

Local and Regional Anesthesia in Food Animal

This session discusses regional and local anesthesia methods available for food animal. When properly administered, local and regional anesthesia provides a safe and effective alternative to general anesthesia. General anesthesia requires more labor and equipment as compared to local anesthesia and has more adverse effects, such as bloat and cardiopulmonary depression. This session will review the common blocks used, landmarks, and administration.

Biography: Dr. Jessica Rush grew up in rural Alabama working on her uncle's family farm. During this time, she developed a great love for cattle and reproduction. She received a BS in Animal Science from Auburn University followed by her DVM from Auburn University College of Veterinary Medicine in 2010. Following graduation, Dr. Rush accepted a position in a rural mixed animal practice in Ashland, AL. After 5 years in private practice, she returned to Auburn University College of Veterinary Medicine as a Theriogenology resident in 2015. Following completion of the residency program and achieving board certification by the American College of Theriogenology in 2018, Dr. Rush accepted a position as Assistant Clinical Professor at Auburn University College of Veterinary Medicine of Food Animal Medicine and Surgery. Since becoming part of faculty, Dr. Rush works to further develop the urogenital surgery service. She enjoys training the AU CVM palpation team and devotes a large amount of extra time to these students. She serves as the faculty advisor for the AU AABP club. Her research interest includes bovine reproduction and beef cattle health with emphasis on venereal diseases and infertility, particularly in the bull.

Learning Objectives: (3-5 defined things viewers should learn from the presentation)

1. Optional alternatives (regional and local blocks) to general anesthesia
2. Review of anatomic landmarks for the different techniques
3. Discuss medications available



Local and Regional Anesthesia in Food Animals

Jessica Rush, DVM, MS, DACT

Good evening, everyone. I'm Dr. Caitlin DeWilde with Vetcetera, and our speaker today is Dr. Jessica Rush. And we are so glad she will be here today and giving us this presentation on local and regional anesthesia in food animals. I'll turn it over to her in just a second.

But I'll let you know that she grew up in rural Alabama, working on her uncle's family farm. She is a graduate of Auburn University College of Medicine, and then did private practice, and then returned to Auburn for a theory of geology residency and now is assistant clinical professor at the Auburn University College of Medicine. So we are thrilled to have her here. And without further ado, I will turn it over to you, Dr. Rush.

Thank you. Hope you all are-- all having a good evening. This is one of the topics that I feel like probably needs to be reviewed a little bit more. We use a lot of local and regional anesthesia in food animals.

- **Benefits**

- Safe
 - Decreased risk of bloat and cardiopulmonary depression
- Less labor
- Technical ease
- More economical

Really and truly when we think about what, the benefits really do make it the number one reason. The safety of it just for the surgeon and for the animal is going to decrease the risk of bloat and cardio pulmonary depression that we deal with, with a lot of general anesthesia in these animals as well as the risk of regurgitation and aspiration once you put them under.

It requires much less labor on the staff and the surgeon, as well as easier restraint. We can do most of these with the animal in some type of head shoot or something like that. Then they're technically easy to perform, and they're very economical as compared to putting the animal under general anesthesia, which can be extremely expensive, especially with some of our larger cattle. So it's a very economical option for what we're dealing with when we're dealing with a production animal type situation.

- 2% mepivacaine hydrochloride
- 2% lidocaine hydrochloride
 - Toxic doses
 - Cattle 10mg/kg
 - Small Ruminants 6mg/kg
- When concern about toxic dose
 - Larger areas or smaller animals
 - 1:1 dilution with saline

Really when we think about what we use the most, it really is lidocaine. The methiodicaine can be used in some situations but really mostly of lidocaine. I'm going to remind you of those toxic doses that we deal with in these animals. We really stick with cattle at that 10 mgs per kg dose.

And with small ruminants, it's somewhere right around six minutes per kg. Both animals have been shown to-- both species have been shown to be able to tolerate a little bit higher. But when we think about what were safe administering on a regular basis, really 10 mgs per kg for cattle and six for small ruminants is what we're going to deal with. I tend, myself, to stick around the six mgs per kg for camelids as well.

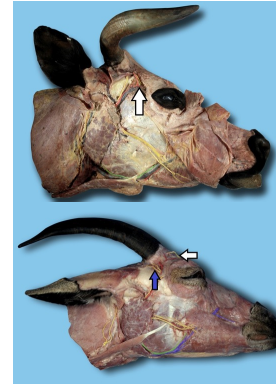
When you are concerned about getting to your toxic limit, there are some things that we can do to help decrease the chances of getting to that, especially when we're dealing with larger areas that need to be anesthetized or smaller animals, those little pygmy goats, that really are very tiny, we can use a one to one dilution with just sailing and increase the volume to be able to administer to those smaller animals or to block a larger area.

Do remember the duration of onset takes a little bit longer once you make it a one to one and make that a 1% solution. And the other thing is it doesn't seem to quite last as long as it would if you use the 2%. So just keep that in mind when you're thinking about that. But

it goes a long way sometimes when you need to block a larger area or when you have a very tiny patient, and you need to have more volume than what might be safe at that regular 2%.

● **Cornual Block**

- Anesthesia to horn & surrounding skin
- Blocks corneal branch of zygomaticotemporal nerve from the trigeminal nerve
- Runs along the frontal crest to the horn
- 5-10mL of lidocaine superficially along the zygomatic arch, halfway between the horn and lateral canthus of the eye



Courtesy of Dr. Ray Wilhite

One of the most common reasons that we do local blocks and feed animals is definitely for disrupting our dehorning. The most common block I feel like we perform is going to be the cornual block to block that corneal nerve. And this will anesthetize not only the horn but also the surrounding skin around it.

You can see it here on these images that have been dissected out at the arrows there at the goat and the cow. And it blocks the corneal branch of the zygomatictemporal, which is from the trigeminal nerve, as it runs along that frontal crest.

And you can palpate that area very well. We typically deposit about 5 to 10 mills of lidocaine superficially along that zygomatic arch halfway between the horn base and that lateral canvas. And you can see that one very easily right there it runs very much between the horn base and that lateral canvas there.

For small ruminants

- Must block the cornual branch of the infratrochlear nerve
- Halfway between the medial canthus of eye and middle of horn base



Small ruminants, we must think about another branch. And that's the corneal branch of the inner cochlear nerve. So we actually do two different block locations on there. You can see in these images here that halfway between the medial canthus of the eye and the middle of the horn base is what you're seeing with that little needle tip labeled A. And that's for the corneal branch of the inner trochlear.

And then right here at B is that regular corneal nerve that we typically block that we do in cattle. And that is just so that we get the entire area desensitized as that is a much more developed nerve and can be more of a problem in these small ruminants.



I do have a video for you all-- hopefully this will play-- of how to block a small ruminant in these and how we administer this.

[VIDEO PLAYBACK]

This video shows a cornual block in a goat kid for the purpose of dehorning. Halfway between the lateral canthus and the horn is a small depression where anesthetic is deposited along the zygomatic arch. And go to second nerve needs to be blocked, the corneal branch of the cochlear nerve. This is blocked halfway between the middle canthus of the eye and the mid horn base along the front of the head as you see here.

[END PLAYBACK]

And you can say just the little blurb that is there with small ruminants, it really doesn't require a whole lot of anesthetic to perform these. And by doing this, we're able to restrain the animal. With goats, we typically give a sedative as well. But with cattle, we typically put them in a squeeze chute tying the head around for restraint. And performing the block is sufficient enough to get the job done for dehorning and also to keep them relatively comfortable for a little while afterwards.

This video shows a cornual block in a goat kid.

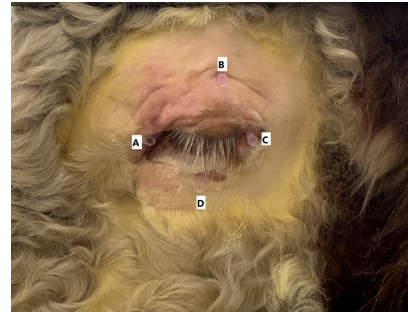
- Auriculopalpebral nerve
 - Motor to the eye
 - Branch of the facial nerve
- Palpate where it crosses the zygomatic arch

I apologize. I was trying to just get forward. When we think about blocking further on the app, the auriculo palpebral is going to be motor to the eyelid and a branch of the facial nerve. You can palpate it across the zygomatic arch. Unfortunately I do not have a video of this for you.

But it's very palpable. It's not quite as palpable as it is in horses where you can actually feel it very superficially and easily. It is not as easily felt in these, but it is definitely there, probably more so in small ruminants. But it does provide ease of use and administration when we're doing some different procedures to the-- and that kind of thing.

- 4 point

- Easy to administer
- Location
 - Medial and lateral canthus
 - Upper and lower eyelids
- Cattle – 7.5-12cm 18g
- SR – 3.75cm 22-20 g



A four-point retrobulbar is probably a very-- one of the most common blocks that are performed for surgery in ruminants. Whether it be an acceleration or enucleation, this is one of the most common ones that you will see. It's easy to administer.

And the locations, as you see here, are really the medial and lateral canthus of the eye labeled A and C, and then through the upper and lower eyelids of B and D. And you can actually feel-- go right behind-- their field right back to the back of the eye. Typically we're going to use, in cattle, a 7 and 1/2 to 12 centimeter 18-gauge needle. And then in small ruminants, about a 3.75 centimeter, either 22 or 20 gauge depending on the size of the animal.

When we're dealing with little pygmies and things like that, I stick much closer to that 22. When we're talking about those big boar goats, Nubian, something with much more size, I'm probably going to go up to that 20-gauge needle just for comfort there to get it long enough and deep enough to administer what I would like. In cattle, you can administer 15 to 20 mLs and an adult cow behind that.

In small ruminants, it varies so much based off their size. Anywhere from 5 to 10 mLs. If it was a really tiny pygmy, maybe even 3 and 1/2. But it definitely allows for that to be administered and pluralization of the eye so that you can perform that.



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[VIDEO PLAYBACK]

This video shows a four-point retrobulbar block. The dorsal and ventral locations, a spinal needle is passed through the eyelid to the back of the orbit. Anesthetic is administered. On the lateral and medial aspects, the needle is inserted through the canthi, and the surgeon's finger is used to block the globe as to not cause damage.

[END PLAYBACK]

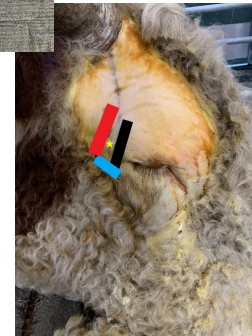
Typically, we do inject this coming out to provide a little ease through those locations. The block is very easily performed with roughly about 5 to 8 mLs per location in an adult but depending on the size and the depth of the orbital fossa itself.

This video shows a--

I don't know why they are doubling themselves up.

● Peterson block

- 10-12cm needle
- Curve
- Landmarks
 - Coronoid process of the mandible
 - Supraorbital process
 - Zygomatic arch
- ***Must stay in horizontal plain
- Walk off coronoid process and advance to the pterygopalatine fossa
 - 10-30mL lidocaine



A Peterson block is another block that is commonly performed. Typically you need about a 10 to 12 centimeter long needle. And we typically curve it as you see in this image up here. We do apply a little bit of a curve to that so that it makes it where it needs to be.

The landmarks, as you see here, are the coronoid process of the mandible, which is blocked by this red bar and the supraorbital process by the black bar you see here, and then zygomatic arch is going to be the blue bar. That star right in the center is the location that you go into. The importance of remembering this is that you need to keep that needle in a horizontal plane as it curves around.

You can have a technical mistake when administering this block if the curve of the needle points up or down. Instead of saying in that curve plane in a horizontal plane around, you can cause damage and actually potentially hit the optic vessels and have a very adverse reaction if administered lidocaine through that.

They always talk about walking off this coronoid process and advancing to that fossa behind the eye. And if you walk off that coronoid process and stay in the same plane holding your needle, there's rarely a problem. Typically about 10 to 30 mLs of lidocaine is what will fit back there depending on the size of the animal.

Some people prefer to use a guard needle like a 16-gauge short needle just to get through the skin. It is completely doctor dependent as to whether or not you feel that helps or hinders your process. But many people really think it will help to keep them straight as they go behind that.



Here is a video of the Peterson block being performed.

[VIDEO PLAYBACK]

In this video, you will see a Peterson block performed in a bull. The needle is inserted through an opening created by the supraorbital process cranially, the cornoid process of the mandible cordially, and the zygomatic arch ventrally. The needle typically has a slight curve, and it is advanced horizontally posterior until the needle comes in contact with the corid mandible. A lot of authors do not want to use the guide needle as they find it more difficult to push a curve needle through.

[END PLAYBACK]

Those are the two blocks that are commonly performed for enucleation surgery, and they really are doctor dependent as to what the doctor feels-- the surgeon feels the most comfortable to perform. Some people are very, very comfortable with the Peterson block and some are not. The four-point is a relatively easy block to perform, so many doctors stick with that in more general medicine.

- Caudal Epidural

- Sacrococcygeal space or first two intercoccygeal spaces
- Dose of 2% lidocaine = 0.5mL/45kg

- Can have ataxia



When we talk about doing reproductive procedures or to stop straining in ruminants, the first thing we think about is a caudal epidural. There are a few locations that can be done, the sacrococcygeal space or one of the first two inner coccygeal spaces. And what you see in this image here, the blue arrow is actually the sacrococcygeal space, and then the orange arrow is the first intercoccygeal space.

We typically dose this at about a half a mL for 45 kgs of 2% lidocaine. You can have some ataxia after this. So you want to be aware of that when you're working with these animals after you finish your procedure. But typically what we do is pump that tail to find that movable space. And you want to advance the needle through the skin completely perpendicular to the tail head right on midline. If you are slightly off midline or are not perpendicular, you very much may miss the space.

Once we get through the skin, we do a hanging drop technique where several drops of anesthetic are placed into the hub until you make a meniscus on top of there. And then as you advance that needle, you'll lose the meniscus and have section of that fluid into the epidural space so you know that you're in the right area, and then the fluid should-- the lidocaine should flow easily when injected into that space.

It is a very simple and easy procedure to perform, most easily performed from the caudal

aspect of the animal so that you can ensure that you are truly right on midline when doing this. Very routinely done for straining from chronic prolapses.

Vaginal prolapse is sometimes uterine prolapse as well as for delivery of dystocias where you are not looking for the dam to assist in pushing to aid in the extraction of the fetus if you have a lot of manipulation to perform. Once the animal is in a head catch or even just in an alleyway that confining the animal is very easily performed. Remember, success of this will be that when the straining stops into the tail will go flaccid. So it's pretty easy to tell once it's working efficiently.

● Internal Pudendal

- Indications
 - Bulls – penile relaxation w/o ataxia
 - Cows – stop straining with chronic vaginal prolapse
 - Removal of rectal/vaginal masses
- Landmarks
 - Lesser sciatic foramen
 - Internal pudendal artery and vein



Another block that we routinely perform in these animals is a pudendal nerve block. We commonly do this in bulls for penile relaxation without having the effects of ataxia. It will cause relaxation of the retractor penile muscles and for a cow to stop the straining with that chronic vaginal prolapse that has been out for an extended period of time, and she will just not quit. It also is really good if you need to remove some kind of rectal or vaginal mass.

When we think about the landmarks for this, this is commonly performed with the arm and the rectum of the animal and trans rectally palpating the lesser sciatic foramen. Many people, including myself, think that it's easier as that is a very subtle, little notch. In the pelvis, it find it easier to just palpate the internal pudendal artery in vein. They're pretty good size. You can feel them pretty readily where they are and make that be your aim for advancement of the needle.

In this image, you can see there these are guide needles. These are 16 gauge 3/4 inch guide needles that are placed at one and two at the area of just call to through the skin where at the level of those foramen so that you can advance your needle through there.

● **Internal Pudendal**

- 8.25cm needle
- Needle advanced to landmarks/ tip should be medial to the sacrosiatic ligament
- Withdrawal needle and advance 2-3cm dorsocaudally to get middle hemorrhoidal nerve



Minimally, an 8.25 centimeter needle is needed for this. And you advance it to those landmarks so that the tip should be medial to the psychosomatic ligament of the needle. When you withdraw the needle-- after depositing at that location, probably about 10 mLs or so, you want to back up and direct it, then advance it about another 2 to 3 centimeters dorsal caudally to that first one to hit the medial hemorrhoid nerve that branches off some of the sacral nerves.

It can also cause some straining issues and some irritation. So it's good to hit that one while you're also in there. And it's just a mild, slight adjustment that can be helpful with that.



In this video, the doctor is performing an internal pudendal nerve block in a bull. Many people choose to use a 14 to 16 gauge guide needle to prevent the spinal needle from deforming or dulling as it penetrates the skin as you see here in this video. The lesser sciatic foramen is palpated rectally. There is a depression in the sacral sag ligament.

Also the internal pudendal arteries in artery and vein can be filled and sometimes are more palpable than this foramen and used as a landmark. The needle is advanced to the site where the internal pudendal nerve lies. The tip of the needle should be just medial to the psychosomatic ligament. And 20 to 25 mLs of anesthetic is deposited in this location.

The needle is then withdrawn slightly and redirected 2 to 3 centimeters dorsal caudally and another 10 mLs of anesthetic it is deposited at this location to desensitize the branches of the middle hemorrhoid nerve.

The process has been repeated on the other side. Once again, everything has to be palpated transrectally so that you're in the right location and feeling what you need to feel. Success of the block is obviously in a bull. The retractor penile muscles relax, and the penis is then extended from the sheath. In a female, it will be that the straining stops. It's a very easy for block to perform.

Do you remember, with bulls, once you finish whatever procedure that you are doing, it's going to be a little bit of time before the penis is actually able to be withdrawn back into the sheath. So in many cases, we do recommend replacing the penis inside the sheath manually sitting in a urine egress tube and wrapping that so that he does not injure himself while we're waiting on sensation to come back and him to be able to replace the penis within the sheath.

- Dorsal penile

- Penis is held in extension with towel clamp
- 2-4mL of 2% lidocaine is deposited on the dorsal surface proximal to area of interest



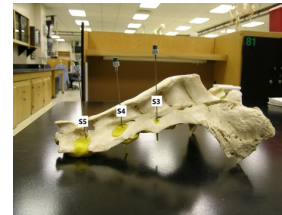
A common block that we do for bulls when trying to deal with penile issues is a dorsal penile nerve block. The penis is held in an extension typically with a towel clamp under the dorsal apical ligament as you see here. And two to four males of 2% locking is just a positive on the surface of the penis proximal to the area of interest.

Obviously, you see here this bull has warts. And so what we will do is the towel clamp is under the dorsal apical ligament. He has warts not only on the glands but also up here with the penile free facial attachment. A tourniquet is placed because we don't want all of our anesthetic to leave us. And the anesthetic is in place on the dorsal aspect right at the level of that area there.

This allows us to do many procedures with just simple restraint of either in a chute or on a tilt table. And a mild amount of anesthetic definitely is a added benefit that we're able to hold the penis in extension during this and provide local anesthetic and have a very quick procedure.

- Sacral Paravertebral

- Anus, vulva, vagina, retractor penile muscles
- Pudendal nerve, medial and caudal hemorrhoidal nerve
- *Animal can still move tail
- 7.5cm 18g
- Location
 - S3, S4, & S5 foramen
- 5-10mL dorsal and ventral to foramen



Dr. Richard Hopper

A block that is often forgotten about and I feel like very rarely used is the sacral paravertebral block for reproductive procedures and stopping of straining. It's actually going to desensitize the anus, the vulva, vagina, pair retractor penile muscles. It hits the pudendal nerve, the medial and caudal hemorrhoid nerves, but the added benefit of this is the animal can still move the tail.

So you can do this block for animals that are straining excessively or those that you need to do penile surgery on or anesthetize that area, but yet the animal can still move its tail. It can still feel that. You don't have that dead tail that we're dealing with, with many of these other blocks. It does require about a 7 and 1/2 centimeter 18-gauge needle to perform.

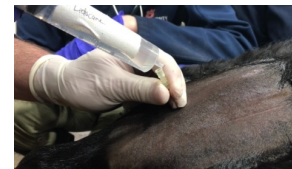
And what you're going to do is place your arm in the rectum and palpate this foramen, use that needle and advance through each of the three, four, and five cycle foramen and deposit 5 mLs above and below the foramen. And you can palpate this. You can feel the tip of the needle turns rectally with your hand while palpating the bull. And you just pull that slightly further dorsal and deposit a little bit more.

Personally, I like to go ahead and deposit under the ventral foramen, and then do the dorsal foramen on the way out. I feel like the animal reacts less in my hands doing this.

But this is a much easily performed block that is rarely used most of the time mostly because it probably takes a little bit more time than some of the others as there is a total of six sites that we are injecting each of the frame and bilaterally. But it is very effective and allows the animal to be able to move that tail swat flies, which is a big thing in the South, while not being in that constant to make mistake that we're dealing with, with vaginal prolapse uterine prolapse, things like that.

- **Lumbosacral Epidural**

- Recumbency w/o sedation for abdominal surgery
- Pelvic limb paralysis
- Cattle - 9-16cm 18-20g
- Location
 - Between L6 & Sacrum
 - Perpendicular to skin
 - Immediately caudal to a transverse line between wings of ilium
- Will feel a pop during advancement



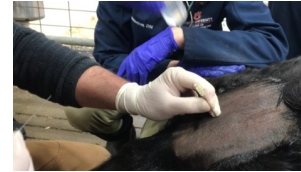
Another one is the lumbosacral epidural. This allows for incumbency without sedation for abdominal surgery and causes pelvic limb paralysis. In cattle, we typically use a 9 to 6 centimeter, 18 to 20 gauge needle.

And you're going to go between the six lumbar vertebrae and the sacrum perpendicular to the skin and immediately caudal to the transverse line between the ilial wings. You'll use this as a guard and palpate the ilial wings. And usually you can fill it right between there. When you are applying that needle and advancing it, you'll feel it pop when it enters the epidural space.

As you can see here in these images as they're advancing through and trying to put a hanging draw upon there,

● Lumbosacral Epidural

- Doses
 - 1mL of 2% lidocaine per 10kg
 - 1mL/45kg (reported)
- If the needle is accidentally advanced into subarachnoid space – cut dose in half
 - Will have CSF



doses that we typically deal with are 1 mL of the 2% lidocaine for 10 kgs. Some people have used the 1 mL or 45 kgs. I feel like that's going to probably not get exactly what you need.

If the needle is accidentally advanced into the subarachnoid space, use half the dose. This is extremely important. You know you'll reach this when you have CSF fluid present. I feel like in some cases it's easier to identify when you're in the epidural space in a goat than it is a cow because goats typically, even under anesthesia, will flag their tail a little bit out of reflex when you enter that epidural space. And there's just this one pop that you feel.

If you do get CSF back, give half the dose of what you have. Otherwise, you're probably going to have some seizure activity and some bad complications potentially with that. But give half the dose slowly and everything will be just fine.



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Play video.

[VIDEO PLAYBACK]

In this video, lumbosacral epidural is performed in a cow. This animal is in sternal recumbency seat. You can see the doctor inserting the finger into the parallel lumbo space between the ilial wings. He advances the needle through the skin and towards the space.

The hanging drop technique is used here. Anesthetic is put in the hub of the needle. The needle is then advanced further into the space. When the proper space is located, the fluid is pulled into the canal as you see there. And the anesthetic is applied.

[END PLAYBACK]

This block can be performed in standing animals and is common what we do with an animal in a sheet like the OV sheet that we have here, the sides up and out. And so we put an animal in a head catch or push them up between two panels. Perform this epidural to cause pelvic limb paralysis, and then do a ventral midline C-section and commonly after rolling the animal up slightly over from dorsal, we're kind of that same--

But the good thing about that is it's safety of the animal. You're able to position them. The animal is still awake but unable to move their rear legs. So safety for the animal and the sergeant are both considered when performing in this.

- Line Block

- Most basic
- 5-10mL administered in a line
- 3.8cm 18-20g
- Disadvantage – vasodilation causes more hemorrhage at incision site



Here we talk about blocks for laparotomy. The most common thing we do is a long block. It's the most basic, and it is exactly what it says, performing alone block, starting dorsally and moving ventrally administering 5 to 10 mLs in a line through the abdominal musculature and the skin. Typically we use about a 3.8 centimeter needle that's about an 18 to 20 gauge.

The disadvantage of this really is the vasodilation that's caused by the lidocaine causes more hemorrhage at the site, and so we will have more bleeding there. You can perform this either straight up and down like you see in this blue line at an angle like you see at this yellow line. The yellow line, that to me is more of what I do when I'm performing a C-section.

The blue line is more so for abdominal exploratory or something like that. And really just apply the anesthetic at the location at which you need it. It requires less anesthetic than using the next block that we're going to talk about, which is an inverted L, because we're just administering it at the site that we're actually going to need to be cutting.

- **Inverted L Block**

- Desensitizes paralumbar fossa
- Two lines
 - Caudally from the rib, parallel to transverse processes
 - Ventrally from the 1st or 2nd transverse process of lumbar vertebra, parallel to last rib
 - 5-10mL per site



When we do an inverted L, it's going to desensitize the entire pair of lumbar fossa. And we make two lines, one going caudally from the last rib, as you see here, parallel to the transverse process, the straight blue line right under those transverse processes, and then a second one going ventrally from the first or second transverse process up here at this corner of this inverted L down parallel to that last rib. And then that yellow line there is what you say that would be to your incision. Once again we're going to do about 5 to 10 mLs per side.

I always tell my students that you start in the corner of this inverted L and work caudally and ventrally so that hopefully the next place you stick it doesn't feel as much pain because the anesthetic starts to work just out of courtesy for the animal. This provides a lot of-- this provides desensitization to the entire paralumbar fossa, everything that's within that L, and works very, very well and is very easy to administer. Requires more lidocaine than the basic line but gives you a little more variability as it's going to block that whole area as to where you can put the animal.

- Proximal Paravertebral Block

- Nerves blocked – T13, L1, L2
- Location
 - Cranial to transverse processes of L1, L2, L3
- Can use guide needle
- 7.6-15.2cm 18g
- 5-10mL per site



Additionally, for laparoscopic-- laparotomy procedures are the pair of vertical blocks. A proximal paravertebral block is going to block T13, L1, L2 nerves at the location cranial to the transverse process of L1, L2, and L3. And that's what you see here drawn on the animal. We have our last rib right here. And each one of these needles are just cranial to those transverse processes on those animals.

You can use a guide needle, which is what these are. These are 16 gauge 3/4 inch that we then ran a larger or longer needle through an 18-gauge, usually about a 7 and 1/2 to 15.2 centimeter needle down straight in front of those transverse processes. And you deposit about 5 to 10 mLs per side. This is going to block the majority of the paralumbar fossa and allow for abdominal surgery there.

I will say that it can be very, very hard to palpate L1 in many very well conditioned animals. It's easier to find it in very animals and beef animals in general. But that transverse process of L1 can be very, very hard to palpate and find. It's a very small bone that is hidden under a lot of time and a lot of muscle. So that can be one of the problems with doing that one.



Here you can see this done in a video.

[VIDEO PLAYBACK]

This video shows a proximal paravertebral nerve block. In many cases, the doctor decides to use a guide needle to aid in administration and preventing barring of the spinal nail during deposition of the anesthetic. A 14-gauge guard nail can be placed just caudal to T13, L1, and L2 vertebrae approximately 4 to 5 centimeters off midline in most cattle. This will put them just caudal to those respective vertebrae.

[END PLAYBACK]

And you can see there she's showing you two, three, and four of those processes. And she should place in the guide needle first. From here, then spinal needle will be advanced through each of those and--

[VIDEO PLAYBACK]

The spinal needle is inserted through the guide needle and should be advanced until it hits the caudal aspect of the transverse process. It's then walked caudally off that process and

advanced 1 to 2 centimeters further through the fascia where 5 to 10 mLs of anesthetic is deposited. Then the needle is withdrawn approximately 1 to 2 centimeters. An additional 5 to 10 mLs of anesthetic is deposited dorsally to the transverse process. And the procedure is repeated for the following vertebrae.

[END PLAYBACK]

And so that's what is done for all three sides.

● Distal Paravertebral Block

- Nerves blocked – T13, L1, L2
- Location
 - Above and below transverse processes of L1, L2, L4
- 7.6-15.2cm 18g
- 15mL above and below each process
 - 3 sites – cranial, medial, caudal



The distal paravertebral block, it once again is going to block the same nerves T13, L1, and L2. The location of deposition is just above and below the transverse processes of L1, L2, and L4 vertebrae. We're going to use the same size needle.

And about 15 mLs is placed above and below each process in a fan motion pretty much with three sites with five males going cranial, medial, and caudal on each transverse process above and below it. When I teach my students how to do that, I tell them, like, if my fist is the end of that transverse process, that they should be aiming that needle to hit the very end of it, and then walk off this top and go right across it in a fan motion going cranial, middle, and then caudal.

If you're not really close to where you're almost just scraping the periosteum, you're probably not going to get a good block. Those nerves won't run extremely close to the top of those transverse processes and can be really easily missed, especially on the ventral aspect. Once again, L1 vertebra has a very tiny transverse process. And unless that animal is thin, it is hard to palpate it much less hit it, especially in a well-conditioned beef cow.

So this is a block that I typically only do in a dairy cow where I can palpate that transverse process well. It can be very difficult to do. And you always want to make sure that you're skipping lumbar three, of course. But what I usually tell my students is the one you can

palpate, the first one you can find and palpate is usually L2. And you can see the space from lumbar transverse process of 2 to the 13th rib there.

It's a little bit of a distance. And so usually this is the one they find, and then L1 is the one that can't find. And it's very much hidden in musculature.



[VIDEO PLAYBACK]

In this video, the doctor performs a distal paravertebral nerve block to desensitize T13, L1, and L2 spinal nerves. L1, L2, and L4 transverse processes are identified. A needle is placed just prox-- just dorsal to the transverse process, and 5 mLs is administered cranally, medially, and caudally proximal to the vertebrae.

The procedure is repeated ventrally of the transverse process of the same vertebrae. The procedure is then repeated for L2 and L4 transverse processes.

[END PLAYBACK]

It can be very difficult to do what is being done here and just slide the needle out, and then go under the process. Sometimes you actually have to administer it through a second injection site, especially when you get to four at the end of that transverse process is much thicker. But fanning across it and being extremely close to the bone is very important for proper technique and to desensitize these nerves. This does allow for once again complete desensitization of the paralumbar fossa for abdominal surgery.

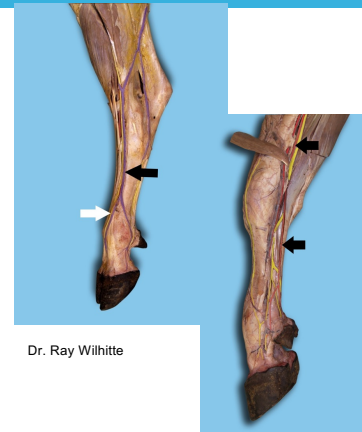
- Ring Block or Inverted V
 - 4-6mL per site
 - 1.6cm 22- 25g
 - Base of teat

When we start thinking about doing ring teat surgery, teat lacerations in dairy cows, typically what we talk about is either just a brain block around the whole base of the teat, putting about 4 to 6 mL per site. Typically, a 22 or 25 gauge needle or something much smaller is done or a V block where we're just blocking down each side of the laceration to allow for it to be repaired.

Unfortunately, this is one place. It's really hard to get a video with an animal standing in a shoot. But it's basically just going all the way around at the base of the teat. And it's relatively simple and easy to do. Typically, you can tell a cow and get her to stand pretty well for it.

- Bier Block

- Tourniquet
- Butterfly catheter
- 20mL
- Thoracic limb
 - Common dorsal metacarpal, palmar metacarpal vein, radial vein
- Pelvic limb
 - Lateral plantar digital vein, lateral saphenous vein



Dr. Ray Wilhite

Surgery to the foot is commonly done for us, something we do a whole lot typically just on a tilt table that we have here at the school. We typically do what's called a bier block, or a tourniquet is placed proximal on the limb to the area of interest. And we find it easiest to use a butterfly catheter. And a 20 mL-- roughly 20 mLs of lidocaine is what we can distend into that vessel to cause desensitization to the foot.

And the thoracic limb, we're going to use the common dorsal metacarpal, the palmar metacarpal vein, or the radial vein. In the pelvic limb, we're going to use the lateral plantar digital vein, or the lateral saphenous vein are probably the most common. And you can see those here in these images pointed out some of them.

- Bier Block

- Not visible or palpable
- Middle on the front of foot
- A thumb width from the dewclaw
- 45-degree angle
- Do NOT aspirate



But the most common place that we do a bier block is going to be distal on the foot. This is what we used for amputations, interdigital fibral removals, severely painful procedures if we're having to do a hoof wall resection, things that are very painful in that foot, and we have them on that tilt table. You can see the end of the tourniquet here. We prefer a butterfly catheter for doing this.

This vessel is not palpable nor is it visual pretty much at all. We either go medial on the foot like you see the image at the bottom right there with that right on midline or on the lateral aspect about a thumbs width away from the declaw. And you're about at a 45 degree angle when you advance this needle through the skin. It's relatively superficial.

And the biggest key thing to this is we don't ask for it back. If you ask for it back, the vessel's going to blow. We just get blood through the catheter and slowly administer our 20 mLs of lidocaine. It works very well for us. You can leave that tourniquet on for about 30 to 45 minutes before needing to release it, 45 minutes maximum. But this provides us the ability to remove corns, amputate claws, and have very comfortable patient during that process.



[VIDEO PLAYBACK]

This video shows a bier block performed on the palmar aspect of the foot. A butterfly catheter is inserted on midline at about a 35 degree angle. Both authors prefer to use a butterfly catheter for this procedure as it tends to have less damage to the vessel if the animal was to move. You can see that the tourniquet is in place.

Repositioning of the needle is sometimes necessary to find the vessel as it cannot be easily seen or palpated even with the tourniquet in place through the thick skin of the distal limb. Once the venial puncture has occurred, it is very important not to pull back on the plunger of the syringe and attempts to aspirate. This could disrupt the integrity of the vessel. Anesthetic should just be administered slowly as seen in this video.

[END PLAYBACK]

Block for Foot



Local and Regional Anesthesia in Food Animals

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And here's the latter one.

[VIDEO PLAYBACK]

This video shows a Bier block being performed on the lateral aspect of the foot. You can see a tourniquet is in place, and a butterfly catheter is inserted at about a 35 degree angle about a thumbs width from the do claw. And anesthetic is administered.

[END PLAYBACK]

- Spermatic cord
- Intratesticular
 - Can give anesthesia in testicle



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And so that allows us to do some very in-depth surgeries very routinely with the animal awake and on foot, on the table, very safe, and good way to perform that. When we talk about castrations and blocking for that, a court block is commonly done where we just administer 5 to 10 mLs depending on the size of the animal into the cord of the testicle with the product pretty much at the neck of the scrotum as you see there in that upper image.

The other one that we typically do can be an intratesticular block, or we administer depending on the size of the testicle anywhere from 5 to 25 mLs, sometimes 30 mLs of lidocaine into that testicle. Obviously this is for castration as this would be very bad for his reproductive career.

The other thing that we can do that we commonly do when castrating these animals is we will actually administer our anesthetic in there as well as far as what we're going to use for sedation. It will work just like an IM injection. And the bonus to this is we put about half a dose in each testicle. And then once you remove them, that extra drug is actually removed from the body. So they don't have to metabolize it to wake up and typically wake up quicker.

So we commonly, with small ruminants, with bores, commonly administer the sedation

and anesthetic all into the testicle so that the animal will recover faster and not stay as anesthetized as long as typically they would.



[VIDEO PLAYBACK]

This video shows a spermatic cord block performed in a recumbent bovid. As you can see, the needle is inserted into the cord. Aspiration occurs to ensure that you are not in the vasculature. Each cord is injected in the neck of the scrotum with a testicle pulled eventually into the scrotum.

[END PLAYBACK]



And then--

[VIDEO PLAYBACK]

Testicle particularly administration of anesthetic is a common procedure. As you can see, then anesthetic is injected into the center of the testicle. This can also be done for administration of induction agents for castration.

[END PLAYBACK]

And that's typically exactly what we would do and take out each testicle. You remove the extra anesthetic sedation, and you don't have to worry about them taking as long to recover. It's definitely a good thing with swine. As we all know, they don't handle sedation as well as some of our other patients.

So just things that we have done that have worked really well with many of our patients and found to work really well. They'll absorb it and process it just like an iron injection. Only it doesn't hang around as long as you're removing your remaining of it when you remove the testicle.

Testicular administration--



Thank you for choosing Vetcetera!

Jessica Rush, DVM, MS, DACT

That is the end of my presentation. I feel like I talked really fast, but I covered a lot in an hour. I appreciate your attention. And if you have any questions, I will be happy to answer them at this time.

Thank you, Dr. Rush. That was really great. I learned a lot, and I really appreciated having videos. It was really helpful to see how and where. So no questions. So you must have done such a great job that they got all the info they needed, so excellent work. As always, Dr. Rush, we really appreciate your time and what you've shared with us here tonight. And have a great evening. That wraps us up for tonight. Thanks, everybody.

Thank you, all.