The possibility of applying Low Stress Stockhandling in reindeer

Möjligheten av att använda Low Stress Stockhandling på renar

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Etologi och djurskyddsprogrammet

Reindeers in a corral (Photo: Ellen Simma)

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SUMMARY

The purpose of the study is to investigate the interest in Sami reindeer herders to use the Low Stress Stockhandling (LSS) method for handling reindeer. Also to find out which reindeer handling situations they think works the best and the worst, and which might need improvement. The purpose of LSS is to reduce the stress animals are subjected to during handling by creating consistent and calm responses from the animals. This is done by handling the animals through the animalsô point of view and using natural herd behavior to accomplish this. Data was collected through a ten question questionnaire distributed to reindeer herders. The questions intended to gain information on the background information about the participant, the aids used when managing reindeer, what handling situation the participants thought worked the best and worst the handling situation they believed is the most and least stressful for the reindeer, and if they thought that the stress reindeers are subjected to needs to be decreased. Other information collected included their thoughts about LSS and if they thought they would benefit from it during reindeer handling. Data received was complied together to get the total sum of all participants answers. 31 people answered the survey, 17 men and 14 women between the ages of 18and 52, with a mean age of 30. The aids used most were snowmobile and herding dog, and lasso was mostly used when capturing reindeer. When agreeing or disagreeing to the statement ñThere is a need to reduce the stress that reindeers are exposed toò on a seven point scale, where one was that they totally agreed and seven was that they totally disagreed; the mean value became 2,74. The handling situation that the participants thought worked the best was moving reindeer and the one that worked the worst was loading. The most stressful handling situation was also believed to be loading and the least stressful was gathering on bare ground. A majority of the participants (68%) thought that the LSS method could benefit them during reindeer handling. Loading and transportation was the handling situation participants found to be the most difficult, making loading a possible handling situation where LSS could be demonstrated and used by reindeer herders. Due to many managers involved in a reindeer herding district there can be difficulties in convincing everyone to participate in the new handling method. Reindeer are susceptible to handling stress. Therefore a reduction of the stress reindeers are exposed to during handling with LSS could benefit not only the reindeer, but also the reindeer herders and consumers of reindeer meat.

SAMMANFATTNING

Syftet med studien var att ta reda på om det finns ett intresse bland samiska renskötare av att använda sig av Low Stress Stockhandling-metoden (LSS) vid hantering av renar och att ta reda på vilken hanteringssituation de uppfattar som den som fungerar bäst respektive sämst och därmed kanske behöver förändras. Syftet med LSS är att minska stressen djur utsätts för under mänsklighantering genom att de hanteras på ett sätt som skapar konsekventa och lugna reaktioner från djuren. Detta är möjligt genom att hanteringen sker ur djurens synvinkel och med deras naturliga flockbeteenden i fokus. Data samlades in genom en internetbaserad enkätundersökning. Frågorna i enkäten omfattade bakgrundsfakta om deltagaren, vilka hjälpmedel som användes vid hantering av renar, vilken hanteringssituation de uppfattade som den som fungerade bäst respektive sämst och vilken hanteringssituation de uppfattade som mest stressande respektive minst stressande för renarna, om stressen renar utsätts för behöver minskas och deras tankar om LSS. Data från respektive deltagare sammanställdes och medelvärden uträknades. Totalt svarade 31 personer på enkäten varav 17 var män och 14 var kvinnor mellan åldrarna 18-52 år och med en medelålder på 30 år. De hjälpmedel som användes av flest deltagare var skoter och vallhund och lasso var det vanligaste sättet att fånga in renar med. När deltagarna fick svara på huruvida de instämde med påståendet òMan behöver minska stressen som renarna utsätts förò på en sjugradig skala där ett var att de instämde helt och sju var att de inte alls instämde blev medelvärdet 2,74. Den hanteringssituation som deltagarna uppfattade som den som fungerade bäst var flyttning och den som fungerade sämst var lastning. Den hanteringssituation som uppfattades som mest stressande för renarna var lastning och den som var minst stressande var samling på barmark. Majoriteten av deltagarna (68 %) trodde att de skulle ha nytta av LSS-metoden vid hantering av renar. Lastning och transportering var de hanteringssituationer som deltagarna uppfattade som de som fungerade sämst och som var stressigast för renarna. LSS hade därför kunnat demonstreras under lastning för att visa fördelarna med metoden och få en större respons ifrån renskötarna. På grund av att de är många ansvariga och viljor i en sameby kan det vara svårt att övertala alla att använda sig av en ny hanterings metod. Renar stressas under hantering och en minskning av den stress de utsätts för kan gynna renar, renskötare och konsumenter av renkött.

1. INTRODUCTION

1.1 Reindeer management

There are approximately 250 000 semi domesticated reindeers, owned by approximately 4600 people in Sweden (Enoksson, 2010). Reindeer herding is conducted in 51 reindeer herding districts, on about 52 percent of Swedenôs land area (Enoksson, 2010). Due to the reindeerôs natural migration, land is also used in Norway during late spring and summer by some Swedish reindeer herding districts. Most reindeers are kept on natural ranges by the Sami people (Nilsson et al., 2006). In the beginning of the 16th century to the end of 19th century the Sami reindeer herders moved along with their reindeer during their natural migrations all year around (Bäck, 1993). From this type of intensive reindeer herding it has developed to a more extensive herding, with semi domestic or nearly wild animals (Rehbinder, 1990). The Sami reindeer herders no longer migrate together with the reindeers, the traditional nomadic culture of the Sami reindeer herders ceased to exist after the 1950s (Bäck 1993). Instead reindeer husbandry became more focused on meat production and no longer on milk production and there was no longer a need to have reindeers as transportation. The access to roads and modern transportations meant that herders could reach their herds quickly, thus there was no longer a need for the herders to follow their reindeers all year around (Bäck, 1993).

The reindeer herding year is divided into eight periods (Bäck, 1993), with the main events being calf marking, separation and slaughter (Pekkarinen, 2006). Reindeer are often gathered and herded with many different methods such as helicopter, snowmobile, dogs or other combinations (Wiklund & Malmfors, 2003).The first period is early spring when the reindeer are moved to their calving grounds from their winter pastures (Bäck, 1993).This is done either by the reindeers themselves who have a natural migration behavior; or by the herdsmen using lorries or other machinery (Wiklund & Malmfors, 1996; 2004). The second period is late spring when the calves are born (Malmfors & Wiklund, 1996).During this period there is almost no handling of the reindeers so that the females can deliver the calves undisturbed. The third period is early summer when the reindeer move toward the high mountains in small groups (Bäck, 1993). The fourth period is late summer when the reindeers graze on the high mountains (Bäck 1993). This is the period where the calf marking (Wiklund & Malmfors, 1996) and castrations takes place. Due to the high temperatures during the day, the reindeer are gathered into big herds and herded into a big corral during the afternoon and night with different machinery. There are different ways of catching the calves, ether with a lasso or a snare attached to a pole. The calves are identified to which owner it belongs by looking at the markings on the damsôears which the calf follows. When captured the calves are marked with a knife cut on the ear, with different cuts identifying who the owner is. Bulls are captured with a lasso and then castrated with forceps. While manually restrained and held by the horns and gently twisted so they are forced to lie down on the ground. The fourth period is late summer when the animals graze the summer grounds. During this period there is little or no handling involved. The fifth period is early autumn (Bäck, 1993) when the reindeers start to return to their winter pastures. This is when the reindeers are in their best condition and slaughter therefore takes place during this period before rutting (Malmfors & Wiklund, 1996). The reindeers that are chosen for own consumption are captured and often slaughtered near the corral. The reindeer for commercial sale are loaded into a lorry and transported to a slaughterhouse, where they often are kept and fed in a corral near the slaughter plant for 1-3 days before stunning and slaughter (Wiklund & Malmfors, 2003). Tougher legislations regarding

slaughter for commercial purposes were instituted in Sweden in 1993 which led to the closing of many localized outdoor slaughter sites. This consequentially increased transportation of reindeers to more distant slaughter plants (Wiklund & Malmfors, 2003). The sixth phase of reindeer herding is autumn when the rutting and mating season begins (Bäck, 1993).During this period the reindeers are often left unattended so that they are not disturbed. The seventh period is early winter when the reindeers move to winter pastures in the same way as they were moved to the calving grounds (Bäck, 1993). During this season the selection, counting and winter slaughter takes place. The reindeers are herded into a big corral and thereafter they might be divided into one small group at a time where they are selected. During the selection each owner selects their reindeers into yet another smaller group. The herdsmen also count the reindeers and some vaccinate their reindeer and some reindeers are also selected for slaughter (Malmfors &Wiklund, 1996) (occurring in the same manner as described earlier). Herders from different herding districts come to this event to select their reindeers and return them to their original herding districts. The herds are now divided into groups based on who owns them. After the selection the reindeers are moved to locations where pastures are preferable. The eighth period is winter, when the reindeer graze in the forest lands (Bäck, 1993) or are being fed in captivity due to lack of food in the wild. During this period reindeers are moved to other pastures when the food begins to decrease and may also be feed commercial supplementary feed.

1.2 The effects of different handling methods and stockpersons

There are different types of stress, physiological and psychological. Physiological stress can occur e.g. when reindeers have restricted feed or are injured (Grandin, 1997). Psychological stress can occur when animals are afraid of contact with people, restraint, or exposure to novelty (Grandin, 1997). The brain processes pain and fear in different places (Grandin, 2003) and an event can be aversive without being painful (Grandin, 1997). Stress hormones can reach higher levels due to fear than many physical stressors (Grandin, 2007).

Fear motivates animals to avoid potential situations that are perceived as harmful (Boivin et al., 2003; Rushen et al., 1999), such as predators (Rushen et al., 1999). Animals can fear humans due to lack of habitation to humans (Rushen et al., 1999). Novelty is a strong stressor. If animals are suddenly confronted with humans it may evoke fear (Grandin, 1997). Forcing an animal towards something novel can evoke strong resistance and fear. However if an animal is allowed to take time and investigate the novelty and realize that it is not a threat, there is no longer a resistance to walking towards or past the object (Grandin, 1997). Animals can also fear humans due to negative experiences (Rushen et al., 1999) or different movements and postures (Hemsworth 2003).

When assessing stress both behavioral and physiological measures should be considered. Behaviour measures are for example, attempts to escape, vocalization, kicking or struggling and physiological measures being for example cortisol, beta endorphin and heart rate (Grandin, 1997). Cortisol is a good indicator of short term stress which can occur for example during castration or other short term handling procedures (Grandin, 1997).

However stress is not always harmful and an individualõs performance can be enhanced and diseases reduced during stress; however only to a certain point (Siegel & Gross, 2007). Exceeding the stress level of what an individual can cope with leads to negative effects (Siegel & Gross, 2007). How much stress an individual can cope with depends on genetics, environment, prior experience (Siegel & Gross, 2007) and social partners reactions (Veissier et al, 1998). There is always a competition for resources amongst body functions such as growth, maintenance, reproduction and health. Responses to stressors lead to a

redistribution of resources in the body. Different body functions are being prioritized when an animal is stressed than when it is balanced (Siegel & Gross, 2007). If an animal is exposed to stressful environments growth potential and reproduction is reduced due to that resources are diverted from growth and reproduction to other bodily functions so that the animal is able to cope better with the stressors in the environment (Siegel & Gross, 2007). It was shown in a study by Nilsson et al. (2006) that reindeer during periods when feed is restricted had a lower heart rate, due to less activity, to save energy and avoid physical stress.

Reindeers are sensitive to restraint and management stress (Rehbinder, 1990). Nilsson et al., (2006) found that handling had a dramatic effect on the heart rate in reindeer and might even affect behavior for several hours. How sensitive they are depends on how tame they are (Rehbinder, 1990; Grandin, 1997). However predicting fear responses is difficult and it depends on how an animal perceives the situation (Grandin, 1997).

Peaceful handling is important especially in transport loading tasks, due to small and crowded handling areas and high injury risk for humans (Pekkarinen, 2006). Wiklund et al. (2001) showed that reindeers during loading and unloading to a transport had an increase in plasma cortisol concentration, indicating an acute stress response. During transport there was a decline in cortisol, however if the lorry stopped there was an increase in cortisol level and when the lorry continued to drive there was once again a decline in cortisol. However reindeersô ability to tolerate transportation stress may decrease due to poor physical condition and energy balance (Wiklund et al., 1995).

Group synchronies in reindeer are well known (Maier & White, 1998), which means that an individual adapts their behaviour depending on the herd. Therefore a herd can lower arousal during exposure to stressful events, unless many individuals are stressed in the herd which results in reduction in the herdsô impact on stressed individuals (Veissier et al, 1998). After weaning, young individualsô interactions with other young individuals increases and they become more aware of the herd. Before weaning however it is the dam that can reduce fear reactions in their offspring (Veissier et al, 1998). Fear in herd animals can be transmitted from one individual to another through behavior and alarm pheromones (Veissier et al, 1998).

Human-animal interactions involve visual, tactile, olfactory and auditory perception (Waiblinger et al., 2006). Interactions are perceived by the animal as negative, positive or neutral. The perceptions are influenced by the animals existing relationship with humans which are based on previous interactions with humans (Waiblinger et al., 2006). If an animal has not experienced either neutral or positive human contact, the most common reaction to humans is fear (Waiblinger et al., 2006). Human interactions towards production animal are often negative such as restraint, separation from pack members etc. Few interactions are positive such as feeding (Waiblinger et al., 2006). Todayôs farming reduces the opportunities and frequencies of neutral contact between humans and animals due to modern machinery (Rushen et al., 1999). However most of the aversive handling still requires human involvement such as restraining, medication and transport (Rushen et al., 1999). This can lead to animals becoming highly afraid of humans (Rushen et al., 1999).

Harsh animal handling may not only affect animals negatively but also the stockmen and consumers. Because different handling methods can affect both animal and human welfare, animal productivity, meat quality and profitability (Waiblinger et al., 2006). Harsh and aversive animal handling includes hitting, shouting and fast movements towards the animals (Hemsworth, 2003).

Animals can have reduced growth rates due to their fear of humans resulting from negative handling experiences. This can cause reduced growth rates and loss of production (Boivin et al., 2003; Hemsworth, 2003; Rushen et al., 1999).

During the summer months, growth in young reindeers, lactation in females and building of fat reserves are accomplished. Intensive herding and continuous stress during this period may lead to inhibition of growth (Reimers, 1972). Lack in feed during summer months can also lead to starvation during winter and increased calf mortality, due to low birth weight, fetal resorptions or abortions (Rehbinder & Nikander, 1999). Reimers (1972) study showed a lower weight gain amongst reindeer calves who were subjected to intensive herding than wild reindeer calves and that slaughter weight was lower amongst reindeer who had been herded more intensively than in reindeer herded less intensively. Stress responses can lead to gastric lesions which affect the digestive tract utilization of food (Rehbinder et al., 1982; Rehbinder, 1990). As many as 80-90 percent of reindeers who have been handled for a long time, e.g. herded for several hours and thereafter handled in a corral and finally slaughtered; showed bleeding abomasums (Rehbinder & Nikander, 1999). If reindeers that have been injured because of too much stress are not allowed to heal before the next stressful long term handling, the injuries will increase. Therefore long term stressful handling should be avoided (Rehbinder, 1990; Rehbinder & Nikander, 1999). Stress also affects the immune system negatively making reindeers more susceptible to different diseases (Rehbinder et al., 1982; Rehbinder 1990). Management stress may therefore affect productivity in reindeer (Rehbinder, 1990).

If animals are fearful of humans, handling can be difficult due to lengthened handling time and difficulties to move animals into different enclosures (Boivin et al., 2003; Grandin, 2007; Ruchen et al., 1999; Waiblinger et al., 2006; Hemsworth, 2003). It can also be dangerous for both the animal and handler (Boivin et al., 2003; Rushen et al., 1999; Waiblinger et al., 2006). Accidents caused by reindeers are increasing (Pekkarinen, 2006). Working in commercial reindeer management is one of the most dangerous occupations in Sweden (Pekkarinen, 2006). A study made by Pekkarinen (2006) showed that the number of Finnish reindeer herders decreased but the number of reindeers increased. Accidents caused by working with reindeer were 35%, and accidents caused by working on uneven, slippery terrain while working with reindeers were 27%. The proportion of accidents caused by reindeer is frequent and has increased. Most accidents were found to occur during gathering for separation and separation itself (27-31% of the total number of accidents caused by reindeer) (Pekkarinen, 2006). Fearful animals that are difficult and time consuming to handle can decrease job satisfaction, job motivation and commitment in stockmen. This may lead to a negative cycle where the stockmen behavior towards the animals worsens resulting in animals becoming even more fearful of humans (Waiblinger et al., 2006).

Reindeer meat quality is affected negatively if animals are stressed and roughly handled (Wiklund & Malmfors, 1996; 2004). Dark, Firm, Dry meat, DFD, occurs when the meat has a high ultimate pH value. DFD not only affects meat colour, texture and water holding properties but also shortens shelf life (Wiklund & Malmfors, 2004). A study made by Wiklund & Malmfors (2004) showed the frequency of DFD was higher in calves than in adult reindeer after transport. Herding with helicopter for several days or capture and sorting reindeer by hand did not seem to affect muscle glycogen content or ultimate pH . Usage of lasso was however the most glycogen-depleting event yet studied in reindeer

(Wiklund & Malmfors, 2004). Reindeer meat slaughtered during late winter can have DFD because of lack of nutrition. This can be prevented if the reindeers are being fed commercial feed two months prior to slaughter presuming that the reindeers are not stressed during pre-slaughter handling (Wiklund & Malmfors, 2004).

Example of positive handling techniques include pats, strokes and slow deliberate movements (Hemsworth, 2003). Animals can habituate to repeated non aversive handling, however they will not adapt to handling they perceive as aversive (Grandin, 2007). However studies have shown that animals that have been handled gently may be able to handle temporary aversive treatments such as castration with a lower stress response compared to animals handled roughly (Hemsworth, 2003; Rushen et al 1999; Waiblinger et al., 2006). Positive handling also counteracts many of the undesired effects caused by harsh handling (Waiblinger et al., 2006). Neutral handling can habituate animals to humans which can decline the animalsô fear of humans (Hemsworth, 2003). This is accomplished with frequent positive or neutral human contact and no negative human contact (Waiblinger et al., 2006).

Stockpersons behavior towards animals can be affected by time constraints, number of animals, self-esteem (Boivin et al., 2003), work environment, behaviour of colleagues (Waiblinger et al., 2006), attitudes towards animals and personality traits (Boivin et al., 2003; Hemsworth, 2003). A way to improve stockmanship is either by selecting people that have good qualities or by training them so that their technical knowledge, working organization and attitudes towards animals (Boivin et al., 2003) and behavior toward the animals are improved (Hemsworth, 2003). If a stockperson knows that an animal is reluctant to enter a corral, he/she might use more aversive handling leading to an increased fear of humans in the animal, consequently making handling even more difficult (Waiblinger et al., 2006). Through practical experience with the animals and knowledge about the animals stockpersons shape their attitudes towards them. Negative attitudes and habits towards animals can be altered to improve animal handling through a combination of practical training and learning scientific knowledge about animal behaviour (Boivin et al., 2003; Hemsworth, 2003).

1. 3 Low Stress Stockhandling

The purpose of low stress stockhandling (LSS) is to reduce the stress animals are subjected to during handling by creating consistent and calm responses from the animals (Cote, 1999). This is done by handling the animals through the animalsô point of view and using natural herd behavior to accomplish this. This method is used on many different animal species such as cattle, sheep, buffalo, camels and reindeers (B. Williams, LSS trainer, personal communication, 2011-04-08). Some of these methods may be rediscoveries of handling methods used in the past (Grandin, 2007). According to Cote (1999) benefits achieved by using LSS can be that less time and manpower is needed when handling animals. Fewer fences and other handling facilities are needed which reduces costs. There can be a better distribution of the herd and better use of the total forage resource, thus increased stocking rates. It may also result in animals with better health, nutrition, conception rates and increased weight gain and a more enjoyable work environment for the stockpersons (Cote, 1999). Using LSS during handling is less stressful for both animals and stockpersons (Stookey & Watts, 2007).

One of the most important concepts in LSS is pressure and release. Animals want to receive release from pressure and without this animals become stressed (J. Lindsay, LSS trainer,

personal communication, 2010-11-17). In order for animals to be able to respond calmly and responsively they have to learn that pressure has an available release. Livestock should not be forced to do what we want; instead you should apply patient and non-aggressive pressure to encourage certain movements of animals which are rewarded with relief from pressure (Cote, 1999). How sensitive animals are to pressure and the handlers position, changes according to circumstances and different situations. Therefore constant stocktaking of the herd is important (Cote, 1999).

Pressure is added by moving into the animalsô flight zone and released by moving out of the animalsô flight zone (J. Lindsay, LSS trainer, personal communication, 2010-11-17)), Flight zones are different in different animals and changes depending on if the animal is alone or in a flock, if they are used to humans and their previous handling experiences (Grandin, 2007). Flight zones also depend on living habits, species, strain etc (Rehbinder, 1990). You get different responses depending on how far in you enter the flight zone and how you are regarded by the animal. Initially animals start to move away from pressure when you have entered their flight zone, but may react first with alertness or curiosity (Grandin, 2007; Rehbinder, 1990). If they cannot release pressure they react with distress, anxiety and fear (Rehbinder, 1990). When handling herdsô humans often apply more pressure than necessary when the animals are already headed in the desired direction. This can cause the opposite results than desired (Stookey & Watts, 2007). Instead you should work in and out of the flight zone to get the desired response. Do not apply pressure when the animals are doing what you want, and release pressure when the animals move and only apply pressure when the herd slows down (Grandin, 2007). If the pressure is not released the animals will turn towards whom is pressuring them (Cote, 1999; J. Lindsay, LSS trainer, personal communication, 2010-11-17). Do not pressure the herd so that it causes bumping and crowding as this is stressful for the animals (Cote, 1999). When using LSS the handler works at the edge of the flight zone. This is when the animals are moved most efficiently (Grandin, 2007).

Another important part of LSS is positioning yourself correctly to get the response that you want from the animals When handling animals you should at least see one of the animals eye, if you do not see an eye the animal does not see you This leads to an animal that turns toward you to be able to see who is pressuring them making handling more difficult. You should move in a zick-zack pattern in a straight line so that every animal in the herd can see you (J. Lindsay, LSS trainer, personal communication, 2010-11-17). The animalôs visual view can be divided into different zones which induce different reactions depending on where the herder stands (see fig. 1).

Sounds can be stressful for animals (Grandin, 2007). Cattle are able to distinguish between people making threatening sounds at them and machinery sounds that are not directed at them (Grandin, 2007). Irregular movements and sounds are more frightening to animals than steady stimuli (Grandin, 2007). Therefore loud noises should be avoided during handling (Cote, 1999).

Herd animals follow other animals that are moving and are comfortable in a herd (Cote, 1999; J. Lindsay, LSS trainer, personal communication, 2010-11-17). Moving a few animals can lead to that the rest of the herd follows (Stookey & Watts, 2007). Animals that are handled calmly want to stay in a herd, whilst stressful handling makes them want to leave the herd (Cote, 1999). Every flock has its order where the leaders go first and then there is a middle part and a tail at the back of the herd (J. Lindsay, LSS trainer, personal communication, 2010-11-17). If herds are driven directly from the rear, being pushed

directly in the direction desired; it can cause the leaders of the group to turn to one side in order to see the human pressuring them making the herd change direction (Stookey & Watts, 2007). If the herd is scared, the herd becomes harder to control as the order of the herd gets disturbed. LSS helps the herd to stay in their natural order (J. Lindsay, LSS trainer, personal communication, 2010-11-17). Calm handling also allows dams and their calves to stay together (Grandin, 2007), reducing the risk of dams turning in order to search for their calves.

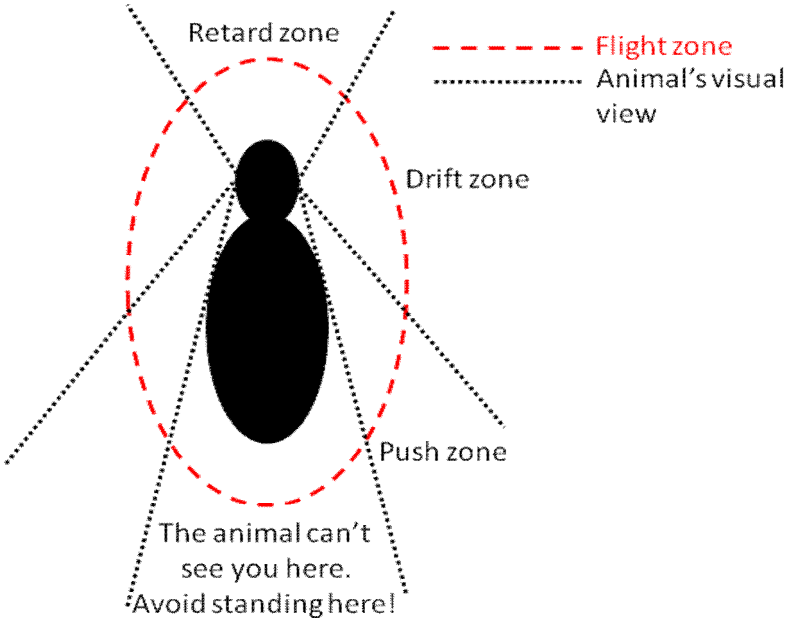

Figure 1: An animalôs flight zone, visual view and recations due to angle of pressure.

By observing the animals you will see where you will need to position yourself in order to get the desired response (J. Lindsay, LSS trainer, personal communication, 2010-11-17). Rapid movements by the animals and herder increases stress (Cote, 1999).

According to B. Williams (personal communication 2011-04-08) who has worked with reindeers in Alaska, it takes about 1-3 days depending on day length, to calm reindeer down and teach them the LSS way of handling. After they were taught with the better handling technique, it could be used in any situation and the reindeers would stay calm. Furthermore, he says that to keep the animals calm they have to be worked properly, so it takes much longer to teach the people handling the animals than the reindeers. B. Williams also has herded reindeer with snowmobile and helicopter and the LSS concept works the same weather you are working on foot or herding with a vehicle. Once animals have been taught to be handled with the LSS technique, they do not need to be trained everytime you handle them (Cote, 1999).

The purpose of the study was to investigate the interest in Sami reindeer herders to use the Low Stress Stockhandling method for handling reindeer. Also to find out which handling situations they think works the best and the worst and which might need improvement.

2. MATERIALS AND METHODS

A survey was made with 10 questions (see Appendix I) to investigate the interest in Sámi communities to try out the Low Stress Stockhandling-method on reindeers. To inform the Sámi reindeer herders about the concept of Low Stress Stockhandling, a homepage (www.lssparenar.n.nu) was constructed with an information sheet (see Appendix II) and information about the purpose of the survey. The participants were redirected from the homepage to the survey which was made at mysurvus.com. The participants could see the whole survey at once. The link to the homepage was distributed by talking to people who participate in reindeer management and by Facebook. To more easily get the word out about the survey a Facebook group (www.facebook.com) was made where people who might have connections to reindeer management were invited to a closed group (where only the people invited could see the information). The people invited were asked to invite more people that might have connections to reindeer herding. At the end of the study the Facebook-group consisted of 175 people. The link to the homepage was also distributed on several other Facebook groups where Sámi people might be active in. The homepage was visited by 139 unique visitors and was shown 196 times. The survey was available for the participants for 25 days. In order to be able to answer the survey some demands were made. The participants had to have witnessed or been involved in the following handling procedures:

- Stunning and slaughter
- Moving reindeer
- Calf marking
- Castration
- Loading
- Selection
- Gathering, bare ground
- Gathering, snow
- Transportation

The survey was divided into three different parts. The first being some background information about the participants, their age, sex and which Sami reindeer herding district they belonged to. The second part was about how they handled reindeers and what they thought about stress in different handling situations. They were asked how much they participate in reindeer management and what kind of aids they use when managing reindeer. The participants were also asked to answer two hierarchy questions which involved the participants scoring the handling situations listed above depending on how well they thought they worked and how stressful they believed that these handling situations are for the reindeer. They also had to agree or disagree to the statement ñThere is a need to reduce the stress that reindeers are exposed toò on a seven-point valuation scale, were 1 indicated that they strongly agreed and 7 indicated that they strongly disagreed. The third part was about LSS and what they thought about it.

From mysurvs.com the results were directly downloaded to Microsoft Office Excel 2007, giving each participants survey answers separately. Each question from every participant was complied together with each other. In both hierarchy questions the sum of each point given by every participant for each handling situation were added together. The points each handling situation got, represented the placing they should get. In the question where the participants had to agree or disagree to a statement on a seven-point valuation scale, the mean value of this question was counted. Regarding the question if they thought that LSS could benefit them during reindeer handling, answers were compared between fulltime reindeer herders, herders with another work besides reindeer management and the participants who only participate a few times in reindeer management. Because of the different amount of participants in each group the percentage value of each answer in each group was calculated.

3. RESULTS

The survey was answered by 31 people, 17 (55%) men and 14 (45%) women, between the ages of 18- 52, with a mean age of 30. The participants belonged to 11 different reindeer herding districts. Two belonged to Norway, and 3 participants were from unknown reindeer herding districts. Of the participants 13 (42%) were fulltime reindeer herders, 8 (26%) had another work besides reindeer herding and 10 (32%) participants only participated a few times in reindeer management. Every one that answered the survey used more than one aid when herding animals. The most common aid used was snowmobile (n=30) and the next most common a herding dog (n=20). All three methods to capture reindeers (lasso, snare and hands) were used by 13 participants. Seventeen participants used hands and lasso when capturing reindeers and one used lasso only.

The handling situation that was perceived as the one that worked the best was moving reindeer to different pastures, and the handling situation that worked the worst was loading reindeer at transport (Table 1).

Table 1. Results of question 4; which handling situation do reindeer herders think works the best? The first place is the handling situation that works the best according to the participants of the survey. The ninth place is the handling situation that works the worst. The points are the total sum of all answers for each handling situation, where the handling situation that works the best has the lowest points and the one that works the worst has the highest number of points.

Handling situation	Place	Total number of points
Moving reindeer	1	99
Gathering, snow	2	123
Gathering, bare ground	3	135
Selection	3	135
Calf marking	5	138
Stunning & slaughter	6	146
Castration	7	169
Transportation	8	197
Loading	9	217

The mean answer amongst the 31 participants on how well they agree to the statement ñThere is a need to reduce the stress that reindeers are exposed toò was 2,74 in a scale of 1 to 7. The 1 indicates that they strongly agree with the statement and 7 indicates that they strongly disagree with the statement. Amongst the participants 9 persons (29%) strongly agreed (1) with the statement, 2 (6%) strongly disagreed (7) with the statement and 8 (26%) participants chose neither (3).

When asked what kind of handling situation the reindeer herders believe is the most stressful loading reindeer was reported. The least stressful handling situation was gathering on bare ground (Table 2).

Five of the participants had never thought about the four different principles in LSS: flight zone, reindeerôs visual view, herd composition and that reindeers tend to turn towards whom is pressuring them if they are being pressured too hard. Most of the participants (17) had thought about the fact that reindeers tend to turn when pressured too hard, 15 had thought about flight zone and 15 about herd composition and 12 had thought about the reindeerôs visual view. Two participants had thought of each principle. Other principles that the participants had thought about before were: the drift zone and different positions which leads to animals turning left or right. When asked if they used this knowledge when working

with reindeers 14 participants answered yes, no one answered that they did not, 8 answered that they used it sometimes and 7 answered that they did not know.

Table 2. Results of question 6; which handling situation do reindeer herders think is the most stressful for reindeers? The first place is the handling situation that is the most stressful according to the participants of the survey. The handling situation on last place is the one were the reindeers are the least stressed. The points are the total sum of all answers for each handling situation, were the handling situation that is the most stressful has the lowest points and the one that is the least stressful has the highest number of points

Handling situation	Place	Total number of points
Loading	1	103
Transportation	2	114
Selection	3	133
Stunning & slaughter	4	134
Castration	5	136
Calf marking	6	148
Gathering, snow	7	193
Moving reindeer	8	198
Gathering, bare ground	9	200

A majority of the participants (21 persons) believed that the LSS-method would benefit them when working with reindeers. Two participants believed that they would not benefit from it and 8 did not know. Below are the answers of the last question by some of the participants that thought they would benefit from LSS;

ñMakes senseò

ñThis method could reduce stress in both animals and humans.ò

ñAlways good to know how to reduce the stress reindeers are subjected to.ò

ñA calm herd makes a calm reindeer herder.ò

Six participants answered, in the open optional last question about why or why not they thought the LSS-method could benefit their work with reindeers i.e. that they thought the method already was used by many reindeer herders and that it is the traditional way of herding reindeer. These are some of their answers;

ñThis method has been used for a very long time and is still used by many reindeer herders who know how to handle reindeer. A herd is never pressured, but herded in their own pace; itôs quite logical and natural.ò

ñI work quite a lot with this method alreadyò

ñThe LSS method reminds me of how the older and wiser reindeer herders work. This describes in words what you otherwise only can learn from experience.ò

ñI use a lot of the LSS principals alreadyé they come naturally and traditionally our family has used them.ò

ñPersonally, I think that if you do not see and feel the animal you are working with you cannot work successfully with that animalé My opinion is that I am almost certain that the so-called LSS method already is being usedé ò

ñI think that reindeer herders already use the LSS-method to some extent but there are certainly occasions and situations where you could learn and embrace new methods, and use it more widelyé ò

Two participants liked the idea of the LSS-method but could not understand how one would be able to use the method in every handling situation reindeers are subjected to, especially the ones that they saw as the most stressful i.e.

ñThe occasions when reindeers are the most stressed I donôt think the LSS method is compatible. Or at least I canôt understand how it could be used during calf marking, handling days before slaughter (selection, transportation etc)éò

ñéI do not see how to use the LSS-method in those situations where the stress is greatest, i.e. when the reindeer are in the corral. Thatôs where one would like to reduce stress.ò

When comparing the results from the three last questions in the survey between three different herding groups based on how active they are in reindeer management, the following results were collected: The participants of the survey who only participated a few times in reindeer management claimed that they had thought of one or more of the method mentioned in the information sheet; flight zone, reindeerôs visual view, herd composition and that reindeers tend to turn towards whom is pressuring them if they are being pressured to hard. The two other groups; fulltime reindeer herders (13 persons), 9 persons reported that they had thought of one or more of the methods mentioned in the information sheet. The group who have another work besides reindeer handling (8 persons), 6 persons reported that they had thought about one or more methods mentioned in the information sheet (Figure 2).

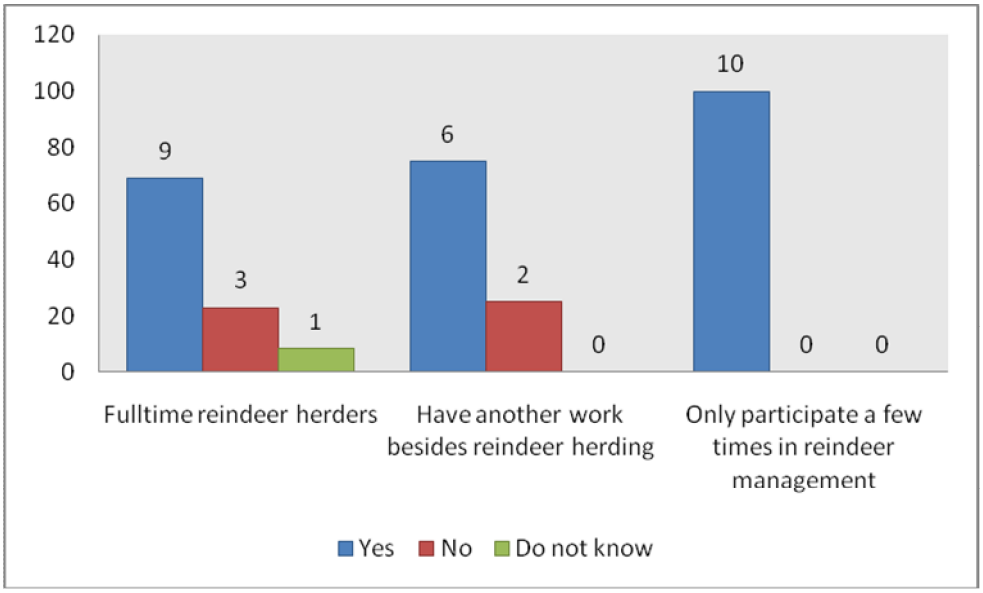

Figure 2. The results in percent when comparing answers of three reindeer herding groups based on the amount or how active they are in reindeer management to the question: If they have thought about some of the main principles in Low Stress Stockhandling, flight zone, reindeerôs visual view, herd composition and that reindeer turn towards what is pressuring them if pressured to hard?. The number on each bar is the number of reindeer herders who responded to each answering alternative.

When comparing the results of the question whether the participants use these methods mentioned in the information sheet a majority of the fulltime herders claimed that they did use this knowledge when handling reindeer (see figure 3).

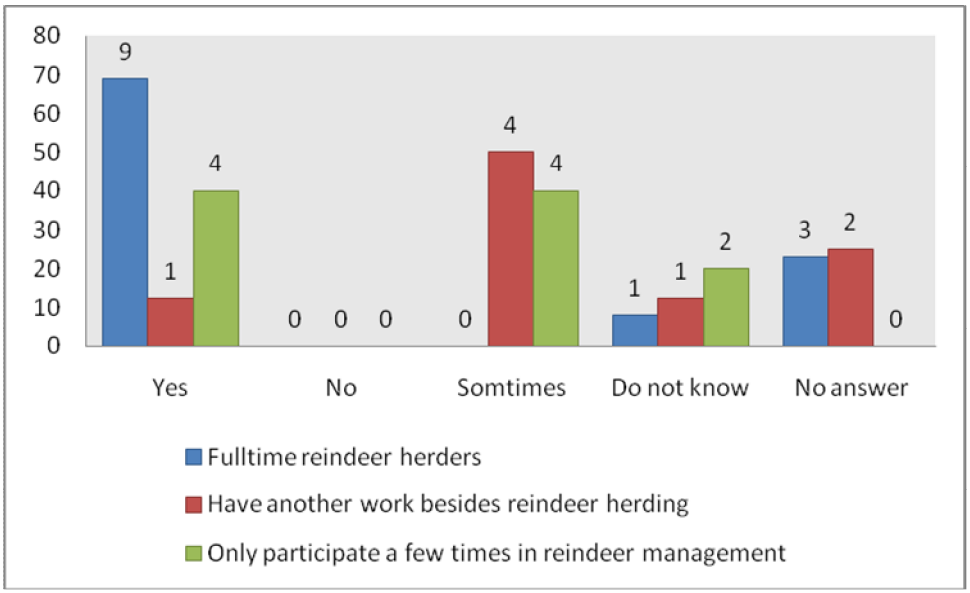

Figure 3.The results in percent when comparing answers in three reindeer herding groups based on the amount or how active they are in reindeer management to the question: Whether they use the principles in Low Stress Stockhandling during handling of reindeer? No answer refers to the respondents that that answered they had not thought of any of the methods mentioned in the Low Stress Stockhandling information sheet in the previous question. The number on each bar is the number of reindeer herders who responded to each answering alternative.

When comparing the answers to question 9 ñif they thought that LSS could benefit them during handling of reindeerò, the differences between herders that worked fulltime with reindeer, herders that have another work besides reindeer management and herders that only participate a few times in reindeer management (see figure 4) was that only fulltime herders included answers that they did not believe that LSS would benefit them during reindeer handling (2 persons). Eighty percent of the participants that only participated a few times in reindeer management thought that LSS would benefit them.

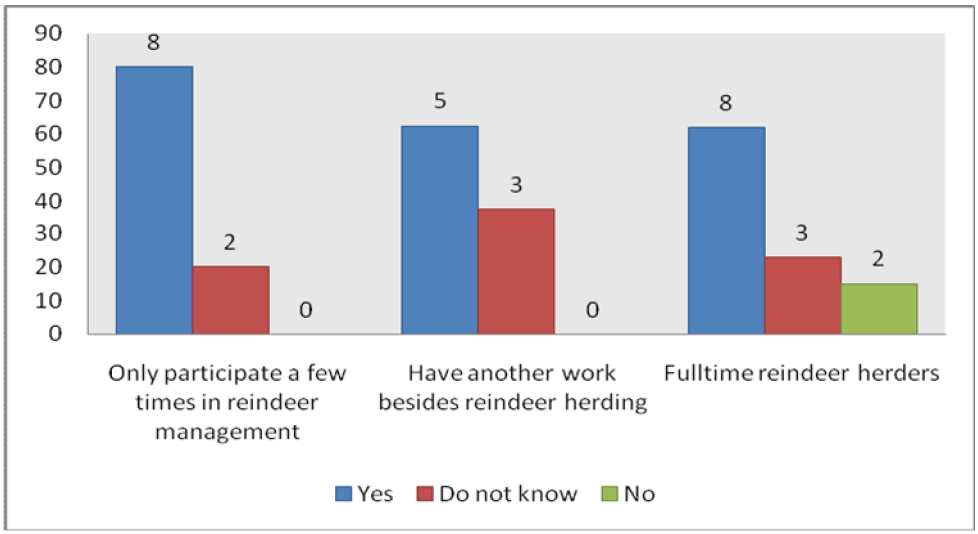

*Figure 4. The results in percent of the question "Do you think the LSS-method could benefit you during handling of reindeer?***ò** *when comparing between three different groups, fulltime reindeer herders(n=13), participants that have another work besides reindeer herding (n=8) and participants that only participate in reindeer managemnt a few times(n=10). The number on each bar is the number of reindeer herders who responded to each answering alternative.*

4. DISCUSSION

Of the 31 participants who answered the questionnaire 17 (55%) were men and 14 (45%) were women. According to the reindeer management department at Sametinget during 2008/2009, 63 % reindeer herders were men and 37 % women (Sametinget, 2010). The participants in my survey are not completely representative for reindeer herders in Sweden according to gender distribution. The age distribution of the participants in the survey was 18-52, with a mean age of 30. During 2008/2009 the reindeer owned by most people were amongst men 55-69 years, whereas amongst women reindeers were owned by women at the ages of 0-14 and >80 (Sametinget, 2010), probably because it is tradition to give reindeer to newborns and when women become widows they inherit their husbands reindeer. Through distributing the information about the survey mainly on Facebook the age group may have been affected by this towards younger people. There were 175 members in the Facebook group and the homepage had 139 unique visitors and 196 showings. However only 31 answered the questionnaire. This might be due to the requirement that that they must have participated or witnessed certain reindeer handling procedures in order to answer the survey. It could also have been due to the 15 minutes it took to read and answer the survey. The ones that were not interested in the LSS concept may have not answered the questionnaire which might affected the results in that way that more people interested or using LSS were answering the questionnaire and the use of LSS is overestimated compared to the whole population of reindeer handlers. The information sheet may have been misunderstood and the whole concept of low stress stockhandling may have been misinterpreted due to the scarce information on the sheet. However in order to get as many as possible to read the information sheet I decided to keep the information as short as possible and just give the most basic information about LSS. Misunderstanding is another factor that might explain why many herders claimed that they already used LSS. For three participants reindeer herding districts were unknown, this might be due to the fact that they do not belong to a reindeer herding district and only help reindeer herders occasionally or that they did not feel comfortable to share that information. Every one that answered the survey used more than one aid when herding animals. The most common aid used was snowmobile (n=30) and the next most common a herding dog (n=20). This is probably due to the fact that in the winter, the only aid used is snowmobile, and in the months without snow, both motorcycles and four-wheelers are used. Herding dog was a common aid used which is interesting since herding dogs were not mentioned in the articles I read about management stress in reindeer. Lasso was the most common way to capture reindeer and this is discussed further later on.

According to the participants of the survey, moving reindeer was the handling method that worked the best and it was the second last handling method they thought was the most stressful for the reindeer. When moving reindeer the herds are smaller and the task is just to move the animals to different pastures and there is no other handling situation involved. This might lower the pressure herders might feel compared to for example when others are waiting for them to bring the reindeers to a corral. This might be why it works the best. The herd is also owned by only a few people who work together. This may make the work more enjoyable and the people may also have the same attitudes and beliefs towards how to work when handling reindeers. An interesting question that was not in the questionnaire is when the herders feel the most stressed/pressured to accomplish their work. The handling method that worked the worst and was perceived as the most stressful, according to the participants of the survey, was loading and thereafter transportation. Loading and transport has shown to be stressful for reindeer, with an increased plasma cortisol concentration (Wiklund et al.,

2001). This might be due to the small enclosures and that animals are being moved into a transport, which is novel for them. Novelty is a strong stressor (Grandin, 1997). The small enclosures may lead to animals being pressured too hard due to lack of space for the herdsmen to release pressure. One way to solve this is to have bigger enclosures or to work the animals outside the enclosure with LSS. At loading time might be a good handling situation to demonstrate LSS to reindeer herders, because they see this handling situation as difficult. Thus getting a more enthusiastic response towards the LSS concept and making them realize the potential value of it. This is also the handling situation which can make them connect stress in reindeer with reduced meat quality and profit loss as most reindeer are only transported once and that is to the slaughter plant.

Reindeer management changed drastically in the beginning of the 1950s, from intensively herded reindeer with frequent human-animal contact to extensive herded reindeer, with few and mostly aversive human-animal contact. The aversive contact can be perceived as negative-interaction from the animalsô point of view. More machinery became available therefore the way of herding the animals changed; however the reindeer are still the same. Reindeer herders have to work together with other herders and take care of other peopleôs reindeer in the reindeer herding district. This can make it difficult to have the same herding technique and they probably do not have the same attitudes and behaviour towards animals, which affects the human-animal relationship (Boivin et al., 2003; Grandin, 2003; Hemsworth, 2003; Waiblinger et al. 2006). In other animal production systems, there is often only one manager and the rest are employees whom of which the manager decides should take care of the animals. This is not an option for reindeer herders, who are often born into the profession and reindeer herding district. Therefore embracing the same herding method could benefit the work environment, making the way of handling animals more consistent and thus improving animal welfare. Reindeer herders born into the profession often begin to interact with reindeer early in life and also participate in reindeer management mainly when the reindeer are in the corral. Thus their attitudes and experiences are shaped early in life. Attitudes can be changed through better knowledge about animal behaviour and this could reshape the herders behaviour towards reindeer. An increase in the knowledge about reindeer behaviour and biology could thus change incorrect attitudes that affect reindeer negatively. This could improve the herdersô interaction with the reindeer. However when these attitudes are shaped so early in life they might be hard to change. A strong relevant scientific research about the effects on different handling methods on reindeer combined with practical handling situations where reindeer are handled in a different way than perhaps done traditionally is probably necessary to help in the process of changing attitudes and indirectly behavior. Reindeer herding has a strong cultural value for the Sami people and changes may thus be hard. However many participants thought that the LSS method was very similar to what older reindeer herders used to use and this might make it easier to convince herders to embrace the concept. Strong cultural traditions with cattle handling in USA and Australia have been changed as a result of LSS courses. These traditions have changed because the farmers have witnessed improvements in efficiency and safety when handling cattle with LSS (S. Atkinson, researcher at the Section of Animal Hygiene, Dept of Animal Environment and Health, personal communication 2011-06-09). With right information provided in the right manner this might also be possible in reindeer management. As a participant said in the survey; that LSS describes in words what you only can learn from experience by getting this knowledge out early in the reindeer herdersô career different, better attitudes towards reindeer might be shaped. There are currently discussions about starting a reindeer management program in high school. This would be a good

opportunity where reindeer behavior, biology and perception of human handling could be combined with practical training in reindeer handling. This would give reindeer herders the knowledge and tools they need for knowing how to handle different challenging situations.

A few reindeer herders wondered if LSS was useful in all types of handling situations as certain stressful events are hard to avoid, such as calf marking and selection. The first contact a reindeer calf has with humans is often when gathered, herded to a corral and marked. This is probably very stressful for both the dam and the calf. This might even be the first time the calf is separated from its dam. During this period the dam is the one that gives security and can affect the calves behaviour to either be calm or fearful (Veissier et al, 1998). If herded calmly with the LSS method the reindeer are able to move in their natural herd composition and this enables the calf and dam to stay together during the gathering and herding procedure. If the herd stays calm the dams will also do so and hereby affecting the calvesô behaviour by making their first contact with humans less aversive and stressful. When the animals are in the corral, rapid movements should be kept at a minimum because it creates stress and confusion in the herd which increases the risk of the calf to lose its dam. Capture with lasso was shown to be one of the most glycogen-depleting event yet studied in reindeer management (Wiklund & Malmfors, 2004). When throwing a lasso at the herd it creates rapid movement in reindeer increasing the stress level. Therefore changing from using lasso to using snares when capturing calves might lower the stress level but here more research is needed since comparisons between lasso and snares has not yet been studied. But the risk of capturing the wrong reindeer may decrease if snares are used instead. The risk of injuries during capturing of the calf can probably be reduced depending on the different capturing techniques used. For example when using snares, the speed of the herders, and thus the herd, may be lowered. However the lasso has a strong traditional value and it may be hard to persuade the Sami people to reduce its use in some handling situations, especially due to lack of scientific research. By keeping the herd calm, the chance of the dam staying close to the calf when it is captured may increase due to a lower fearfulness in the animal, making it easier for the calf to find its dam once released. If the stress levels are reduced during the calf marking period, the mothers are more likely to stay closer to their calves, which facilitates correct ear marking and remothering up after the ear marking. This will also reduce the handling/captivity time required. The difference in calves marked when handled calmly or when handled more harshly has yet not been studied in reindeer. During castration the bulls are captured and castrated without anesthesia. According to Grandin (2007), animals that are subjected to a handling procedure that is painful, do not habituate to it. However the bulls are only castrated ones and handling them calmly and having a good human-animal relationship with them may lead to a lower stress response once captured and castrated (Hemsworth, 2003; Rushen et al., 1999; Waiblinger et al., 2006). A calm herd may also help the bull to stay calm which will reduce stress (Veissier et al., 1998). Because most of the animals in the herd are not handled with painful procedures but are probably stressed even when handled carefully and calmly; the importance of keeping the non handled animals calm during their time in the corral may lead to the reindeer which are being captured and restrained to have a lower stress response during the procedure. Less stress will also increase the chance that calves and dams that may have lost contact will find each other before being released from the corral. This may lead to less calves being left behind in the corral to wait for their dam to return, which is probably very stressful for the calf. The aim should also be to only bring the reindeer to the corral once and to reduce the time they are in the corral. This is to decrease the amount of time they have to be away from pastures. Lack of feed during the summer affects reindeer

growth and chance of survival during the winter negatively (Rehbinder & Nikander, 1999; Reimers, 1972).

During selection there are several handling procedures involved. First reindeers are gathered and herded into a corral where animals meant for slaughter and unmarked reindeer might be selected first. Thereafter, the reindeer are separated to smaller groups, one small group at a time. The reindeer are captured by hand by their owners and put in another separate corral through a door and maybe a narrow aisle, where they wait during the rest of the procedure. More reindeer join them after each selection group. It is often very crowded in the selection corral with many herders and reindeer in a small space and the people are deep inside the animalsô flight zone. This pressure is not released until the reindeer are selected and brought to the separate corral. Depending on how many reindeers there are in the herd and the time it takes to separate the reindeer, the procedure can take several hours. Sometimes the reindeer are being held in captivity and handled for over 24 hours. This is the longest handling procedure. The selected herd is also moved to pastures which increases the handling time. The reindeers that are commercially sold might even be in captivity for several days before being stunned and slaughtered (Wiklund & Malmfors, 2003). The long days work for the herders may lead to impatience and harsh handling of reindeer. Selection takes place during the catabolic phase when reindeer have lowered their activity and heart rate to save energy (Nilsson et al., 2006). Handling during this time of year caused an increase in physical activity and thus energy use. Animals that are calmer during handling do not waste as much energy as stressful animals. Therefore handling methods that lower stress in animals can potentially lead to less energy being wasted, which may allow them to survive the winter better. In a study by Rehbinder & Nikander (1999) they saw that 80-90 percent of the reindeers handled for a long time with stressful handling during selection lead to bleeding abomasums. This makes it harder for reindeers to preserve nutrients which are extremely important during the winter when feed is restricted. Feeding reindeers in the corral after they have been selected might be preferable to restore and increase the energy intake. Wiklund et al. (1995) showed that animals with poor physical condition and energy balance may be more susceptible to transportation stress so feeding before transportation is a possible way to restore their energy balance and therefore decrease transportation stress. Feeding the animals also results in a positive interaction between reindeer and humans which is scarce otherwise. More research is needed to investigate which handling procedures needs to change and how to be able to decrease stress. For the LSS method to work the animals need to be handled properly according to the principals (B. Williams, LSS trainer, personal communication 2011-04-08). How the LSS method should be used on reindeers during selection is a challenge and there might be a need to change the way reindeers are being selected, in order to make it work.

Reindeer herding is one of Swedenôs most dangerous occupations (Pekkarinen, 2006). According to Pekkarinen (2006) human injuries due to reindeers have increased. Peaceful handling like the LSS has shown to reduce injuries (Cote, 1999). Fearful animals may struggle when captured; leading to an increased injury risk for both the human and the animal. Thus by reducing the fear in animals the number of injuries should reduce as a consequence. By handling reindeer in a consistent and predicable way which LSS enables, fear in reindeer towards humans should be reduced. The same study also showed that uneven slippery terrain also caused many accidents. If herders move earlier and slower rather than later and faster when herding animals (which is possible when using LSS), these accidents may also be reduced. It would have been interesting to see if the participants who

answered the survey ever had got injured during managing reindeer but unfortunately this question was not asked in the survey.

When comparing the results from the three different groups i.e. fulltime herders, herders who have another work besides reindeer management and herders who only participate a few times in reindeer management; the results are different. Every participant that only participated a few times in reindeer management claimed that they had thought of one or more of the main principles in the LSS information sheet. Of the fulltime reindeer herders 9 claimed that they had thought of the LSS principles and 3 that they had not and 1 did not know. In the next question whether they used this knowledge when handling reindeer, 50% of the reindeer herders who only participate a few times claim that they use these principles when handling reindeer and 50% use it sometimes. The 9 fulltime herders who claimed that they had thought about LSS principles also claimed that they used them when handling reindeer. However at least two of the fulltime herders answered in the last open question that they did not see how the LSS method could be used in every aspect of reindeer management, however they claimed that they used some of the methods when handling reindeer, in every aspects. The participants might not have interpreted the questions the same way I have. The most positive reactions towards LSS were from the ones that only participate a few times in reindeer management. This might be due to the fact that they are not involved in handling as often and therefore specific handling methods are not as deep-rooted as they might be for the participants that are involved with reindeer more often. This might also be seen as critic for the methods used today and people that work a lot a certain way may not want to see the deficiencies in their handling methods. However a majority of the participants in the survey believed that LSS would benefit them during reindeer handling and that the stress reindeers are exposed to needs to be reduced. If a reindeer herding district would like to try low stress stockhandling it is important that it is done correctly and that there are follow-ups so that they are able to persist the handling method. This is to ensure that they are successful and get the accurate result from handling animals with the LSS concept. If this is not done successfully, convincing more people to adopt this method will be difficult (Grandin, 2003).

There is a lack of research in the field of reindeer management and current research is not benefiting reindeer management the conclusions made are not practicable in todayôs reindeer management. Research in the field of reindeer management needs to focus on the needs of the reindeer herders as well as reindeer welfare to increase the possibility that the results from research will be used in practice. Handling methods that are quite easy to change if needed, such as usage of lasso or snare during calf marking, need to be investigated in order to see how reindeer welfare is affected by the different methods.

5. CONCLUSIONS

A majority of the participants in the survey believed that LSS could benefit them in their work with reindeer. Loading and transportation was the handling situation participants found the most difficult, making loading a favorable handling situation where LSS could be demonstrated to reindeer herders. However the reindeer herding districts need to be supported so that they are able to access information about correct handling procedures according to LSS. Correct access to LSS information will also prevent misunderstandings and misinterpretations which could lead to a negative and false view of LSS. Due to many managers involved in a reindeer herding district there can be difficulties to convince everyone to participate in the new handling method. Reindeer are susceptible to handling stress. Therefore a reduction of the stress reindeers are exposed to during management and handling procedures by using LSS methods would benefit not only the reindeer, but also the reindeer herders and consumers of reindeer meat.

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REFERENCES

Boivin, X., Lensink, J., Tallet, C. & Veissier, I., 2003. Stockmanship and farm animal welfare. Animal Welfare, 12:479-492.

Bäck, L., 1993. Reindeer management in conflict and co-operation. A geographical land use and simulation study from northernmost Sweden. Nomadic Peoples, 32: 65-80.

Cote, S., 1999. Low Stress Livestock Handling. Grazing Behavior of Livestock and Wildlife (Eds. K.L. Launchbaugh, K.D. Sanders & J.C. Mosley). Idaho, Idaho Forest, Wildlife and Range Experiment Station**.**

Enoksson, M., 2010. Rennäringen i Sverige. http://sametinget.se/1126. Used: 2011-05-04.

Grandin, T., 1997. Assessment of Stress During Handling and Transport. Journal of Animal Science, 75:249-257.

Grandin, T., 2003. Transferring results of behavioral research to industry to improve animal welfare on the farm, ranch and slaughter plant. Applied Animal Behaviour Science, 81: 215-228.

Grandin, T. 2007. Behavioural Principles of Handling Cattle and Other Grazing Animals under Extensive Conditions. In: Livestock Handling and Transport, 3rd Edition, (Ed. T. Grandin), Oxfordshire, CAB International.

Hemsworth, P.H., 2003. Human-animal interactions in livestock production. Applied Animal Behaviour Science, 81: 185-198.

Maier, J. & White, R.G., 1998. Timing and synchrony of activity in caribou. Canadian Journal of Zoology, 76:1999-2009.

Malmfors G. &Wiklund, E., 1996. Pre-slaughter Handling of Reindeer ï Effects on Meat Quality. Meat Science. 43: 257-264.

Nilsson, A., Åhman, B., Norberg, H., Redbo, I. Eloranta, E. & Olsson, K., 2006. Activity and heart rate in semi-domesticated reindeer during adaptation to emergency feeding. Physiology & Behavior, 88: 116-123.

Pekkarinen, A., 2006. Changes in reindeer herding work and their effect on occupational accidents. International Journal of Circumpolar Health, 65(4): 357-364.

Rehbinder, C., 1990. Management stress in reindeer. Rangifer, 3: 267-288.

Rehbinder, C., Edqvist, L.E., Lundström, K. & Villafañe, F., 1982. A Field Study of Management Stress in Reindeer (Rangifer tarandus l). Rangifer, 2(2):2-21.

Rehbinder , C. & Nikander, S., 1999. Ren och rensjukdomar. Lund, Studentlitteratur.

Reimers, E., 1972. Growth in domestic and wild reindeer in Norway. Journal of Wildlife Management, 36(2): 612-619.

Rushen, J., Taylor, A.A. & de Passillé, A.M., 1999. Domestic animalsô fear of humans and its effect on their welfare. Applied Animal Behaviour, 65: 285-303.

Sametinget, 2010. Statistik om rennäringen i Sverige 2008/2009. http://sametinget.se/9238. Used: 2011-05-26.

Siegel, P.B. & Gross, W.B., 2007. General principles of Stress and Well-being. In: Livestock Handling and Transport, 3rd Edition, (Ed. T. Grandin), Oxfordshire, CAB International.

Stookey, J.M. & Watts, J.M., 2007. Low-stress Restraint, Handling and Weaning of Cattle. In: Livestock Handling and Transport, 3rd Edition, (Ed. T. Grandin), Oxfordshire, CAB International.

Veissier, I., Boissy, A., Nowak, R., Orgeur, P., & Poindron, P., 1998. Ontogeny of social awareness in domestic herbivores. Applied Animal Behaviour Science, 57: 233-245.

Waiblinger, S., Boivin, X., Pedersen, V., Tosi, M.V., Janczak, A.M., Visser, E.K. & Jones, R.B., 2006. Assessing the human-animal relationship in farmed species: A critical review, 101: 185-242.

Wiklund, E., Andersson, A., Malmfors, G., Lundström, K. & Danell, Ö., 1995. Ultimate pH values in reindeer meat with particular regard to animal sex and age, muscle and transport distance. Rangifer, 15(2): 47-54.

Wiklund, E. & Malmfors, G., 2004. The effects of pre-slaughter handling on reindeer meat quality ï a review. Animal Breeding Abstracts, 72(1): 1N-6N.

Wiklund, E., Rehbinder, C., Malmfors, G., Hansson, I. & Danielsson-Tham, M.L., 2001. Ultimate pH values and bacteriological conditions of meat and stress metabolites in blod of transported reindeer bulls. Rangifer, 21(1): 3-12.

APPENDIX I

Information om dig /Please enter your information:

Kön / Sex

Ålder / Age

Sameby/ Reindeer herding district

1. Hur aktiv är du inom renskötseln? / How active are you in reindeer herding?

☐ Heltids renskötare/Full time reindeer herdeer

☐ Har ett annat heltidsjobb vid sidan av renskötseln / I have full time work beside reindeer herding

☐ Deltar enbart några enstaka gånger i hanteringen / I pacipitate only a few times in reindeer handling

☐ Äger renar men är inte aktiv/ I own reindeer but do not handle them

2. Vilka hjälpmedel använder du dig av vid drivning och flyttning av renar? /Which aids do you use when herding reindeer?

☐ Skoter / Snowmobile

☐ Motorcykel/Motorcycle

☐ Fyrhjuling/fourwheeler

☐ Helikopter/Helicopter

☐ Paramotor

☐ Hund/Herding dog

☐ Häst/Horse

☐ Annat/Other:

3. Hur fångar du in renar?/How do you catch reindeers?

☐ Lasso

☐ Snara/ Snare

☐ Händerna/Hands

4. Numrera från 1 till 9 vilken hanteringssituation du tycker fungerar bäst, där nummer 1 är den du tycker fungerar bäst och nummer 9 du tycker fungerar sämst/ Number 1-9 which handling situation works best for you, where number one is the one you think works best and number 9 you think works worst.

--- Avlivning, slakt/ Stunning and slaughter

--- Flyttning / Moving reindeer

--- Kalvmärkning/Calf marking

--- Kastrering/Castration

--- Lastning/Loading

--- Renskiljning/Selection

--- Samla, barmark/Gathering bare ground

--- Samla, snö/ Gathering snow

--- Transportering/Transportation

5. Ange hur väl du instämmer med påståendet "Man behöver minska stressen som renarna utsätts för"/Indicate how well you agree with the statement "There is a need to reduce the stress that reindeers are exposed to".

	1	2	3	4	5	6	7	
Insämmer helt/Strongly agree	☐	☐	☐	☐	☐	☐	☐	Instämmer inte alls/Strongly disagree

6. Numrera från 1 till 9 när du tror att renarna är som mest utsatta för stress, där nummer 1 är den hanteringssituation där de är som mest utsatta för stress och numer 9 där de är som minst utsatta för stress/ Number 1-9 which handling situation you think the reindeeers are the most subjected to stress. Number 1 is the handling situation were tey are the most stressed and 9 were they are the least stressed.

--- Avlivning, slakt/ Stunning and slaughter

--- Flyttning/ Moving reindeer

--- Kalvmärkning/ Calfmarking

--- Kastrering/ Castration

--- Lastning/ Loading into lorry

--- Renskiljning/ Reindeerseparation

--- Samlia, barmark/ Gathering, bare ground

--- Samla, snö/ Gathering, snow

--- Transportering/ Transporting

7. Har du tänkt på några av de punkterna som tas upp i LSS informationsbladet/ Have you thought about some of the methods mentioned in the LSS information sheet?

☐ Flyktzon/ Flightzone

☐ Renens synfält/ Reindeer's field of view

☐ Flocksammansättningern (ledare, mitten djur, djuren som går sist)/ Herd Composition (head, middle animals, animals that go last)

☐ Att renarna vänder sig mot en om de pressas för hårt/ Reindeers turn towards you if pressured to mutch

☐ Nej/ No

☐ Annat/ Other:

8. Om du markerat någon av alternativen i fråga 7 använder du denna kunskap vid hantering av renar? / If you marked any of the options in question 7, do you use this knowledge in the handling of reindeer?

☐ Ja / Yes

☐ Nej/ No

☐ Ibland/ Sometimes

☐ Vet inte/ Don't know

9. Tror du att du hade haft nytta av LSS-metoden? /Do you think the LSS-method could benefit you during handling of reindeer?

☐ Ja/ Yes

☐ Nej/ No

☐ Vet inte/ Don’t know

10. Varför/varför inte hade du haft nytta av LSS-metoden?/ Why/Why not would you benefit from using the LSS.method. Öppen & frivillig fråga /Open & voluntary question

APPENDIX II

Vad är Low Stress Stockhandling?

Low Stress Stockhandling (LSS) går ut på att hantera djur på ett sådant sätt att de stressas så lite som möjligt. Det mest grundläggande är att man lägger press på djuren och tar bort pressen när de rör sig dit man vill.

Djur som inte är stressade är friskare och växer snabbare. Djurägare som provat på denna metod har sänkt sina läkemedelskostnader, tiden som krävs för hantering av djuren, antalet personer som hanterar djuren är färre, djuren växer snabbare och producerar mer.

Grundaren till detta koncept, Bud Williams har bl.a. arbetat med renar i Alaska med LSS-metoden. Renar anpassar sig till denna nya hanteringsmetod snabbt, enligt Bud Williams, tar det en dag på sommaren eller 2-3 dagar på vintern (p.g.a. de korta dagarna). Därefter, om hanteringen sker på rätt sätt, så kommer renarna vara lugnare och mindre stressade vid all typ av hantering. Det leder till att insamling och vallning går snabbare och färre personer kan hantera fler djur.

Helikopterförare såväl som renskötare hade kunnat utbildas i denna metod för att på så sätt minska tiden de behöver för att driva renarna vilket är en fördel för både miljön och plånboken. Man har även sett att hjordar håller ihop bättre då de hanteras med denna metod, vilket kan minska arbetsbelastningen för renskötare.

LSS- metoden används på flera djurarter, allt från nötdjur till bison, kameler och renar, i olika delar av världen från stora kött- och mjölkproducenter till hobbyverksamma djurägare.

<u>LSS-metoden bygger på att man tar hänsyn till flockdjurs grundinstinkter så som:</u>

1. Djur rör sig mot den riktningen de står vända mot
2. Boskap kommer att följa andra som rör sig i ett behagligt tempo, de dras till sådan rörelse.
3. Boskap vill se vad som pressar dem, det är därför de kommer att gå runt dig eller vända sig om, svänga, om du driver dem bakifrån.
4. Flockdjur vill komma undan stressen de utsätts för.

<u>Detta är grundprinciperna i LSS-metoden:</u>

1. Alla flykt/flockdjur har en flyktzon (se bild 1), där de inte är bekväma att människor befinner sig i. Om du befinner dig i den zonen så kommer de att flytta på sig, befinner du dig utanför kommer de inte flytta på sig. När du arbetar med djuren ska du röra dig in och ut ur denna zon för att få önskad respons. Du pressar djuren genom att gå in i deras flyktzon.

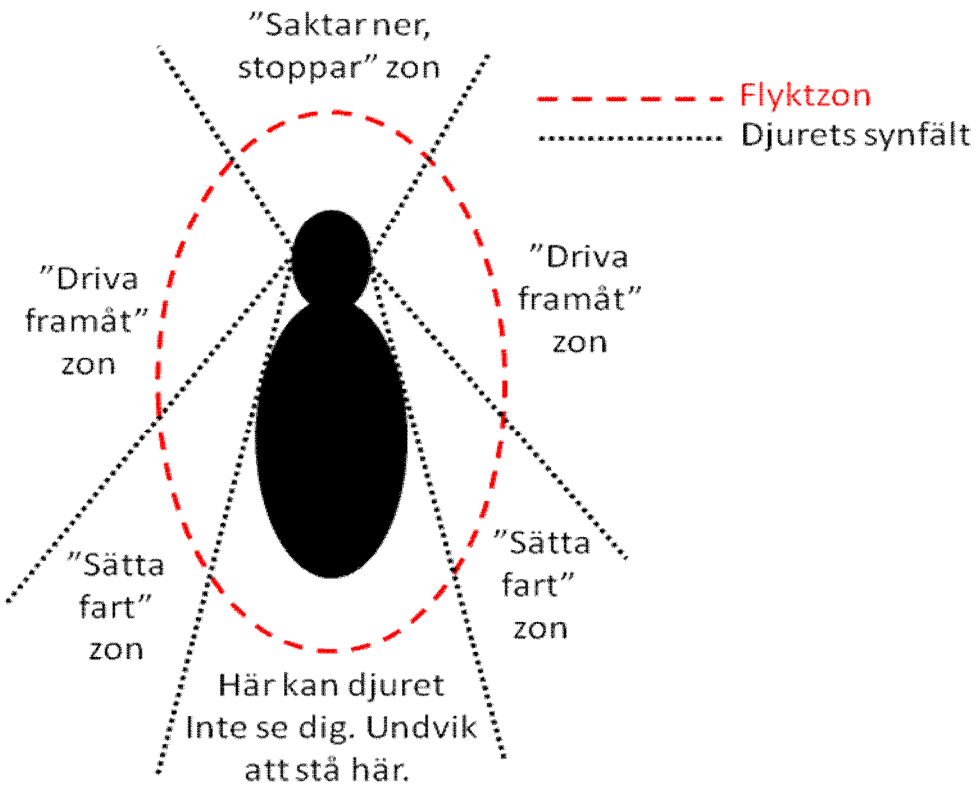

Bild 1: Renens flyktzon och synfält indelat i fyra olika delar.

2. Var du befinner dig och hur du rör dig leder till olika beteenden från djuren. Genom kroppsspråk säger du till djuren vad du vill att de ska göra.
3. Din position gentemot djuret avgör dess respons. När du vallar dem ska du alltid kunna se åtminstone ett av djurets öga, ser du inte det, betyder det att djuret inte ser dig. Ser inte djuret dig kommer det att gå runt dig eller vända sig om. Gå i linje i zick-zack sidledes så att alla djuren i flocken ser dig även de som går längst fram (*Se videon i slutet av artikeln för att få en bättre bild av hur hanteringen och zick-zack rörelsen går till: http://www.atl.nu/Article.jsp?article=63547&a=B%C3%A4ttre%20k%C3%B6tt%20och%20mindre%20stress*).
4. När man sätter press på djuren ska man sluta pressa dem när de gör som man vill.
5. Om djuren inte växelvis befrias från pressen under drivning kommer de att vända på sig och komma mot det som pressar dem istället.
6. Varje flock har dess ledare. Om man pressar djuren så att de måste trängas eller skrämmer igång djuren till rörelse så blandas flockens ordning och det blir svårare att hantera dem(se bild 2).

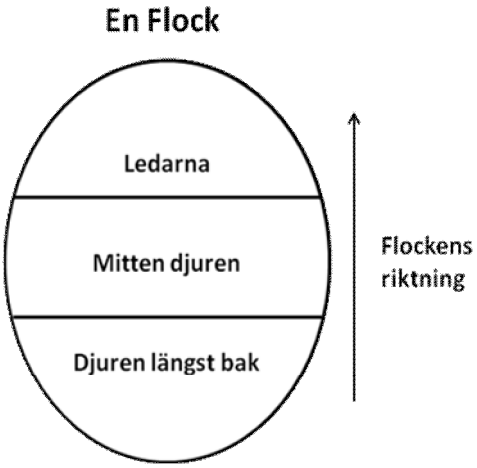

Bild 2:Varje flock har sin ordning, för att djuren ska kunna hanteras lätt bör denna ordning bevaras under hanteringen.