SECOND EDITION

Veterinary Techniques in Llamas and Alpacas

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WILEY Blackwell

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Preface

Traditional farm animal species are routinely included in veterinary curricula, have immense volumes of published information, and most large animal veterinarians and veterinary technicians possess experience and a general understanding of procedures to be performed on these species. This wealth of resources greatly outweighs that available regarding South American camelids for most veterinarians. South American camelids are increasingly ingrained in modern veterinary culture, but this experience is relatively new—measured in decades versus centuries for that of traditional species. Early on, medical and surgical care was directed toward specialty clinics and veterinarians with special interest. This was largely due to the extreme monetary value of animals and veterinarians' apprehension to treat animals in which they have little to no experience. Also, many practitioners have limited direct practice experience with llamas and alpacas. Many methods for common procedures as well as specialized investigative procedures have been developed through trial and error. The general acceptance of South American camelids as a common component of mixed animal veterinary practice has led to veterinarians finding themselves performing examinations, diagnostic testing, and medical and surgical procedures on llamas and alpacas. Comfort working with the species has grown as graduating veterinarians receive more formal training and experience during their education.

We receive and address many calls from the field and from other academic institutions on how to perform varying procedures. Our goal with this text is to synthesize our combined experience with procedures from routine maintenance to advanced procedures into a single, organized, concise, visually descriptive volume for veterinary reference. This manual is intended to serve as a reference and patient-side guide for veterinarians and veterinary technicians to facilitate performance of these procedures. We gratefully acknowledge the input of our fellow veterinary practitioners who have contributed to the advancement of knowledge about these species and to increasing the standard of care provided to llamas and alpacas.

Section I

Behavior and Capture Techniques

1

Behavior and Capture Techniques

David E. Anderson

Behavior

Llamas and alpacas are intensely herd oriented. Each group of animals has a distinct social structure including a command hierarchy. Interestingly, group hierarchy often changes when the makeup of the group is altered. When herds are moved to a different location, a member of the group is removed, or members of different groups in different pastures are mixed, a period of reorganization occurs.

These dynamics are important when llamas and alpacas are maintained in involuntary groupings based on management decisions (e.g., breeding groups, weaning groups, etc.). Involuntary grouping refers to the fact that small groups are assembled by humans for the purpose of management structure, pasture availability, or other matters of convenience or necessity relative to the working of the farm. Thus, the llamas and alpacas are forced to create stable groups that may not be ideal and, in rare cases, are incompatible. The likelihood of establishing an integrated and stable group can be reduced by limited space. High stocking density creates social stress that is often not perceptible to farm personnel or veterinarians. When regulations are developed for minimum space needs for various species of animals, these guidelines most commonly refer to critical self-care needs to lay down, stand up, turn around, eat, drink, etc. With llamas and alpacas, we have found that these animals seem to have a need for "psychological space." Thus, when herd groups are assembled, space requirements should take into account the need for llamas and alpacas to have the freedom to lay down, eat, move, and so on without disruption of this individual space.

Any assessment of llama and alpaca herds should include an analysis of the herd structure, group compatibility, and space limitations. Occasionally, llamas and alpacas that are losing weight, suffering early embryonic losses, or failing to produce hair or fleece optimally are manifesting these problems as a reflection of herd stress or social stress. This may be present in a herd as a whole or with specific individuals. For example, a herd of 200 alpacas was examined because of a history of weight loss and sudden death. Diagnostic testing suggested deaths were associated with *Clostridium perfringens* Type A overgrowth in the small intestine. Upon inspection of the herd, the 200 alpacas were found to be residing in a rectangular barn of 80 feet by 60 feet square and a 10-acre pasture, and were being fed a daily ration of hay and commercial pelleted supplement. The hay was of good quality (TDN 55%; crude protein 16%) and the grain supplement was appropriate for alpacas and included trace minerals. Observation of hay and supplement feeding revealed that, hay

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was fed based on expected intake with the desire to minimize waste in a feeding trough 60 feet long. The hierarchy of the herd created a dynamic of limited feed access for subordinate members of the herd. Feeding space was inadequate (desired bunk space >18 inches per alpaca; actual bunk space <6 inches per alpaca). Thus, the dominant members of the herd consumed a diet in excess of nutritional requirements, the middle hierarchy alpacas consumed an adequate diet, and the subordinate members of the herd received inadequate nutrition. This problem was resolved by segregating the herd into groups based on body condition score and changing feeding practices such as provision of unlimited grass hay. This achieved the goal of grouping the alpacas based on social compatibility and also matched feeding sources and feeding space to stocking needs more appropriately.

An example of an individual problem occurred in an alpaca herd of 140 alpacas segregated into groups of 20 to 30 alpacas on 5-acre pastures. One alpaca was noted to be progressively losing weight and had a body condition score of 2 out of 10 (1 = emaciated; 10 = obese). Diagnostic investigation revealed evidence of chronic malnutrition despite ample pasture, hay, and a grain-based supplement. Observation of the group dynamics revealed that the alpaca was not integrated with the group and was a "social outcast." The alpaca remained in the areas of the pasture distant from the barn and without interaction with the other alpacas. Thus, the alpaca suffered relative malnutrition because of social limitation rather than because of inadequacy of management or diet. This situation was resolved by removing the female from the pasture and comingling her with other subordinates until a social group could be established.

Capture Techniques

Both herd and individual behaviors should be used to assist veterinary interactions with llamas and alpacas. When performing group activities such as annual vaccination and deworming, these procedures can be easily and readily performed in small groups of animals. Small group settings (e.g., < 10 alpacas; < 5 llamas) lessen the stress of individual handling and may help to prevent stress-induced problems such as peracute ulcers, abortion, and premature births. Ideally, the farm facilities should be used to create a series of enclosures such as pens or corrals so that the entire group or herd can be captured in total, and then smaller groups separated off for procedures and interactions.

When there is a need to capture a single animal within a herd group, the entire group should be captured before attempting to single out the individual. For example, a group of 12 alpacas can be gathered from the pasture into a large pen. A subset of 4 alpacas containing the desired alpaca is separated away from the larger group, then the single alpaca captured, haltered, and taken to the working area. When females have a cria at their side, the cria should be taken to the working area as well. Ideally, the cria would be contained within a small pen adjacent to the female and in full view. This prevents the cria from "wandering off" during the exam resulting in the dam becoming agitated.

Alpacas and llamas have similar "flight zones" as cattle and small ruminants. Cattle, sheep, and goats have different behavioral responses to people. Goats tend to be interactive with people; sheep often respond with fear and run away from humans; cattle tend to be calmer than sheep but less interactive than goats with regard to human interaction. Llamas are most similar to dairy cattle and goats. Llamas are inquisitive but stoic. Human interaction most often is readily achieved, and llamas are less likely to react with sudden or violent maneuvers. Llamas are typically halter trained and can be led easily. This training makes group handling less important for brief activities in llamas. Alpacas are more similar to beef cattle and sheep. Alpacas accept human interaction to a point but will flee if a perceived threat is present. Alpacas are best

worked in groups and using pens or stalls to achieve a close confinement area for whatever activity is needed.

When groups of llamas or alpacas need to be brought in from an open pasture, people doing the herding should use behavioral traits and barriers, such as fence lines, to facilitate driving the group into a containment area. The "flight zone" for llamas and alpacas allows for a single person to drive a herd into an enclosure by maintaining a position relative to the point of the shoulder. By stepping in front of the point of the shoulder, the llamas or alpacas are expected to move away and backward. When the person is behind the animal and distant from them, no movement is expected. The animals can be driven forward when movement toward the animal is done from a position well behind the point of the shoulder. The closer the handler is to the animal the more likely the llamas or alpacas are to turn away from the drivers. The further away the driver is, the more likely the animals are to maintain forward progress. Fence lines are useful to limit side-to-side and sudden reverse movements. If the group is uncooperative or resistant to being driven into the working area, a rope may be used to create a moving barrier or fence line (Figure 1.1). The rope can be anchored to a stationary post at the entryway to the containment area and then a single driver can close this rope around the group to create an ever-decreasing space until the animals move into the capture pen (Figure 1.2). Rope barriers are also useful in open pasture areas if at least two drivers are present. These two people can suspend the rope between them in order create a long barrier to make herding easier until the group is within the capture pen. The rope barrier limits any sudden reversal, or escape movements, by expanding the driving zone and moving the handlers further away from the animals and their pivot point. However, overly aggressive movements, progressing too close to the animals, or making threatening gestures will cause the herd to seek and escape from the situation. In this instance, the herd may charge and break through the barrier. Once the group is in a smaller containment area, each animal can be captured and haltered if needed.

Although many llamas and alpacas are trained to be handled and haltered, uncooperative individuals can easily be captured in a small catch pen (Figure 1.3). The camelid is positioned against a solid barrier or toward a corner of the enclosure and approached from the neutral point of the shoulder. Then the lead rope is swung over the back at the base of

Figure 1.1 A long rope can be used as a movable barrier to herd llamas and alpacas into a containment area.

Figure 1.2 The long rope used as a mobile barrier can be suspended between two people or may be attached to a stationary object and used to gradually reduce the area of containment.

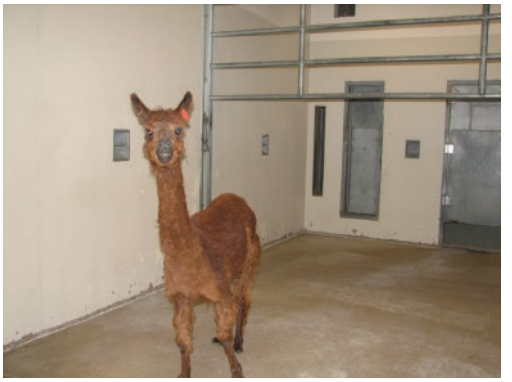

Figure 1.3 Uncooperative patients, such as this alpaca, are most easily captured by initial containment in a stall or pen.

Figure 1.4 A length or rope, such as a lead rope, may be draped across the back while standing behind the point of the shoulder.

the neck (Figure 1.4). Then, the handler slowly walks around the front of the camelid to the neutral point of the opposite shoulder until the animal turns away. The free end of the lead rope is grasped and the rope held firmly to restrain the animal's movement (Figure 1.5). The handler then moves toward the side of the neck closest to the shoulder and wraps the arms around the neck and firmly grasps the neck for restraint (Figure 1.6). A halter is placed on the head (Figure 1.7) and positioned so that the cross strap of the halter is maintained on the bony bridge of the nose (Figure 1.8).

This is important because the rostral end of the nose is cartilaginous and easily collapses

Figure 1.5 After placement of the rope across the shoulders, the handler walks in front of the animal toward the opposite shoulder. This movement encourages the patient to pivot away and expose the free end of the rope. The free end is grasped and the newly formed loop used to control the position of the alpaca.

Figure 1.6 The length of rope is shortened until the handler's arms can be encircled around the base of the neck. Then the arms are moved forward along the neck until positioned behind the head.

Figure 1.7 An alpaca halter is fitted over the nose by first approaching the head with the halter below the jawline.

under pressure, which can obstruct breathing (Figure 1.9). Llamas and alpacas that are halter trained are most often accustomed to being held and lead from the left hand side of the animal (Figure 1.10).

Figure 1.8 The size of the halter is assessed to ensure proper fitting. The nose bridge of the halter should cross immediately in front of the eyes in such a way that the halter is entirely positioned on the bony bridge of the nose.

Figure 1.9 Improperly placed halters can obstruct breathing by compressing the cartilaginous bridge of the nose.

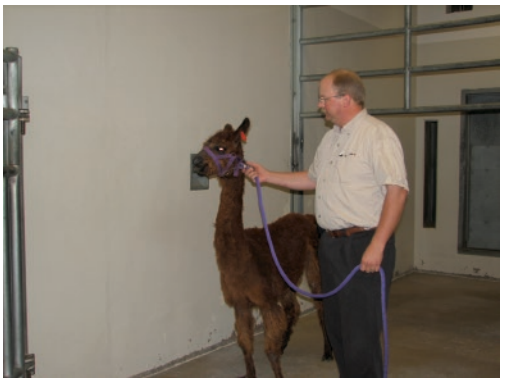

Figure 1.10 Once a halter has been properly fitted, the lead rope should be attached to the halter. Llamas and alpacas are typically led from the left-hand side.

Section II

Physical Restraint and Injection Sites

2

Haltering

Meredyth L. Jones

Purpose or Indication for Procedure

This procedure provides sufficient restraint for physical examination, injection, blood collection, nasal swabbing, and other minor procedures.

Equipment Needed

Alpaca and llama halters (Figure 2.1) are commercially available in various sizes to allow proper fitting and should be used with a lead rope. Additionally, sheep or goat halters and even cattle rope halters (Figure 2.2) may be used if properly adjusted.

Restraint/Position

Standing, sternal recumbency (cushed), or laterally recumbent positions may be used.

Technical Description of Procedure/Method

The handler should place one arm around the animal's neck and gently slide the halter over the bridge of the nose, with the strap placed behind the ears and secured. All types of halters should be checked for proper fit. On a properly fitting halter, the portion over the bridge of the nose should ride over the caudal one-third of the bridge (Figure 2.1). The rostral one-third to one-half of the bridge of the nose is comprised of soft cartilage and is easily compressed by ill-fitting halters. Ill-fit results in occlusion the nasal passages, especially when the animal is resisting leading and is pulling back on the halter. Camelids are nasal breathers and will panic and further resist restraint because of an inability to breathe easily (Figure 2.3). Continued compression can lead to asphyxiation and death. When animals are unattended or out to pasture, halters always be removed; they should never be tied and left unattended. In uncooperative camelids, a surgical huck towel, stocking cap, large sock, or other fabric can be tucked into the halter at the bridge of the nose to keep regurgitate from hitting the handler (Figure 2.4). Lightweight fabric should not be used for this purpose due to the risk of the fabric being pulled to the nostrils with inhalation.

Practice Tip to Facilitate Procedure

Alpacas and llamas are most easily gathered as a group. They can be gathered into a corner using lightweight pipes or a rope (Figures 2.5a and 2.5b) or with a team of people and then individuals restrained.

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Figure 2.1 A properly fitted alpaca halter. The muzzle portion of the halter encircles the jaws in the caudal third of the nasal passages and fits securely around the head.

Figure 2.2 A common cattle rope halter is easily adjusted for use with camelids.

Figure 2.3 This halter is too small for this animal, as evidenced by the muzzle portion, which sits too far rostrally and is compressing the soft nasal cartilage of the nasal passage, restricting airflow.

Figure 2.4 The use of a surgical huck towel to manage spitting/regurgitation behavior.

Figure 2.5a and 2.5b A single individual is able to herd a group of alpacas by the use of a rope (or long piece of lightweight conduit), tied at one end at an appropriate height. The rope or conduit is then secured and the animals contained for individual handling.

Potential Complications

Camelids have a soft, cartilaginous rostral end of the nasal passage, and nasal occlusion may occur with ill-fitting halters. Cervical injuries may occur in animals that violently resist haltering and leading.

It is not recommended that camelids be allowed to wear halters except during handling. Friction from the nosepiece can cause fiber loss and reduce the ability of animals to open their mouth and prehend feed. Their curious nature also increases the risk of catching the halter on environmental obstacles.

3

Manual Restraint

David E. Anderson

Purpose or Indication for Procedure

Manual restraint is needed for a wide variety of procedures. Most often, standing restraint is utilized, but either sternal recumbency ("cush"; alternative spelling "kush") or lateral recumbency is desired to facilitate procedures such as ultrasound examination, toenail trimming, and whenever access to the ventral aspect of the body is desired.

Equipment Needed

Halter, lead rope, 2-meter length of cotton rope, or cattle hobbles are needed.

Restraint/Position

Standing, sternal recumbency ("cush"), or lateral recumbency positions may be used.

Technical Description of Procedure/Method

Standing Restraint

Standing restraint can be achieved with or without a halter. In the absence of a halter, restraint can be achieved by grasping the neck and pulling the head and neck inward against the handler's body (Figure 3.1). Then, one hand is placed behind the head near the base of the ears and the other hand is placed underneath the jaw at a point midway between the mouth and the eyes (Figure 3.2). The grip should be firm but not tight enough to elicit an adverse response. When needed, the hand placed behind the head can easily be moved onto the ears and used to squeeze the ears tightly (Figure 3.3). An ear squeeze is an effective method to gain additional control for short periods of time similar to a nose twitch in horses. The ears should not be twisted, and the squeeze should not be used often or for long periods of time. Oral examination can be performed by moving the hand from behind the head around the opposite side of the head from the handler and up to the mouth. This position places the head into the crook of the handler's elbow, allows the handler to firmly control the head within the arm, and frees up the hand to stimulate opening of the mouth (Figure 3.4). The mouth can be opened by placing the fingers into the commissure of the lips and pulling backward. Extreme care must be observed not to place the fingers or hand into the diastema of the mouth because of the upper and lower canine teeth and the upper incisor teeth present. In adult males, these teeth are well developed and sharp if they have

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Figure 3.1 The head and neck are grasped and pulled firmly against the handler's body for manual restraint in the absence of a halter.

Figure 3.2 Control can be maintained using minimal restraint by grasping the jawbones (mandibles) with one hand and simultaneously placing the other hand behind the poll of the head and the uppermost portion of the neck.

Figure 3.3 An ear squeeze can be used to gain additional control in uncooperative patients.

Figure 3.4 Cursory oral examination can be done by placing the poll of the head in the crook of the elbow and then inserting the fingers into the cheek. Care must be exercised so the fingers are not introduced between the teeth.

not been trimmed. The standing restraint position also can be used to obtain blood samples from the jugular vein. For this procedure, the camelid is placed into a submissive posture by tucking the head and neck under the arm and leaning over the animal's back (Figure 3.5). The rostral neck is positioned under the handler's armpit, and that arm is used to restrain the neck and the hand to occlude the jugular vein (Figure 3.6). The free hand is used to palpate the jugular vein and obtain blood samples (Figure 3.7).

Figure 3.5 A submission posture can be achieved for control during the one-person jugular bleeding method by placing the head and neck beneath the arm and shoulder furthest away from the chest. The handler's knee is braced against the sternum of the animal.

Figure 3.6 The hand of the arm used to apply the head and neck brace is used to occlude the jugular vein.

Figure 3.7 The free hand is then used to insert the needle into the jugular vein and the sample obtained.

Toenail trimming can be done with the animal standing, but it requires coordination to allow the animal to maintain balance. A halter and lead rope are placed on the llama or alpaca and tied to a stationary post (Figure 3.8). Then, the handler approaches the shoulder and places the nearside foot between the front feet of the animal (Figure 3.9). This allows positioning of the handler's knee beneath the sternum and facilitates restraint and encourages the animal to remain standing as well as helping to maintain balance. The handler grasps the metacarpal region firmly and lifts the lower leg (Figure 3.10). The hand is moved down to the pastern region, the toenails trimmed as needed, and the limb released (Figure 3.11).

Figure 3.8 A halter and lead rope may be used to tie llamas and alpacas to a stationary post, but these animals should not be left unattended.

Figure 3.9 The front foot may be raised by inserting the nearside foot in between the patients front feet and bracing the knee against the sternum.

Figure 3.10 The front pastern is firmly grasped and the leg lifted.

Next, the handler approaches the hip and places the near-side foot between the rear feet

Figure 3.11 The toenails are inspected and trimmed as needed based on growth patterns.

of the animal (Figure 3.12). This allows positioning of the handler's knee medial to the stifle and facilitates restraint and encourages the animal to remain standing as well as helping to maintain balance. The handler grasps the metatarsal region firmly and lifts the lower leg (Figure 3.13). The hand is moved down to the pastern region, the toenails trimmed as needed, and the limb released (Figure 3.14).

Sternal Recumbency

Sternal recumbency is a natural posture for camelids and is referred to as a "cushed" posture. Alpacas often attain this posture when resisting being handled as a self-protection mechanism. Llamas do this less commonly,

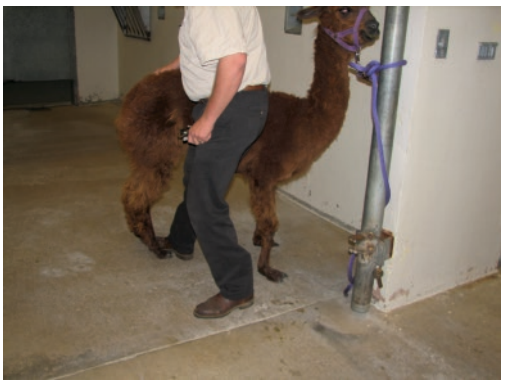

Figure 3.12 The handler places the nearside foot in between the rear feet of the patient and braces the knee against the inner thigh and stifle.

Figure 3.13 The pastern is grasped firmly and the leg lifted.

Figure 3.14 The toenails are inspected and trimmed based on growth patterns.

preferring to tuck individual limbs away from the handler but remaining standing. Sternal recumbency can be achieved with manual restraint when needed. First, a halter and lead rope are placed on the head (Figure 3.15). Then, the head is pulled to the ground and the lead rope used to fix the position of the muzzle on the ground (Figure 3.16). The front limb on the same side as the handler is grasped and flexed up off of the ground (Figure 3.17). The position of the head and front limb is maintained until the llama or alpaca lies down in sternal recumbency (Figure 3.18). This can be encouraged by a second handler applying pressure downward on the pelvis and lumbar region. When a sternal posture is attained, the head and neck must be held firmly against the ground to maintain restraint (Figure 3.19).