a zig-zag motion so that if you continue approaching on that path it would take you past the animals, not directly into the mob.

5. Going with the flow slows down or stops movement

Moving in the same direction and parallel with the animal will slow them down (Figure 7).

Going with the flow of a mob of sheep in a paddock will slow them down provided that you can keep up with their speed of movement, without running, and you remain parallel with them and not cut them off if their direction changes.

Going with the flow when sheep are going into a race will not fill the race as you will be slowing down and stopping the movement of the animals.

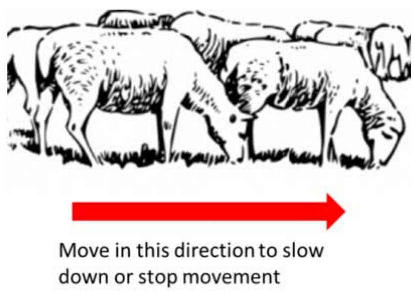

Figure 7: Diagram indicating that moving in the same direction and parallel with the animal will slow them down.

6. Going against the flow initiates or speeds up movement

Moving in the opposite direction and parallel with the animal will speed them up (Figure 8).

Going against the flow when sheep are going into a race will assist in filling the race as you will be speeding up the movement of the animals.

Once you get to the end of the race, when the sheep are entering, move away from the race, outside of the animals pressure zone. Move to the beginning of the race, step closer to the race inside the animal’s pressure zone and walk towards the end of the race going against the flow, to help fill the race.

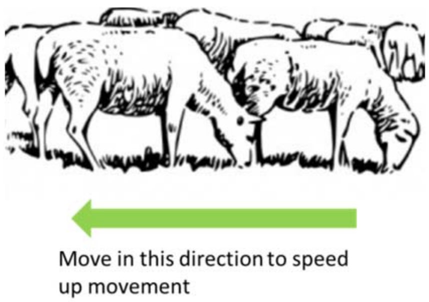

Figure 8: Diagram indicating that moving opposite direction and parallel with the animal will speed them up.

Just like any newly learnt skill, competency come with practise. The degree to which you will pick-up the new handling techniques depends on many factors but it is recommended that you practise these skills when time permits and when you do not have a demanding task (such as loading onto the truck) to put you under pressure to get the job done quickly. The behaviour and background of your sheep will also impact on the adoption of the handling techniques because the animals need to be in a calm state to respond to the new techniques and thus allowances and understanding must be made for sheep that are very flighty.

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