

## ***Rural Veterinary Experience, Teaching, and Service*** ***An introduction to Field Anesthesia***

Important points before we begin this discussion;

1. Anesthesia involves more than simply looking at a chart and pulling up anesthetic drugs. Patient behavior, breed, age, the environment in which you are working, the availability of supplies, the skill and experience level of yourself and of those around you (surgeon, support staff and client), the position the patient will be in for surgery, and the expected length of the surgery, will all affect the protocols, dosing, and timing that you choose for each patient.
2. One of the most important things that you can learn in your Veterinary career is how to recognize and respond appropriately to being over your head. There are techniques covered in this presentation that I would not undertake unless I was working with experienced “handy” horsemen/practitioners, and or I/we felt that the patient’s life was in imminent danger.
3. Our protocols may be different from what you are used to, and there are reasons for the choices that we have made. Our choices are simple, safe, effective and utilize the supplies and equipment that are available to us where ever we happen to be working. They are affected by cost, time constraints, and the difficulty associated with performing rechecks on the patients that we see.

### **INJECTABLE ANESTHESIA**

A couple of notes before we undertake the issue of the basic protocol that we use, adjusting it to fit your patient and circumstances, and dealing with patients who you are unable to touch.

Jugular venipuncture in the horse is not difficult. This makes catheters unnecessary for routine cases

- This is an excellent time to learn to manipulate the patients’ position to allow for easier visualization of and access to the vein.
- Have a staff member show you the effect of
  1. Repositioning the head.
  2. Placing a pillow under the neck
- **Remember: IV injections are to be supervised by a staff member.**

There are four possibilities for maintaining anesthesia in the horse on R-VETS clinics after they have been induced. They are:

1. Intermittent injections of “top offs.” This is by far the most common method on our clinics (Xylazine at 0.125 mg/ lb and Ketamine at 0.25 mg/lb mixed in the same syringe).
2. Double drip: Xylazine (2.1 mg/kg/hr) and ketamine (7.2 mg/kg/hr) in a 250 ml bag of diluent, run through a 15 drop / ml admin set at 1 drop per second for maintenance of anesthesia during longer procedures.
3. Triple drip: Xylazine (500 mg), ketamine (1000 mg or 1 g), in a liter of 5% guaifenesin (50mg/ml), given at 1ml/lb/hr.
4. A combination of boluses of 5% guaifenesin (not exceeding 1 ml/lb/hr) and “top off” injections

In the event that the choice has been made to use double drip, triple drip, or boluses of guaifenisin, a catheter will be placed (guaifenisin is very irritating if administered perivascularly). This will take place after the patient has been induced.

Important points regarding use of the protocols that follow.

- Injectable anesthesia on RVETS' clinics is performed on many patients who have never been touched. These horses:
  1. Generally involve higher doses than a horses with more handling,
  2. Are more challenging than the average equine patient, both behaviorally and anesthetically
- Optimally, you will administer a dose just adequate to anesthetize the patient for the procedure they are to undergo.
- Administering more than necessary will cause the patient to remain asleep for longer than needed and can compromise recovery.
- Administering a less than adequate dose does not become apparent until after the patient is let out of the chute. In this case, there are three possibilities:
  1. The patient does not attain lateral recumbency
    - This patient must be run back through the chute
    - Requires another round of anesthetic drugs. The second round of anesthesia is administered as if the first round did not occur. (you start over and increase your doses)
    - The patient will become sternal, rather than becoming completely anesthetized. This patient must not be approached by anyone other than a staff member.
      - a. If approached in a way that is at all stimulating, this patient will rise and run off,
      - b. If possible, more anesthesia will be administered as quietly as possible
  2. The patient will lie down and will not be at an adequate plane of anesthesia for the procedure. At this point all you can do is administer more drugs.
  3. Inadequately anesthetized patients tend to:
    - Require repeated "top offs," which translates to more anesthetics than would have been necessary if the dose had been adequate to begin with.
    - Not become deeply anesthetized until after all stimulation ceases (until after the procedure is complete and they are left alone) after which the drugs reach the target receptors and they sleep for extended periods.
    - Have difficult recoveries.
      - a. This can be countered by administration of xylazine at the end of the procedure.
      - b. This allows the patient to sleep off the additional anesthetics.

Anesthesia maintenance is achieved by intermittent administration of xylazine/ketamine “toppers” or one of the other regimens described above.

### ***THE ANESTHESIA PROCESS***

- Evaluate your patient. If it is possible do a brief physical exam. If a “hands-on” exam is impossible or likely to “jack up” or excite the patient, skip it. Do not compromise the patients’ anesthesia and recovery as well as your safety trying to take an obviously healthy horse’s temperature.
- If it is not possible to do a” hands-on” exam, an “exam” of sorts can still take place. When deciding if anesthesia is safe without touching the patient you must ask yourself:
  - Does the patient appear healthy? Even if the patient is underweight anesthesia may be safe. Some stallions when penned will pace the fence line and lose weight. This patient is unlikely to gain weight until it is castrated and returned to its’ herd. Patients living in rural Latin America tend to receive a very low plane of nutrition. Not castrating them will not improve this situation, and may cause them to use more energy looking for something to breed than they might if they were castrated. To make this decision, think about the following:
    - Is the hair coat healthy?
    - Are the eyes bright?
    - Is the patient energetic?
    - Is the patient likely to be castrated by its’ owner if we do not anesthetize it?
    - If these questions are answered yes, we are likely to anesthetize the patient, even if the BCS is as low as 2.
  - If the answers to the above questions are no, then you must consider;
    - Is the patient a risk to the safety of those around it? If this is a 4 year old stud colt in a Latin American village where children or women with children strapped to their backs may be using the horse in the fields...
    - Does the patient require an exam to rule out causes of its’ physical state in order to determine if euthanasia is warranted or if treatment is possible?
    - Is there a crippling injury to a structure such as a joint in an unhandled horse? (Anesthesia for examination may be the only option.)
  - If any of these questions is answered yes, we are likely to anesthetize the patient, even if the BCS is quite low.

**REMEMBER:** if we anesthetize a patient under ANY of the circumstances listed above, there must be clear notes in the record indicating the reason and reasoning behind the decision. If you do not understand why a patient was anesthetized, ASK. These discussions are a valuable part of the learning experience and make good rounds topics.

Your anesthetic plan will be based on:

1. Patient size  
Calculated doses are based on size
2. Patient temperament  
Dosing must be adjusted to account for fractious or excitable animals
3. Patient breed  
Burros and mules clear anesthetic drugs at a higher rate than horses  
Draft breeds (and foals) can be harder to read
4. Your skill level  
Until you have gained some experience you may want to keep the patient a little deeper
5. Skill level of the surgeon  
A less skilled surgeon will need longer to complete a given procedure
6. Skill level of the support team  
Always think through who is available to help if something unexpected happens
7. Patient positioning  
Dorsal recumbency is more stimulating than lateral and will require more top offs
8. Use of Local Anesthesia  
Local anesthesia reduces the amount of stimulation to the patient
9. Expected length of surgery
10. Your surroundings / environment
  - If working in a really tight space, or on a surgery where your surgeon and support staff may be forced to work between the patients legs, you may choose to keep the patient deeper
  - If working in a very loud environment you must consider how this will affect recovery, and what you can do to offset this effect.
11. Available equipment

ANESTHETIC DRUGS AND RANGE OF USE		
Drug	Our Basic Protocol	Range of Use
Xylazine	1 mg/kg	0.3 to 1 mg/kg
Butorphanol	0.02 mg/kg	0.02 to 0.04 mg/kg
Diazepam	0.03 mg/kg	0.01 to 0.1 mg/kg
Ketamine	2 mg/kg	1.5 to 2.75 mg/kg

EQUINE DOSING CHART THE BASIC ANESTHESIA PROTOCOL					
Weight In lbs	Weight In kg	Xylazine ml	Butorphanol ml	Diazepam ml	Ketamine ml
		1mg/kg 0.5 mg/lb	0.02-0.04 mg/kg 0.01-0.02 mg/lb	0.03 mg/kg 0.02 mg/lb	2 mg/kg 1 mg/lb
110	50	0.5	0.2	0.3	1.0
220	100	1.0	0.2	0.4	2.0
330	150	1.5	0.3	0.5	3.0
440	200	2.0	0.4	1.0	4.0
550	250	2.5	0.5-1.0	1.5	5.0
660	300	3.0	0.5-1.0	2.0	6.0
770	350	3.5	0.5-1.0	2.5	7.0
880	400	4.0	0.5-1.0	3.0	8.0
990	450	4.5	0.5-1.0	3.5	9.0
1100	500	5.0	0.5-1.0	4.0	10.0
1210	550	5.5	0.5-1.0	4.5	11.0
1320	600	6.0	0.5-1.0	5.0	12.0

ADJUSTING YOUR PREMED TO FIT YOUR PATIENT							
Premed	Standard Dose	Very Quiet Patient	No Butorphanol Available	Slightly Excited or Excitable	Moderately Excited or Excitable	Very Excited or Excitable	Intractable
Patient Behavior				Just beginning to wind up	Not yet unmanageable	Close to or completely unmanageable	Unable to access vein
Xylazine Dosing Adjustment		Decrease by up to 50%	May Increase 10%	Increase 20%-25%	Increase 50%	Increase 80% - 100%	
Xylazine Dose	1 mg/kg	0.75 mg/kg	1.1 mg/kg	1.2 mg/kg	1.5 mg/kg	1.8 to 2 mg/kg	
Butorphanol	0.02 mg/kg	0.02 mg/kg	-----	0.02 mg/kg	0.03-0.04 mg/kg	0.04 mg/kg	
IM Detomidine	<p>In selected situations where horse temperament or facilities present a danger to the patient or handlers we may use IM sedation. This will be done using detomidine. Following sedation the anesthesia process will proceed as with an un-sedated patient. This is because patients requiring IM sedation will be roused when approached and will be difficult to anesthetize. They should be approached very quietly and only with the help of skilled staff. We generally try to avoid the use of IM alpha 2 agonists due to increased difficulty of recovery. Improving the quality of these recoveries will be covered later.</p>						20 – 40 mg IM 20 minutes prior to performing anesthesia

To begin the anesthesia process in your patient, start with sedation. Every effort should be made to this quietly. Learning to finesse the patient is an important skill that will pay off over and over in your career.

1. Xylazine + Butorphanol given IV in the same syringe (leave 18 gauge needle in place when possible)
  - Evaluate the degree of sedation achieved by this combination: Premature induction tends to result in
    - a. Stiff induction

- b. Patient may paddle or swim in place after falling to the ground
- Within 2 -5 minutes the horse's head should drop below the level of the withers.
- If this does not occur, another dose of xylazine (0.1-0.2 mg/lb) may be necessary.
- Adequate sedation is important for smooth induction, adequate anesthesia, and safe recovery.
- Generally the needle used to administer sedation is left in place in the jugular vein preventing another source of stimulation prior to induction.

<b>ADJUSTING YOUR INDUCTION TO FIT YOUR PATIENT OR ENVIRONMENT</b>							
	<b>Standard dose</b>	<b>Routine Environment Or Castration</b>	<b>Castration with ligation or cord splitting</b>	<b>Small area, need patient to rise soon</b>	<b>Large area</b>	<b>Crypt or hernia surgery</b>	<b>To patient away from chute before they drop</b>
Diazepam	0.03	0.03	0.04	0.03	0.04-0.05	0.05	Choose appropriate column, No adjustment to Ketamine or Valium required
Ketamine	1.5 - 2.75 mg/kg	2.0 mg/kg	2.0 – 2.2 mg/kg	----	----	2.2 -- 2.75 mg/kg	
Xylazine	To move patient further away from chute, or site of induction, do not allow patient to become very sedate after premed Administer ketamine / valium / xylazine together and chase the cause patient away from the chute, only until adequate forward movement has begun.						~20 -- 30 % of original dose added to ket/val

Once the patient is sedate, induce:

2. Administer Ketamine and Diazepam, slowly, IV mixed in the same syringe (remove needle). The horse will become recumbent in less than a minute.
  - If using a chute, open the gate immediately and wave your arms, a hat, or a rope at horse to encourage him to leave.
  - If performing a “hand induction”,
    - a. drop patient on left side (if possible)
      - Elevate the head and turn slightly to the right.
      - Some anesthetists will lower the horse's head and pull it slightly to the left.
      - A quiet induction is more important than dropping the horse on its left. The patient can be rolled over if need be.
    - b. Do not attempt to knock the patient off of its feet as this will cause him to fight the process and may prevent his becoming recumbent.
3. Horse becomes recumbent.

- Do not approach until the patient is fully relaxed.
  - a. The anesthetist makes this call.
  - b. The upper leg should be on the ground.
  - c. DO NOT RUSH THE PATIENT.
- After becoming recumbent the patient may be stiff and move their legs for a few seconds.
- Once adequate anesthesia occurs, everyone must proceed with their tasks as efficiently as possible.
- Everyone must remain on the neck/back side of the patient, (away from the legs of the horse).
- If the patient does not obtain lateral recumbency a staff member will administer more anesthetics.
- Nystagmus or tearing (lacrimation), muscle tone or strong palpebral reflex may be present.
- Place a pillow under head to prevent facial nerve paralysis
- Place a towel over the eye to minimize stimulation.

The anesthetist remains at the head of the patient at all times. They are “armed” with two doses of anesthetic “top off” consisting of 1 ml of xylazine to each 2 ml of ketamine (administered at a dose of xylazine, 0.125 mg/lb and ketamine, 0.25 mgs/lb) mixed in the same syringe. These “top offs” are used if the patient needs additional anesthesia. Prior to the start of the procedure the anesthetist should check that they have these “top offs” in their caddy.

Note: for castrations, as long as the patient was dosed appropriately, and the cord and skin were blocked well, it should not be necessary to “top off” the patient.

**NOTE: All anesthesia “top offs” must have an 18 gauge 1 ½” needle on them. If you are doing equine work you must check the needle on all toppers and ensure that they are appropriate.**

**DETERMINING IF THE PATIENT IS ADEQUATELY ANESTHETIZED FOR SURGERY**

READING ANESTHETIC DEPTH	
LIGHT	ADEQUATE/DEEP
Nystagmus present	No nystagmus
Eye position Rostral	Central
Lacrimation, (tearing)	Less moist (eye should remain moist)
Muscle tone	Muscle relaxation
Vocalization	None
Movement	None
Strong palpebral reflex	Reduced palpebral reflex
Frequent spontaneous blink	No or occasional spontaneous blink
Change in respiratory pattern, rate, and or depth indicates a change in plane and is considered by some to be the most reliable sign.	

Note: The table above refers to patients anesthetized with the basic xylazine-butorphanol, ketamine-valium protocol.

Once the patient is recumbent with a pillow under the head and a towel over the eye, check for depth of anesthesia:

If the patient is recumbent but seems light immediately after induction (nystagmus, tearing/lacrimation, muscle tone);

- Wait 2 minutes and check depth again.
- Administer a top off if
  - If horse does not completely relax (the upper leg does not move to the ground.
  - If nystagmus has not slowed
- If patient has relaxed and or nystagmus has slowed, wait another minute and re-asses.

#### Determining When to Administer More Anesthetic Drugs During the Procedure

Many factors will affect your decision to top off your patient during the procedure. They will include all of the factors you considered when choosing a protocol, but will also include what point in the procedure the surgeon is at. For a routine castration if the procedure is moving along as it should, the patient should not require a top off. Inexperienced anesthetists frequently top off patients unnecessarily. Consider the following

- If the patient stretches its' hind legs during the first crush, this does not necessarily warrant a top off.
  - This may be an unconscious reflex.
  - If the team is working efficiently, the block will not have taken effect. By the time the second testis is crushed it will have.
  - You will lower the patients' leg between crushes / after the second crush. During this time there is little to no stimulation, and most patients will become deeper, without the addition of anesthetics.
- If the patient stretches its' hind legs during the second crush
  - You will lower the patients' leg after the crush. During this time there is little to no stimulation, and most patients will become deeper, without the addition of anesthetics
  - The procedure is basically over, and the drugs administered will not affect the procedure, they will only cause recovery to be delayed.

#### RECOVERY

- Pull the down forelimb forward to prevent the radial nerve from "falling asleep" (this results in a recovery where it may appear to onlookers that the patient has broken a leg.
- The majority of our patients will recover without incident or assistance.
- If working in an enclosed area (arena) and anesthesia was smooth and appropriate, with a single or no top off, the patient should be left without stimulation to recover. The towel should be left in place over the patient's eye to reduce stimulation.
- Occasionally, a patient will try to rise while it still has nystagmus.
  - a. The anesthetist should prevent the horse from rising by holding the head so that the nose is elevated approximately 90 degrees to the ground, until the nystagmus stops.



- b. Before attempting to keep a horse down by holding the head, have an experienced handler demonstrate the technique.
- In the event that the patient needs assistance,
  - a. Avoid using the lead rope or head to provide it. This tends to make the patient more unbalanced. Instead,
  - b. Pull back on the tail as the horse rises to allow him to steady himself.
  - c. With mustangs or completely untrained animals it is better to allow them to stand without assistance, as their instinct is to bolt when the feel restraint. This can result in the horse falling.
- The horse is allowed to stand for 10-15 minutes before being moved or transported.
  - a. This will depend on the length of anesthesia.
  - b. At times, with patients who were behaviorally challenging, it is safer for all involved to load the patient into the trailer as soon as they have risen. This is often the case with animals who were sedated in the trailer, prior to unloading.

#### IMPROVING THE QUALITY OF RECOVERY FOR YOUR MORE CHALLENGING PATIENTS

- For patients who did not ever get quite deep enough, or who fought induction (did not go down well)
  - a. Finish with a xylazine dose of 20% of the initial premed dose.
  - b. Do not disturb the patient after this.
- For longer surgeries or if your patient received multiple top offs,
  - a. Finish with xylazine dose of 20-30% your initial premed dose.
  - b. Pull the down forelimb forward.
  - c. Do not disturb the patient after this.
- For patients who received IM sedation prior to surgery,
  - a. Finish with a xylazine dose of 30 to 35% of the initial premed dose.
  - b. Wait 20 minutes, roll the patient, pull the down forelimb forward.
  - c. One hour after the last ketamine, administer alpha 2 reversal. (Tolazine or Yohimbine; We use **2/3 the label dose** and administer over a **minimum of 30 seconds**)
  - d. Allow the patient to recover unassisted.

DOUBLE DRIP					
For Anesthetic Maintenance After Induction					
Add xylazine & ketamine to 250 ml bag of NaCl or LRS.					
Run at 1 drop per second through a 15 d/ml admin set					
Weight in kgs	Weight in lbs	XYLAZINE 2.1 mg/kg/hr		KETAMINE 7.2 mg/kg/hr	
		mg	ml	mg	ml
50	110	105	1	360	3.6
75	165	160	1.6	540	5.4
100	220	210	2.1	720	7.2
150	330	315	3.15	1080	10.8
200	440	420	4.2	1440	14.4
250	550	525	5.2	1800	18.0
300	660	630	6.3	2160	21.6
400	880	840	8.4	2880	28.8
450	990	950	9.5	3300	33.0
500	1100	1050	10.5	3600	36.0
550	1210	1155	11.5	3960	40.0
600	1320	1260	12.6	4320	43.2
650	1430	1370	13.7	4680	47.0

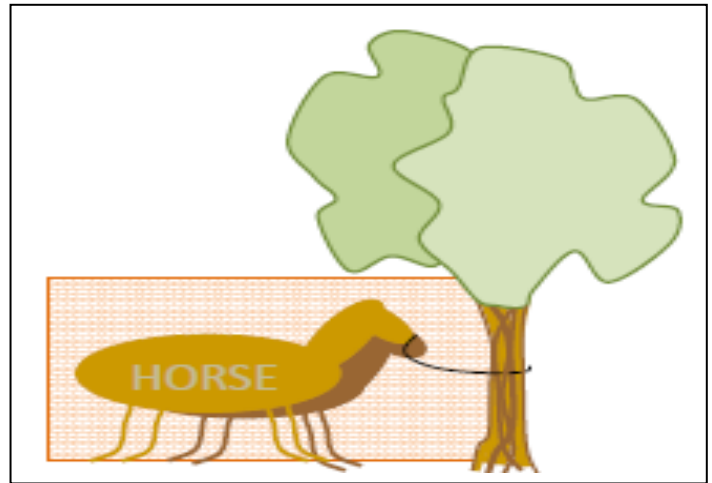
TRIPLE DRIP				GG 5%	Xylazine	Ketamine
For Anesthetic Maintenance				500 ml	5 ml	10 ml
				1000 ml	10 ml	20 ml
kg	lb	Maintenance ml/hr	Maintenance 10 d/ml admin set	Maintenance 15 d/ml admin set		
50	110	110	~ (<) 1 drop every 3 seconds (120 ml)	~ (<) 1 drop every 2 seconds (120 ml)		
100	220	220	~ (>) 1 drop every 2 seconds (180 ml)	~ (<) 1 drop every second (240 ml)		
150	330	330	~ (<) 1 drop every second (360 ml)	~ 2 drops every 3 seconds (360 ml)		
200	440	440	~ 5 drops every 4 second	~ (<) 2 drops ever second (480 ml)		
250	550	550	~ 3 drops every 2 seconds	~ 5 drops every 2 seconds (600 ml)		
300	660	660	~ (<) 2 drops per second (720 ml)	~ (<) 3 drops every second (720 ml)		
350	770	770	~ (>) 2 drops per second (720 ml)	~ (>) 3 drops every second (720 ml)		
400	880	880	~ 5 drops every 2 seconds	~ (<) 4 drops every second (960 ml)		
450	990	990	~ (<) 3 drops every second (1080 ml)	~ (>) 4 drops every second (960 ml)		
500	1100	1100	~ 3 drops every second (1080 ml)	~ 9 drops every 2 seconds 1080 ml)		
550	1210	1210	~ (>) 3 drops every second (1080 ml)	~ 5 drops every second (1200 ml)		
600	1320	1320	~ (<) 4 drops every second (1440 ml)	11 drops every 2 seconds (1320 ml)		
Patient should have				(100-150 mg/kg of GG will cause recumbency)		
<input type="checkbox"/> Brisk palpebral, <input type="checkbox"/> Occasional nystagmus, <input type="checkbox"/> Wet eye.						
The equivalent of one 3 ml topper is delivered in 100 ml						

The sooner you learn to use equine behavior to your advantage, rather than allowing it to work against you, the better off you will be. If you are working with un-handled, under-handled or exited/excitable horses, here are a few ways to go about working with them.

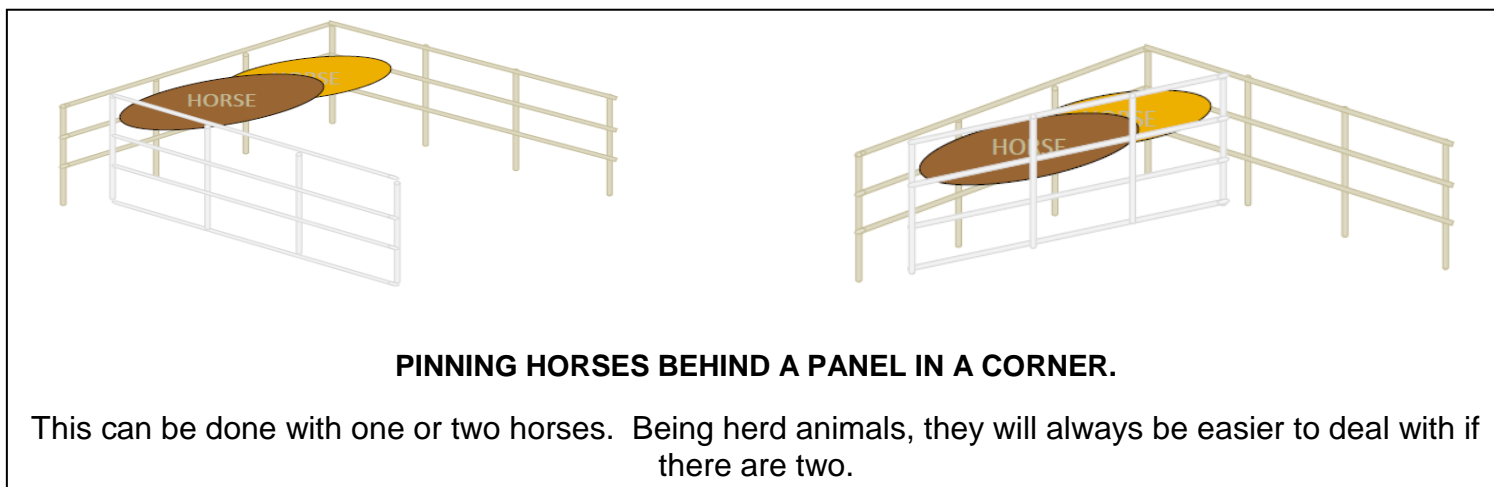
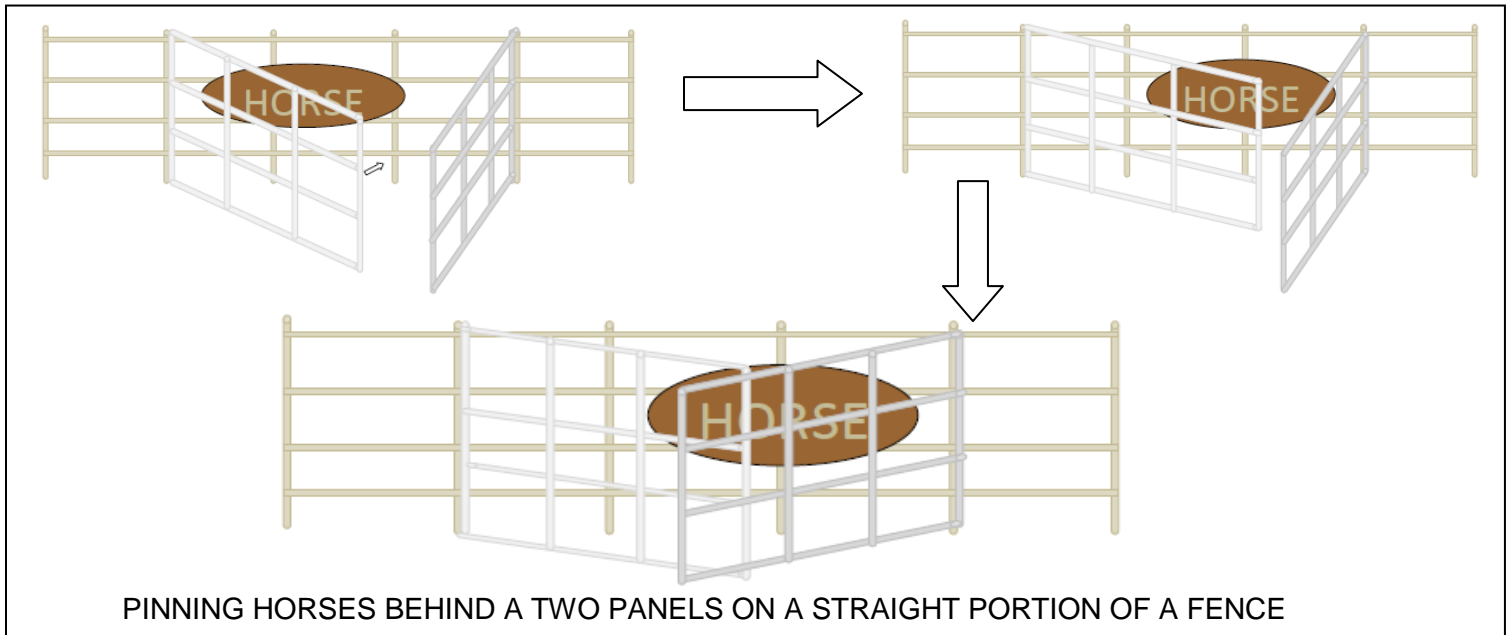
**Use of a quiet, well broke horse to pin a horse for sedation**

Two haltered horses, one well broke (in front) and one unwilling to be sedated (behind), standing against a wall or fence. In most instances the difficult patient will stand quietly if the anesthetist works calmly and quietly. Simply

- reach under the neck of the quiet horse,
- place your needle (bury it in one smooth motion),
- wait for the patient to react
- administer sedation



Much of the time these horses will not be bothered by the needle as it enters the vein. They are, however, frequently truly worried about the dangerous biped predator who wields it (i.e. YOU).



In both cases above, the panel or panels are tied shut with a quick release knot. Once the patient is adequately sedated, the induction dose is administered, the rope is released, and the panel is swung open. Someone on the other side of the fence works to motivate the horse to move away from the fence. This can be accomplished with a rope, a hat or simply by "whooping" the patient away from the fence, (or out of the chute). Remember to use only enough "motivation" to move the patient an adequate distance from you panels or the chute.

Although in most cases you will be able to place a halter once the patient is pinned and you may use it to help restrain the pinned patient, resist the temptation to use this;

- In an attempt to lead the patient out of the chute. If you had to pin a patient to sedate and induce it, its behavior during induction may be unpredictable. These patients are dangerous until they are fully anesthetized. They may occasionally bolt and kick out in an attempt to escape. Do not place yourself or those around you in danger by trying this.
- In an attempt to pull the patient out of the chute. A horse's natural instinct when someone or thing pulls on its head, is to pull back. Pulling on horses causes them to fight both you and the induction process. If this "method" is used you will need to increase your sedations and induction doses unnecessarily. This in turn affects recovery time and quality. Always motivate the patient to move by becoming a temporary predator. Use only enough motivation to get the patient to move an adequate distance from the chute or panel to allow continued use of this tool (the chute or panel).

For the patient wearing a neck rope;

- After the patient has become adequately sedated to induce, quietly loosen your neck rope and move it to the head.
- Place it under the patient's jaw or mandible and use it to support the patient's head. This will allow you to maintain a taut enough vein that venipuncture is still possible.

For the pinned patient or the patient in the chute

- Prior to administration of your induction dose make sure that someone is ready to let the patient out.
- If using bucking chutes, this person should stand quietly to the side of the chute until signaled to open it.
- When the gate is opened the gate person should step back as they open the gate to ensure that the gate cannot hit them, and the horse cannot run over them.
- At times the space you are working in may become too congested to allow for the safety of your team and patients. If the area close to the chute/s has become congested and the area away from the chute/s is clear, the following method can allow you to move the patient farther from the chute prior to induction.
  - Administer your sedation dose.
  - Wait until the patient starts to become sedated, but do not wait until they are profoundly sedated
  - Add 20% of your initial Xylazine dose to your induction syringe.
  - Administer your induction dose (a little earlier than you would normally)
  - Open the gate and run the patient out. You will need to be more serious in your attempt to run them away from the chutes. These patients will move further from the chutes prior to dropping. If

you do not use adequate ketamine, or you administer the induction dose prematurely, your patient will not become anesthetized.

REMEMBER; ***never*** rush or jump on a horse if it has not become laterally recumbent in an attempt to pull it down.

- This will cause the patient to fight the anesthesia process. If the patient fails to become fully anesthetized you, your support staff, and your patient are better off if you simply run the patient back through the chute and start over.
- Performing a castration on a horse who has not relaxed, will increase the chances of straining during the procedure, and evisceration after the procedure.

Caution should always be used when working in the field, and no procedure should be attempted or performed without thoroughly evaluating/considering the possible negative outcomes of your actions and how these can be handled. Your reputation is everything in these communities and the safety of your team and your patient should always be your first priority.

Anesthetic protocols used for range of use table etc... can be found in the following publications;

Plumb's Veterinary Drug Handbook Fifth Edition, Donald C Plumb, Blackwell Publishing 2005, pg 442

Equine Anesthesia Monitoring and Emergency Therapy Second Edition, William W. Muir, John A. E. Hubbell, Saunders Elsevier, 2009, pgs. 250, 263, 264, 267

Manual of Equine Medicine and Surgery, Patrick T Colahan, I.G (Joe) Mayhew, Alfred M Merritt, James N. Moore Mosby, 1999 pgs. 759, 760

Handbook of Veterinary Anesthesia, Fourth Edition, William W. Muir, John, A. E. Hubell, Richard M. Bednarski, Roman T Skarda, Mosby Elsevier, 2007, pgs. 391, 393, 394

Manual of Equine Emergencies Treatments and Procedures, Second Edition, James A. Orsini, Thomas J. Divers, Saunders, 1998, pgs. 759, 760