February 26, 2012

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SUBJECT: Assessment of Stress during Gathering, Handling, and Transport of Wild Horses

INTRODUCTION

At the request of Dave and Sue Cattoor: Cattoor Livestock Roundup, Inc., Nephi, Utah,

we were invited to observe handling and evaluate horse welfare during a roundup of wild

horses on February 18, 2012 at the BLM Onaqui Herd Management Area, approximately 50

miles south-west of Tooele, Utah. Due to scheduling difficulties, I was unable to attend the

gather and asked my assistant, Mark Deesing to travel to Utah and observe and record all

aspects of handling during the roundup. Mark is qualified to access welfare of livestock during

handling. He has worked for me as a facility designer, animal behavior consultant and expert

on humane handling of livestock, wildlife, and captive wildlife species since 1993.

Mark is also an expert horseman with experience as a farrier and trainer.

Below is a summary of Mark's observations and recommendations, reviewed

and

approved by me on Sunday, February 26, 2012. I also had the opportunity to view the many

photographs and video Mark took during his visit.

<u>TRAP & CAPTURE PENS</u>

February 18, 2012

5:00am, Tooele, Utah

A trap site was selected by the Cattoors before the gather by flying the area in a helicopter. The site was chosen carefully using several criteria; it was close to the area where the horses were found, close to a natural route the horses travel, and it took advantage of the natural terrain. In my opinion, the trap site at Onaqui was ideal. The wings of the trap were constructed in a large V-shape using a burlap mesh cloth attached to T-posts. The catch pens were assembled at the point of the wing funnel. One side of the wing ended at a natural rock outcrop, the opposite side flared outward for approximately 250 yards, creating the V-shaped funnel. The most important feature of this trap site selection was the up-hill direction horses were travelling through the funnel into the capture pens. The trap pens were located just over the top of the hill. Horses entering the trap were unable to see the pens, vehicles, and people stationed near the pens. The up-hill direction of travel also

served to slow the animals down before they reached the trap pens. The two trap pens were

approximately 30 ft. X 30 ft., attached to an alley leading to a stock trailer, or the auxiliary

pen set up for holding foals (see diagram).

Because it is difficult for the pilot to control the exact number of horses entering the

trap at one time, making two capture pens is important to prevent overcrowding

which can lead to injury. The catch pens, the sort pen and alley fences had a type of shade

cloth that was not completely solid. The calming effect of solid, or partially sided

fences in handling systems is probably due to a combination of factors, such as

blocking the view to an escape route and preventing the animals from seeing people,

movement of vehicles and other distractions (Grandin, 2000). Not all capture sites are as well

suited as the site chosen at Onaqui. The up-hill direction of travel into the wings of the trap,

and the pen location out of the view of the horses was very important. Although not every

site for a gather can be set up in such ideal conditions, we recommend that these criteria

should be considered in selecting future trap sites.

HELICOPTER GATHERING AND TRAPING

On the morning of the gather, the crew and I met for breakfast in Tooele, Utah. From

there we drove the approximate 60 miles to the trap site. After the trap was assembled, the

crew on the ground directed the helicopter pilot to bring up the first group of horses. I

positioned myself on the top of a hill and watched using high powered binoculars. I had a

clear and unobstructed view of the helicopter and the horses. I was also in position to see the

horses orient as the helicopter began to approach.

Horses have panoramic vision which enables them to move together in a herd and constantly scan the surroundings for predators or other dangers. When startled, their eyes and ears will quickly orient in the direction of any novel sight or sound. Orienting responses are accompanied by an internal state of nervous system arousal (Boissey, 1995, Rogan & LeDoux, 1996, Grandin & Deesing, 1998), and alert the animal to possible danger. When the helicopter approached the first group of approximately 20, the horses first oriented, and then took flight. The flight zone is a well known and understood principle in animal behavior.

The flight zone is the distance within which a person (or helicopter) can approach an animal before it moves away. Herd animals usually turn and face a potential threat when it is outside their flight zone, but when it enters the flight zone the animal turns and moves away (Grandin & Deesing, 1998). Genetic factors influence individual flight sizes between animals of the same species or breed. For example, in a large group of animals with similar genetics and previous handling experiences, most members of the group will have similar flight distances, but a few individuals will have either a very small or very large flight zone. Flight zone size is also strongly affected by experience and learning. An animal that survives a close call with danger learns to be more wary of similar dangers in the future and increases its flight zone size accordingly.

From my position on the hill, I watched as the helicopter pilot expertly used flight

zone principles to move the horses toward the trap. The pilot first moved into the collective flight zone of the herd moving in a direction toward the trap. The horses started out running fast but then slowed in response to the pilot moving back to the edge of the flight zone. To move a single animal, or to control the movements of a large herd is done by alternately entering and withdrawing from the edge of the herd's collective flight zone. Moving a herd to the right is done by moving to the left side of the collective flight zone. Moving a herd to the left is done by moving to the right side of the collective flight zone, and slowing or stopping movement is done by moving to the front of the flight zone in the direction of travel. The pilot was able to herd the horses to the trap at alternating speeds between fast trotting and fast and slow galloping.

On an interesting note, the path of the first group of horses intersected with a Pronghorn Antelope. The antelope joined the horse herd and ran along almost up to the trap.

Small and flighty herd animals such as deer and antelope have larger flight zones than domestic herding animals, including those of feral horses (Grandin, 1989). Given the fact that the top speed for Pronghorn antelope is far faster than a horse (61 mph vs 45 mph), the Pronghorn could have left the horses behind if its flight zone was being too deeply encroached on. This is testament to the expertise of the pilot.

I did not see any sign of panic in the horses moving toward or into the trap. Panic is characterized by wild running in an erratic manner with many changes in direction. The horse herd strung out in a line with the fastest first, or those individuals with the largest flight

zones, and the slower with smaller flight zones at the rear. Also in the rear was one small

foal that never lost sight of its mother. The foal was clearly having trouble keeping up, but

was not left behind or abandoned.

As the horses got close to the trap, they could see a few vehicles and a number of

people on the hill above the trap. They attempted to change direction a few times to avoid

going into the trap, causing the pilot to move closer into the animals flight zone. The pilot

flew the helicopter to the left and right and forwards the closer the horses came to the point

of the trap. Deep encroachment of the flight zone at the point of the trap wings was

necessary by the pilot to keep the horses from turning back from the trap. The capture crew

also helped with this critical point of the capture by releasing a tamed horse, called a "Judas

horse," which has been trained to lead wild horses into a pen or corral. Once the horses were

herded into an area near the holding pen, the Judas horse is released. Its job is then to

move to the head of the herd and lead them into a confined area. Two of the capture crew

were concealed at the point of the trap funnel and quickly closed the gate of the first catch

pen.

<u>WEATHER CONDITIONS & TEMPERATURE</u>

On the day of the gather I attended at Onaqui HMA, the low temperature in Tooele,

Utah was 23F, and the high was 41F. The skies were clear and sunny with light wind. In a

report from the Humane Society of the United States (HSUS) to the Bureau of Land

Management (July 13, 2011), the HSUS recommended that BLM refrain from conducting

helicopter drive trapping gathers in temperatures above 90F and below 32F. It is

the opinion of Dr. Temple Grandin and myself that gathers in temperatures at or above 90F

should always be avoided, and the low temperature should be adjusted to 20F.

The thermo neutral zone (TNZ) for horses is defined as the range of temperatures in

which the horse maintains its body temperature with little or no energy expenditure.

Essentially, the TNZ is the temperature range wherein the horse does not have to work to

raise or lower its body temperature (Kentucky Equine Research Staff, 2011). The TNZ for a

given horse is influenced by the temperatures to which the horse has been accustomed. Full

acclimatization takes about 21 days, but horses usually adapt to temperatures in 10-14 days.

The wide range of the lower critical temperature (LCT) in adult horses extends from 41° F (5°

C) for horses in mild climates to 5° F (-15° C) in natural-coated/unclipped horses adapted to

very cold temperatures. Young horses and foals have higher LCT than adult horses.

Although the 20F or above recommended by us is above the TMZ for horses adapted

to cold temperatures, and is well within the temperatures at Onaqui HMA on February

18, 2012, temperatures at or below 20F are too cold for people and equipment to function

properly and safely.

DETERMINATION OF STRESS LEVELS

A precise determination of stress levels is impossible without direct physiological

measures; ie, heart rate, respiration rate, and stress hormone levels in the blood. In

the

absence of physiological measures, behavioral observations are a good substitute. There are

two types of stress during helicopter gather and capture. The first is physical stress from

exertion caused by running distance. The second is psychological stress (fear stress),

moderated by the anti-predator response. Behavioral assessment of physical stress can be

predicted by animals slowing way down, showing less attention to the pressure of

the helicopter, stumbling, falling behind, or collapsing. Psychological (fear) stress is more

difficult to access through behavioral observation. Emotional states (how scared were the

horses?) is subjective and difficult to quantify. All the same, behavioral observations can be

helpful. I did not observe any wild running (panic), or self-destructive behavior during this

gather. None of the horses ran off a cliff, or failed to detour away from hazardous ground

conditions, or froze in response to the helicopter deep in their flight zone.

In order to simplify my summary of the stress response of these animals during the

gather and catch process, imagine stress levels like the level of mercury rising in a

thermometer. For hypothetical purposes, imagine the mercury low on the thermometer

while the horses were resting or grazing. This represents the low level of stress motivated

vigilance required in this species to always be on the alert to potential danger, at rest or

while grazing. At the detection by sight or sound of the helicopter, and during the orienting

response, the mercury on the horses stress thermometer begins to rise. The short term stress

hormone Cortisol is released from the adrenal glands to fuel the muscles for the flight response and all the senses go on high alert. The short term stress response is variable between individuals within the herd. Genetic factors influencing such things as nervous system reactivity, and temperament, and the complex interaction of these factors combined with the effects of environment, upbringing, and learning account for the differences in degrees during the orienting response (Grandin & Deesing, 1998). Behavioral Genetics is a complex subject. Some of the horses may have been captured before and hearing the sound of the helicopter caused the mercury on the thermometer to rise before the helicopter comes into view. For others, the rise in temperature at the first sight and sound of the helicopter was novel and caused a rise in temperature similar to other novel threats.

At the onset of the orienting response and the anti-predator flight response, the mercury rises on the thermometer to moderately high , maybe higher in some individuals.

The initial threat of the helicopter represents the greatest threat. Predators first stalk and then attack. It is during the initial attack stage that prey animals feel most threatened and are under high levels of psychological stress.

During the run, depending on such factors as ambient temperature, the terrain, the physical shape of the horses, distance to run, previous experience, and temperamental factors, all play a role in the amount of experience required by pilots to complete a gather without causing unacceptable levels of both physiological and psychological stress.

In my opinion, the horses experienced a high rise in stress at the beginning of the run, but

after the initial rush, the horses began to settle into a feeling of not being attacked, to one of

being chased, and stress levels lowered. When the pilot needed to turn the herd and

flew into and out of the flight zone may have caused the collective stress levels in the

herd to rise and fall. Even so, at no time during the run to the trap did I observe what I would

consider critically high stress levels. From my vantage point, I saw no wild running, no self-

destructive behavior, no falling, and no injuries. Overall, I considered the capture process as

moderately stressful in the majority of horses and very stressful in the rest. Well done!

<u>HANDLING AT THE CATCH PENS</u>

At the point of the trap wings, the capture crew rushed to close the gates on the catch

pens while the pilot was encroaching deeply in the flight zone of the herd preventing

them from turning back. Some people call this a stampede. I call it controlled movement

under difficult conditions. Stress levels were elevated from the resting rate during the run to

the trap and up to the point of closing the gates to the pens, but not yet near dangerous

levels. Even though the horses entered the capture pen wet tired, I was surprised at how

quickly they began to settle down.

At the point of capture, the stress of the gather is complicated by the stress of confinement. Confinement in a species used to having space is stressful, in addition to the stress which can be caused by crowding too many animals in too small a space. This is social stress. Horses are a social animal in tuned to the social nuances of the individuals within their band group. Research with cattle and other livestock species show that social stressors such as isolation and over-crowding are as stressful to

animals as restraint (Grandin, 1997). Crowding different bands can also raise stress levels. For the stallions, the stress level may rise even higher than mares and yearlings. The stallions have an instinctual duty to protect their band.

All these factors determine the attention required in the design and layout of the capture pens. Since there are no industry standards outlined for the size and square footage for horses held in short term holding pens, estimating the pen size for horses can be based on the industry standards for short term holding of cattle, adjusted for horses . The industry standard for short term holding of cattle is 20 sq. ft. per animal. I estimate the square footage required for holding horses for short term following capture at 60 sq. ft. per animal. I consider this overestimating on the side of caution. A 900 sq.ft. pen holding 45 head of cattle allows enough room for all the cattle to lay down if they want, and provides enough room for handlers to safely enter the pen to move the cattle out. A 900 sq. ft. pen holding no more than 20 horses is enough to prevent over-crowding and allow the horses to move around enough to avoid fighting. The third pen can be smaller in size to hold young colts and fillies. Overcrowding must be prevented to reduce social stress, and especially to prevent injury to the foal's and young horses. Mixed bands don't get along. The defensive fighting I observed is a result of the social stress caused by mixing bands.

The Cattoor Livestock Roundup crew knew by experience the importance of not overcrowding the horses. The largest number of horses I observed herded into the catch pens was no more than 20 horses. The number was small enough to keep small bands

together,

but not too many to mix several bands together. I was surprised and impressed. The second

catch pen was almost immediately used by the capture crew to sort any overtly aggressive

animals away from the rest of the group. Reducing the potential risk of injury is paramount

to insure humane handing.

From the second catch pen, horses were moved forward into a 8 ft. wide sort alley by

handlers outside the fence shaking sticks with a plastic bag taped to the end. At the

entrance to the 8 ft. wide alley, a sort gate was situated to direct any young colts or

fillies into a pen to avoid the threat of injury in a crowded pen, and to be held

separately and subsequently loaded into a separate compartment of the stock trailer.

When the horses first arrived at the catch pens they were wet with sweat and

breathing hard. All the same, I was surprised at how quickly they settled down and most

were almost dry before they were loaded on trailers.

REMOVING DISTRACTIONS

Removing distractions means making sure any non-essential people and equipment

are moved away from the trap site. We understand the public right to observe the trap and

capture process, but proximity of the public viewing area may at times have an effect on the

willingness of horses to enter the area.

To insure humane handling, trap sites must be free of unnecessary distractions.

TRAILER LOADING FROM THE CATCH PENS

The Cattoor crew prefers to build the trap and temporary holding facility at the same

location. However, at the Onoqui Herd Management Area this was not possible due to wet ground conditions. This prevented them from trucking equipment and portable fence panels to the site. The temporary holding pens were therefore assembled at a site approximately 10 miles away. The horses were loaded into stock trailers and transported to the holding pens, or transported about 1 mile away and transferred from the stock trailers onto a semi-truck trailer then transported to the holding pens.

At a gather I observed several years ago in Wyoming, loading the horses on trailers was one of the most stressful procedure I observed. The Cattoor Livestock gather crew had a clever yet simple solution to this problem. A trench approximately 1 foot deep was dug in the ground for the wheels on both sides of the trailer to back into. This lowered the back of the trailer to just inches off the ground. Even though ruminant animals have depth perception, their ability to perceive depth at ground level while moving with their heads up is probably poor. Grandin (1989), suggests that there may be an extensive blind area at ground level and moving livestock may not be able to use motion parallax or retinal disparity cues to perceive depth. To see depth on the ground, the animal would have to stop and lower its head. This may explain why livestock often lower their heads and stop to look at strange things on the ground. Cattle, pigs, sheep and horses will often balk and refuse to walk over a drain grate, hose, puddle, shadow or change in flooring surface or texture (Grandin, 1989). The Cattoor Roundup crew also used specially built stock trailers with pipe rails rather than solid sides common in most stock trailer. The open sided trailers appeared less confining to the horses and worked real well.

At one point during the loading procedure, a trailer was backed into position at the end of the sort alley and the rear gate was opened. Before the handlers even had a chance to move behind the horses, a group of six or seven horses loaded on the trailer by themselves.

When I showed the video I recorded of this to Temple Grandin she was amazed at how quietly and easily the horses entered the trailer. At the Wyoming gather site I visited several years ago, almost every horse balked at the step up into the trailers.

"As with most wild animals, any effort to capture, handle, restrain, and transport wild horses, no matter how carefully planned and executed, will inevitability cause a certain amount of stress and discomfort for the animals involved, and under some circumstances, cause injuries, illnesses, and deaths" (HSUS report to the BLM, 2011). I agree with this statement in the report by the Humane Society. All the same, the level of stress in the horses gathered at Oniqua HMA did not exceed the stress levels I have observed by other livestock species during handling or restraint. Some individual horses experienced higher stress levels than others, but the percentage of highly agitated horses was less than 10% overall. There were no life threatening injuries observed during the gathering and entry into the catch pens, only bite wounds and minor skin lesions caused during close confinement in the trap pens. The Cattoor Livestock Roundup, Inc., did an excellent job handling during the trap and capture process.

HANDLING THE TEMPORARY HOLDING PENS

One hundred and fifty-five (155) horses were gathered at the Oniqua HMA. I observed approximately half of this number trapped and loaded on trailers. At that time, I drove from the trap to the temporary holding pens to observe these horses as they arrived and were sorted. The temporary holding pens were assembled to include a restraint box, single file alley leading to the restraint box, a 6-way sorting gate system, 6 sorting pens, and unloading/loading areas for stock trailers and semi-trucks. The horses were unloaded at the holding pens from either the stock trailer or semi truck into a central alley containing a single file chute and a restraint box.

The horses were moved into single file 3 or 4 at a time. When more than this number were crowded into single file they were more likely to become frantic. It is important to instruct handlers to not overcrowd horses in pens or handling areas. About 5 to 10 percent would rear, back up, kick, charge forward, or freeze. This was caused when handlers entered deep into their flight zone. Approximately 10 to 20 percent were completely calm and moved through the single file chute into restraint with no fear reactions observed. The remaining horses had reactions intermediate between the two extremes. It is important to train handlers to move back from a horse's flight zone when it starts to get agitated in a chute.

The Cattoor Roundup crew was very experienced handling horses at the holding pens. Two people were positioned at the restraint box, and one person moving horses through the single file chute. No electric cattle prods were used. There was no yelling,

and

handler movements were slow and deliberate. The only driving aids used were flag sticks

waved behind the horses to move them forward. In the restraint box, the horses were aged,

sexed and sorted into similar groups. This was a capture and release operation. Mares were

treated the next day with an immunocontraception vaccine intended to reduce population

growth rates, then released.

The previous experience of an animal will affect how it will react to handling

(Grandin,1989). The idea of training an animal to voluntarily accept restraint is a new concept

to some people. Animals that are handled gently can be trained to voluntarily accept

restraint in a comfortable device (Grandin, 2000). It is very important that an animal's first

experience with a new person, corral, or vehicle is a good one. If an animal's first experience

with something new is bad the animal may develop a permanent fear memory. Animals are

very specific in how they perceive events around them. Since animals do not have

language, these memories will be in the form of pictures, sounds, or smells. Animals can

instantly recognize the voice of a familiar trusted person. They may also become frightened

when they hear the voice of a person who abused them. They also make associations such as

people in blue coveralls are "safe" and people in white lab coats do painful procedures.

A person that an animal associates with a painful or frightening experience may have

difficulty training or working with the animal. The animal may be easier to train if a new

person works with it. With this in mind, the importance of reducing stress during the

first

gathering experience will affect the behavior horses during any subsequent gathers, or

during handling Reducing stress during the trap and capture process is very important. Stress

is cumulative. If horses are highly stressed during the trap and capture process, this will raise

the level of stress experienced during loading, transport, and subsequent handling at the

temporary pens. at the long term holding facilities, and the behavior of the horses following

adoption.

CONCLUSIONS & RECOMMENDATIONS

Throughout the entire process, trap and capture, sorting, loading, un-loading, and

handling at the temporary pens was conducted by the Cattoor Livestock Roundup crew with

patience, a genuine care for the welfare of the horses, and professionalism. I did not observe

any aspect of the gather I found unacceptable from an animal welfare standpoint, or any

practices or procedures I would consider inhumane.

The high standard of care demonstrated by the Cattoor crew can be assured by

documenting and recording all procedures during a roundup; horse numbers, ecology, horse

gather history, age, sex, foal age, health, existing injuries, injuries sustained during the

gather, transport assessments, death losses, road conditions, and weather conditions. People

manage better what they measure. Video monitoring of animal operations is a good way to

ensure humane handling is taking place on a daily basis. Video cameras mounted in

helicopters and in the capture and holding pens can also render the activists videos as simply

nothing more than proof that your business "walks the walk" when it comes to upholding

animal welfare standards.

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Temple Grandin **Mark Deesing**

REFERENCES AND ADDITIONAL READING

Grandin, T. (2000) Behavioral Principles of Handling Cattle and Other Grazing Animals Under Extensive Conditions. In: *Livestock Handling and Transport* (CABI Publishing)

Biossy, A. (1995) Fear and Fearfulness in Animals. *Quarterly Review of Biology* 70, 165-191

Rogan, M.T., and LeDoux, J.E. (1996) Emotion:Systems, cells, and synaptic plasticity. *Cell* (Cambridge, Mass.) 85, 369-475

Grandin, T., and Deesing, M.J. (1998) Genetics and Behavior during Handling, Restraint, and Herding. In: *Genetics and the Behavior of Domestic Animals* (Academic Press)

Grandin, T. (1989) Behavioral Principles of Livestock Handling. (Professional Animal Scientist)

Hazard, H., Boyles, S.L., and Hopkins, H. (2011) Recommendations on the Bureau of Land Management's Standard Operating Procedures for Wild Horse and Burro Gather Operations.

A Report to the Bureau of Land Management-Wild Horse and Burro Program
The Humane Society of the United States

Kentucky Equine Research (February 25, 2011. *Nutrition and Health Daily*. Lower Critical Temperatures for Horses.

Heird, J.C., and Deesing, M.J. (1998) Genetic Effects of Horse Behavior. In: *Genetics and the Behavior of Domestic Animals* (Academic Press)

Grandin, T. (1997) Assessment of Stress During Handling and Transport. *Journal of Animal Science*, volume 75, 249-257