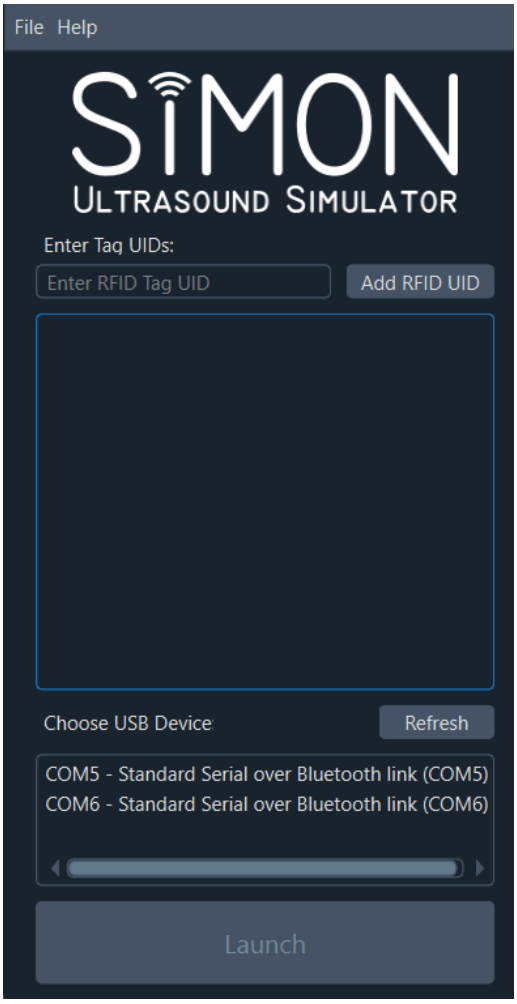
SIMON Equine Distal Limb Ultrasound Simulator

Information Packet

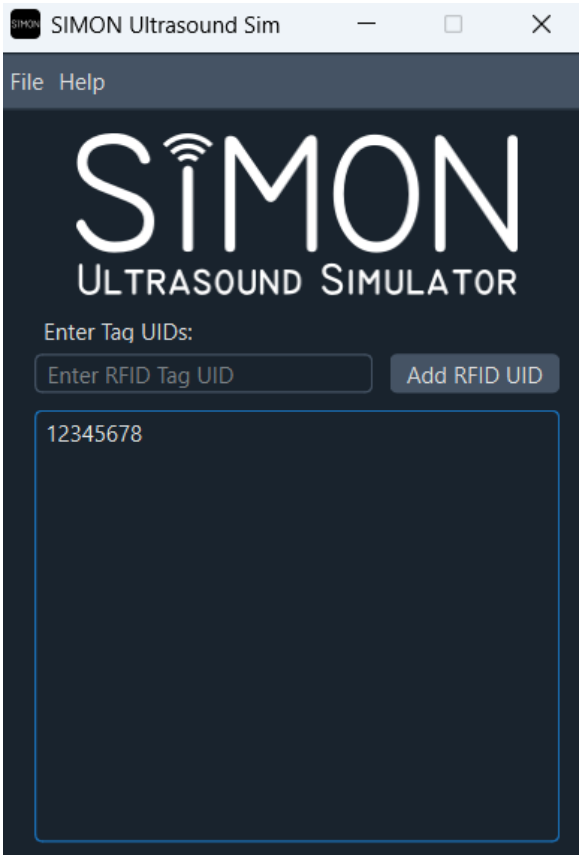
Tutorial

Before starting, create a new folder in your computer library. This is where you should save the ultrasound videos you plan to use for the simulator **(the name and location of this folder is irrelevant)**. Videos can either be your own collection, or you can download ultrasound videos from our website at: **simonedu.org**

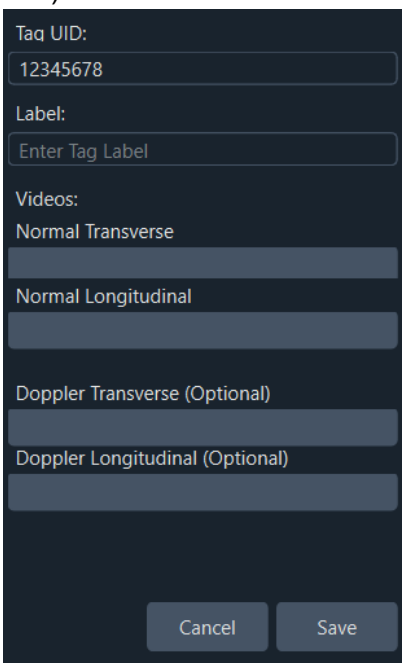
Step 1: To start, download the SIMON software on your computer from our website at **simonedu.org**. Once the software has been installed, double click the program to open the user interface as seen below.



Step 2: Refer to the “Tag ID Card” included in your kit and find the first code listed on your card (all codes are 8 characters long). The first code listed on your card should correspond with “MC-1A”. Next, on the user interface, enter the first code from your card into the space titled “Enter RFID Tag UID” **(first image shown below)**. Once you have entered the code, click the button titled “Add RFID UID”. This should add it to the white box **(second image shown below, with “12345678” as an example).**

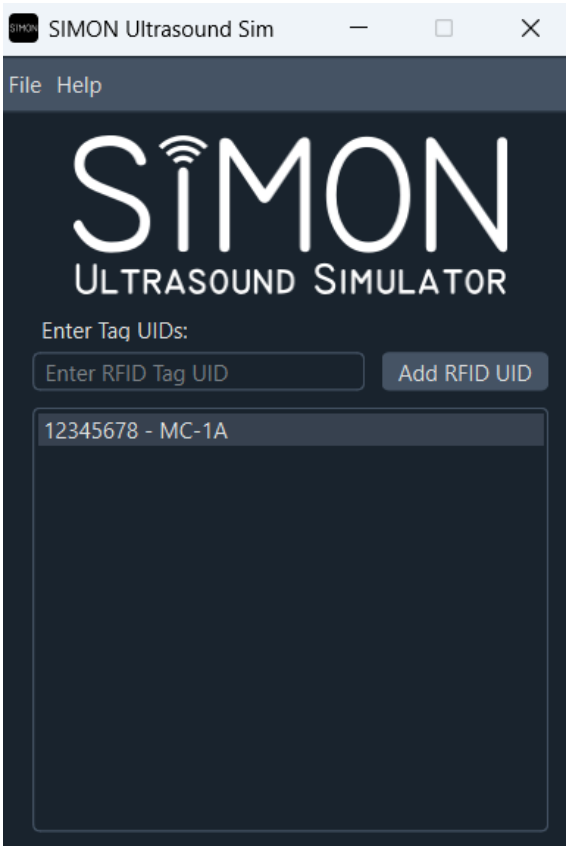


Step 3: Double click the code (12345678) in the large box. This should open another window **(shown below)**. In the section titled “Label”, enter the tag name as listed on the “ID Card” in your kit (for example, Tag #1 should be labeled “MC-1A”, Tag #2 should be labeled “MC-1B”, etc.).



Next, double click the box under “Normal Transverse”, which will open file explorer on your computer.
In file explorer, navigate to the folder containing your collection of ultrasound videos (created at the beginning of this tutorial). Select a transverse video corresponding with the label from your “Tag ID Card” and then click “Open” to upload it (for example, with Tag #1, you would upload a transverse video of MC-1A). **The video you upload can either be normal or pathological, whatever you want to see in this location.** Repeat this process for the Longitudinal section. **Make sure you upload transverse videos to the transverse section, and longitudinal videos to the longitudinal section.**
“Doppler” videos are completely optional for the simulator. If you have any doppler videos that you wish to use for this specific region, you can upload them to the corresponding section.
Once you have uploaded all the desired videos for this specific tag, click “Save” at the bottom.

Step 4: Clicking “Save” should bring you back to the main user interface. The tag you just entered should now be listed in the large box **(example shown below)**. If you wish to edit the information or videos associated with this tag, simply double click it to re-open the window from the previous step.



Step 5: Repeat steps 1-4 for each tag listed on your “Tag ID” card. Make sure to title the tags correctly and upload the right videos for each anatomical location.

Step 6: Once you have finished uploading the videos for each tag, you can save this information as a "case" by going to "File" → "Save As…" **(shown below)** and saving under the appropriate name. The next time you run the program and want to access this "case", go to "File" → "Load" and select the desired file in your computer library. **For example, if the videos you uploaded to each tag are considered "normal findings", you can save these settings as a "Normal Case". Then, the next time you want to look at a "Normal Case", you can simply press "Load" and select the appropriate file. By saving your settings, this will prevent you from having to re-upload videos every time you run the software.**

Step 7: Plug the ultrasound probe into your computer using the USB cord included in your kit. When the probe is plugged in, a device should appear in the box at the bottom of the user interface **(shown below as "COM3")**. If you do not see a device when you plug your probe in, try pressing "Refresh". If this does not work, try plugging the probe into a different USB port. **Once the probe is detected by your computer, simply click once on the name listed in the box to select it.**

Step 8: After completing steps 1-7, click the button at the bottom of the user interface titled "Launch". **The program will not launch unless a USB Device has been selected.** Pressing "Launch" will start the simulator and should prompt a black screen to appear.

Step 9: You are now ready to perform a simulated ultrasound exam on the equine limb model included in your kit.
To begin your exam, hold the probe by the handle and lightly press the gray end against different regions of the equine limb. **If you are not familiar with the location of equine distal limb anatomy, refer to the "Equine Distal Limb Anatomy Guide" included in this guide below the tutorial**.
While scanning the limb…

- If the probe encounters a tag, a video will play on your screen
- If the probe does not detect a tag, then a video will not play and the screen will remain black.
- Once you see a video, hold the probe over that spot to inspect it.
- While a tag is being scanned, the probe can be rotated horizontally and vertically to demonstrate transverse and longitudinal videos of that location, respectively.
- Scan the full limb to see different structures. The equine model is anatomically accurate and represents the location of structures in a live equine patient.

Step 10: To activate "Doppler Mode", press "D" on your keyboard while scanning a particular tag. This will play a doppler video of that specific location, **but only if a doppler video has been uploaded to that tag.** If a doppler video has not been uploaded to this tag (as previously described in this tutorial) then pressing "D" will do nothing. To exit "Doppler Mode", press "D" again.

Step 11: When you are done using the simulator, press "Q" on your keyboard to exit and return to the user interface.

Step 12: Before closing the program, make sure you have saved your current settings (if desired). If you close the program without saving your settings then your progress will be lost.

Equine Distal Limb Anatomy Guide

Abnormalities of tendons and ligaments of the distal limb is one of the most common causes of lameness in horses. Ultrasound allows us to visualize these structures and determine if they appear healthy or not. For this reason, it is very important for veterinarians to develop competency with ultrasound and familiarize themselves with the normal appearance of the equine limb. However, this is easier said than done, as many veterinary students unfortunately graduate with little to no experience using ultrasound.
This equine distal limb ultrasound simulator is anatomically accurate and displays real ultrasound videos on your computer depending on where you scan the limb. Additionally, the probe is tilt-sensitive, and demonstrates either longitudinal or transverse videos depending on how the probe is oriented.

Practicing with this simulator allows students to familiarize themselves with normal anatomy of the equine limb. Additionally, video feedback can be customized to demonstrate pathology and other abnormalities. By learning equine ultrasound on a patient model, students can feel more comfortable before attempting the actual procedure on a live patient.

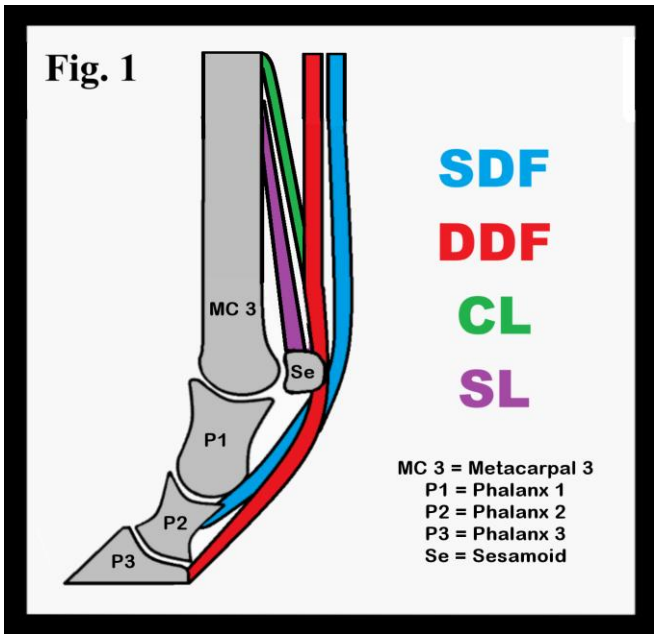
The key to performing ultrasound of the equine distal limb is knowing what structures you should expect to see at each location.

Additionally, it's important to understand that ultrasound of the equine distal limb is primarily done by scanning the palmar side (AKA "back" or "underside") of the limb. This is because the tendons/ligaments are located on the palmar aspect of the limb, and scanning the palmar aspect of the limb gives you the best visualization of each structure. *In other words, if you scanned the dorsal (front) part of the limb, you wouldn't see very much because ultrasound waves can NOT penetrate bone.*

There are four main structures to be aware of:

Superficial Digital Flexor (SDF)
Deep Digital Flexor (DDF)
Check Ligament (CL)***
Suspensory Ligament (SL)

****The "Check Ligament" in this case refers to the inferior check ligament, which connects MC 3 to the DDF. However, it's important to understand that there is another ligament referred to as the superior check ligament that connects the SDF to the radius. However, this ligament is located higher up on the limb and is not relevant to this simulator. In most cases of equine distal limb ultrasound, the inferior check ligament is the more important one we look at.*



Another name for "MC 3" is the "cannon bone"

*This diagram does not depict the sesamoid ligaments, those are shown on **Fig 3** below.*

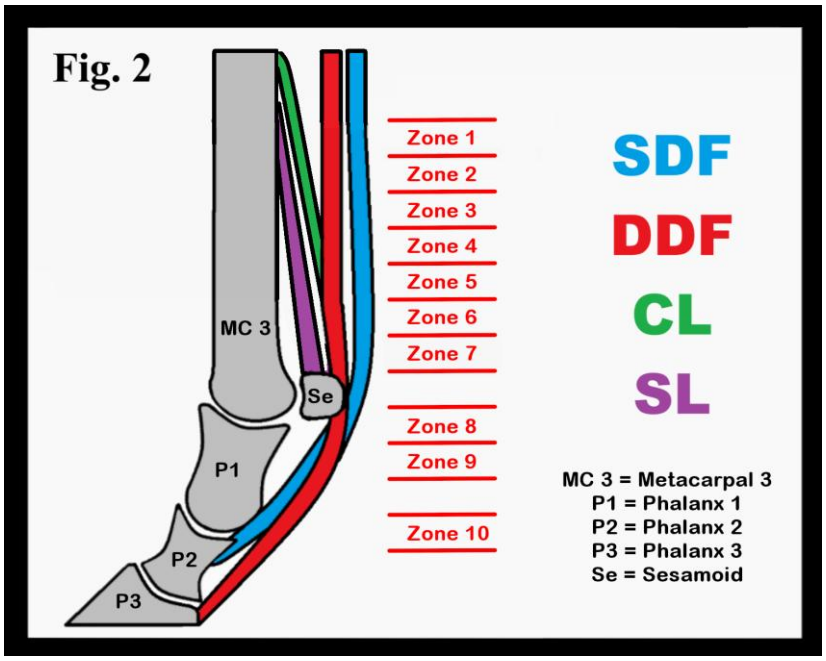
Important Anatomy Information

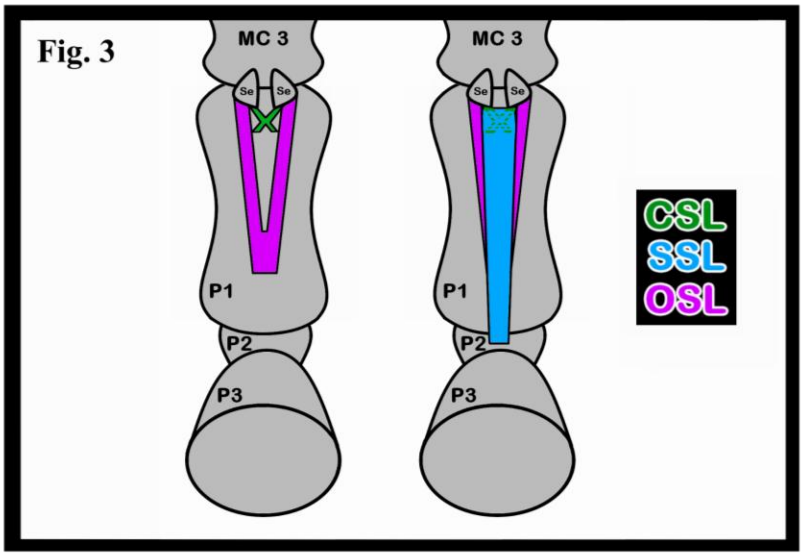
- The Superficial Digital Flexor (SDF) is the most superficial structure on the equine limb. However, beyond the first phalanx (P1), the SDF courses beneath the Deep Digital Flexor (DDF). From this point on, the SDF is deep to the DDF (as seen in the diagram above)
- As you scan the limb from top to bottom, the Check Ligament (CL) gradually moves towards the DDF, and eventually fuses with the DDF about mid-way down the bone (MC3).
- The Suspensory Ligament (SL) is the deepest structure in the equine limb and inserts (attaches) to the sesamoid bone towards the end of MC3.

"Origin" and "Insertion" of Each Structure

- **SDF**
  - Origin: Medial humeral epicondyle
  - Insertion: Middle Phalanx (P2)
- **DDF:**
  - Origin: Medial humeral epicondyle, radius, and ulna
  - Insertion: Distal Phalanx (P3)
- **CL:**
  - Origin: Middle region of the third metacarpal bone (MC 3)
  - Insertion: Deep Digital Flexor (DDF)
- **SL:**
  - Origin: Proximal region of the third metacarpal bone (MC 3)
  - Insertion: Proximal sesamoid bones (Se)

The equine limb is divided into “zones” (shown below). **Each zone is approximately the size of the ultrasound probe in your kit.** Depending on which zone of the limb you scan, the location and appearance of these four structures will differ.





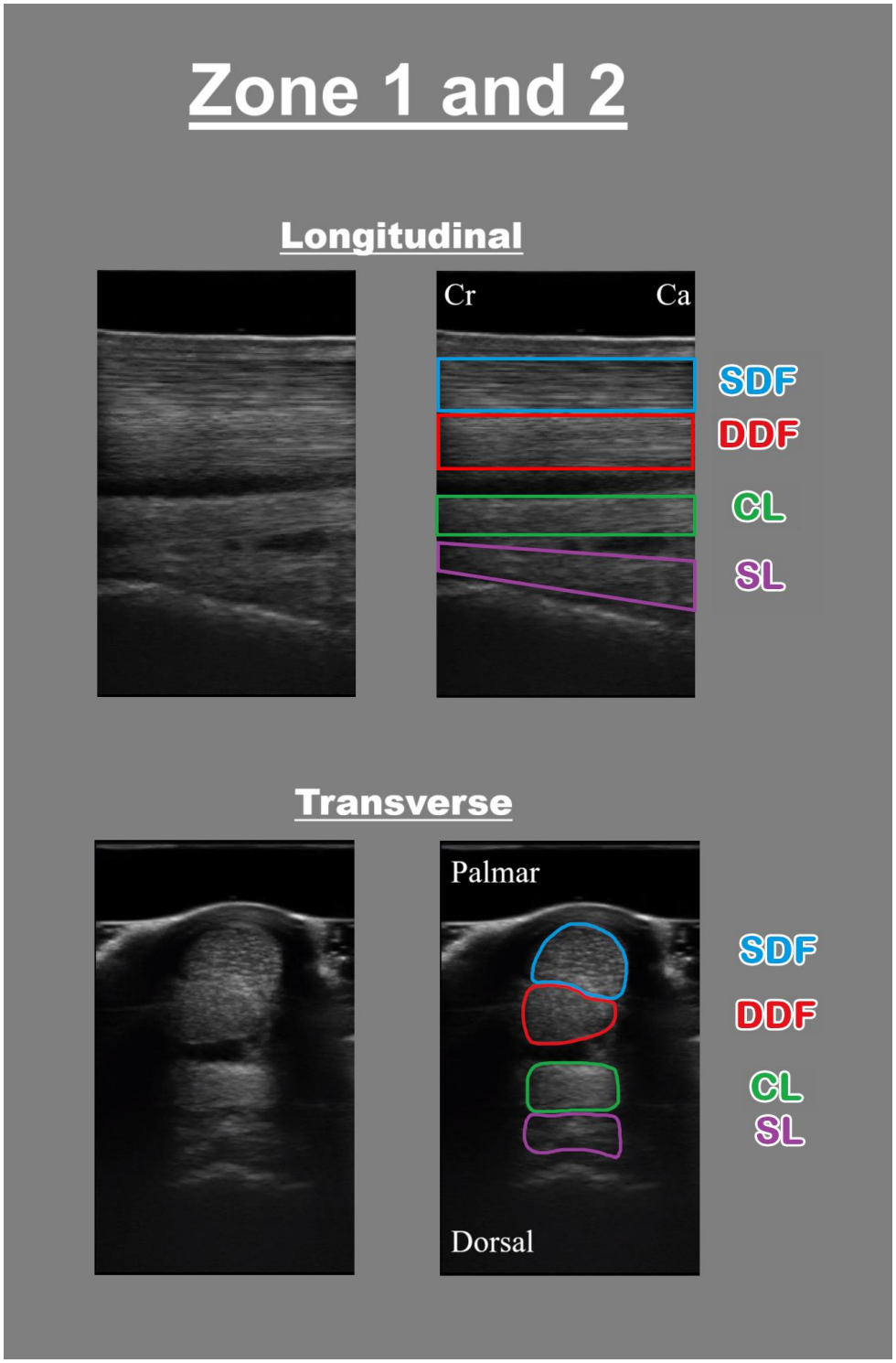
Pictured Above: Cruciate Sesamoid Ligament (CSL), Straight Sesamoid Ligament (SSL), and Oblique Sesamoid Ligament (OSL). These structures run along the palmar aspect (“back side”) of the limb.

Important Note: These three ligaments lie deep to the SDF and DDF, which are not drawn above. The SSL is the most superficial, and lies on top of the other two. The image on the left depicts how these ligaments look when the SSL is dissected out, while the image on the right shows all three of them together.

Labeled Ultrasound Images

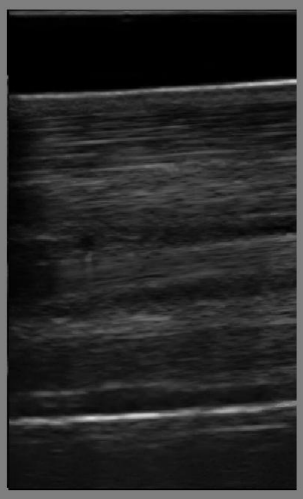
Zones according to diagram above (Fig. 2)

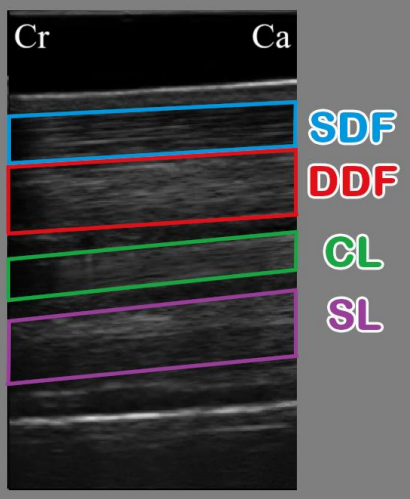
Cr = Cranial, Ca = Caudal



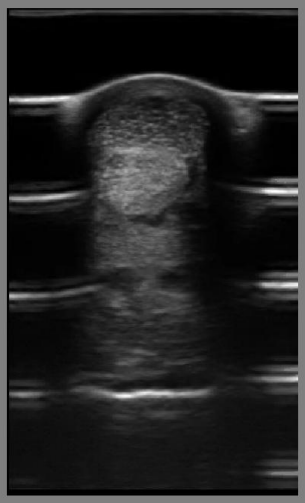
Zone 3

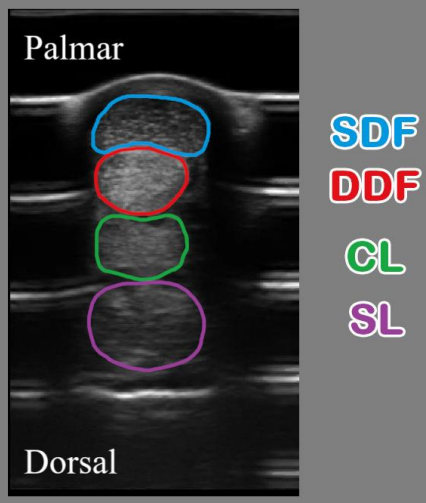
Longitudinal





Transverse

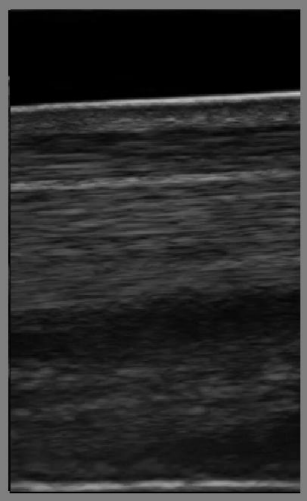


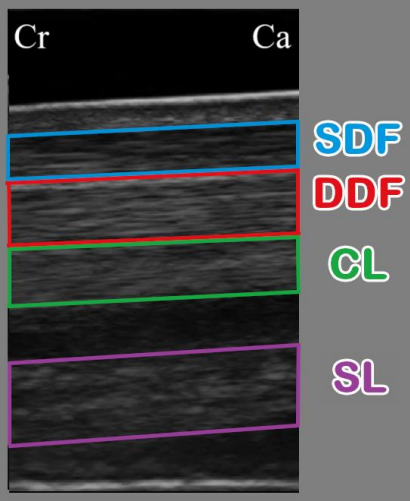


Notice the check ligament moving dorsally towards the DDF as you scan further down the limb.

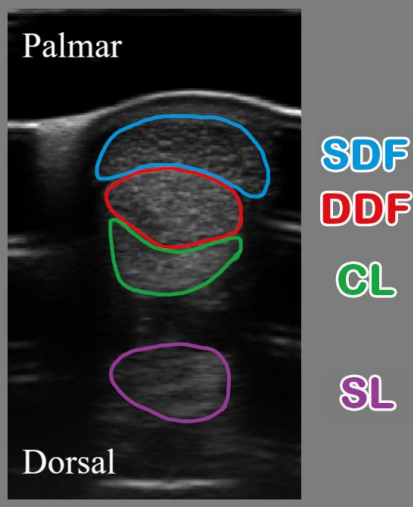
Zone 4 and 5

Longitudinal



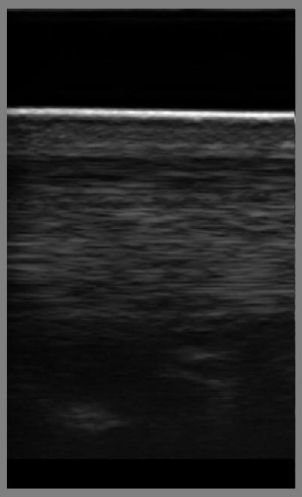


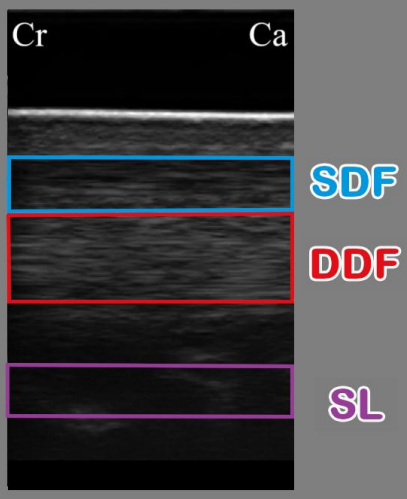
Transverse



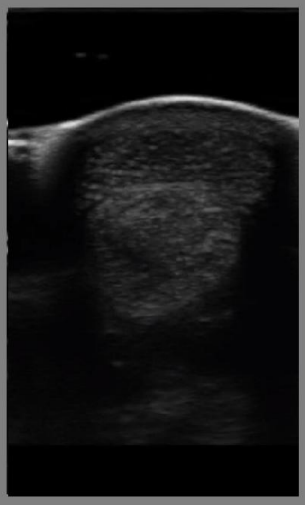
Zone 6 and 7

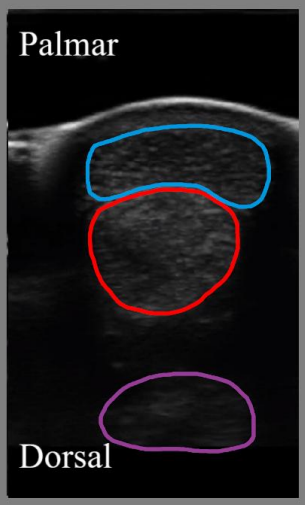
Longitudinal



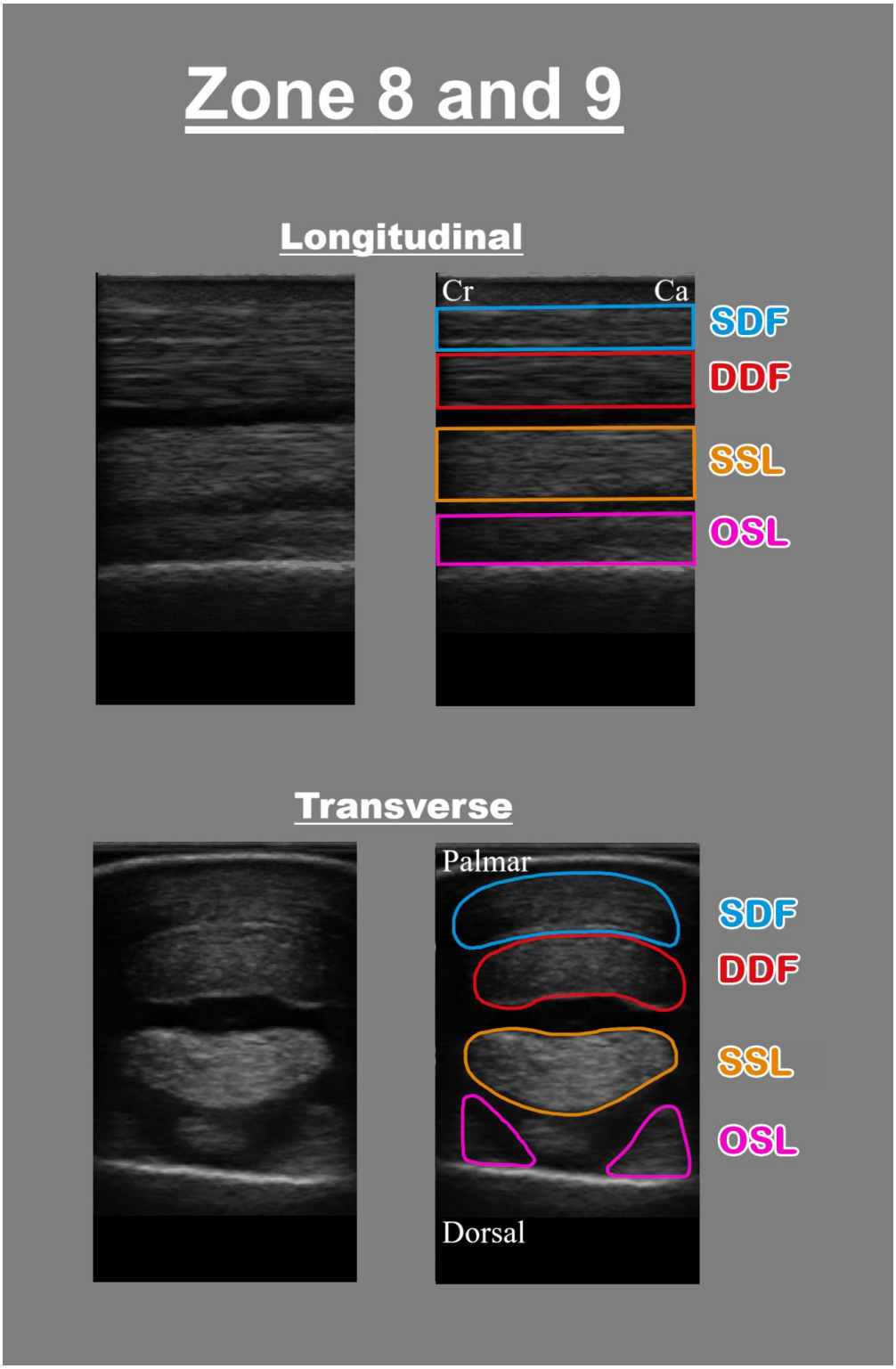


Transverse

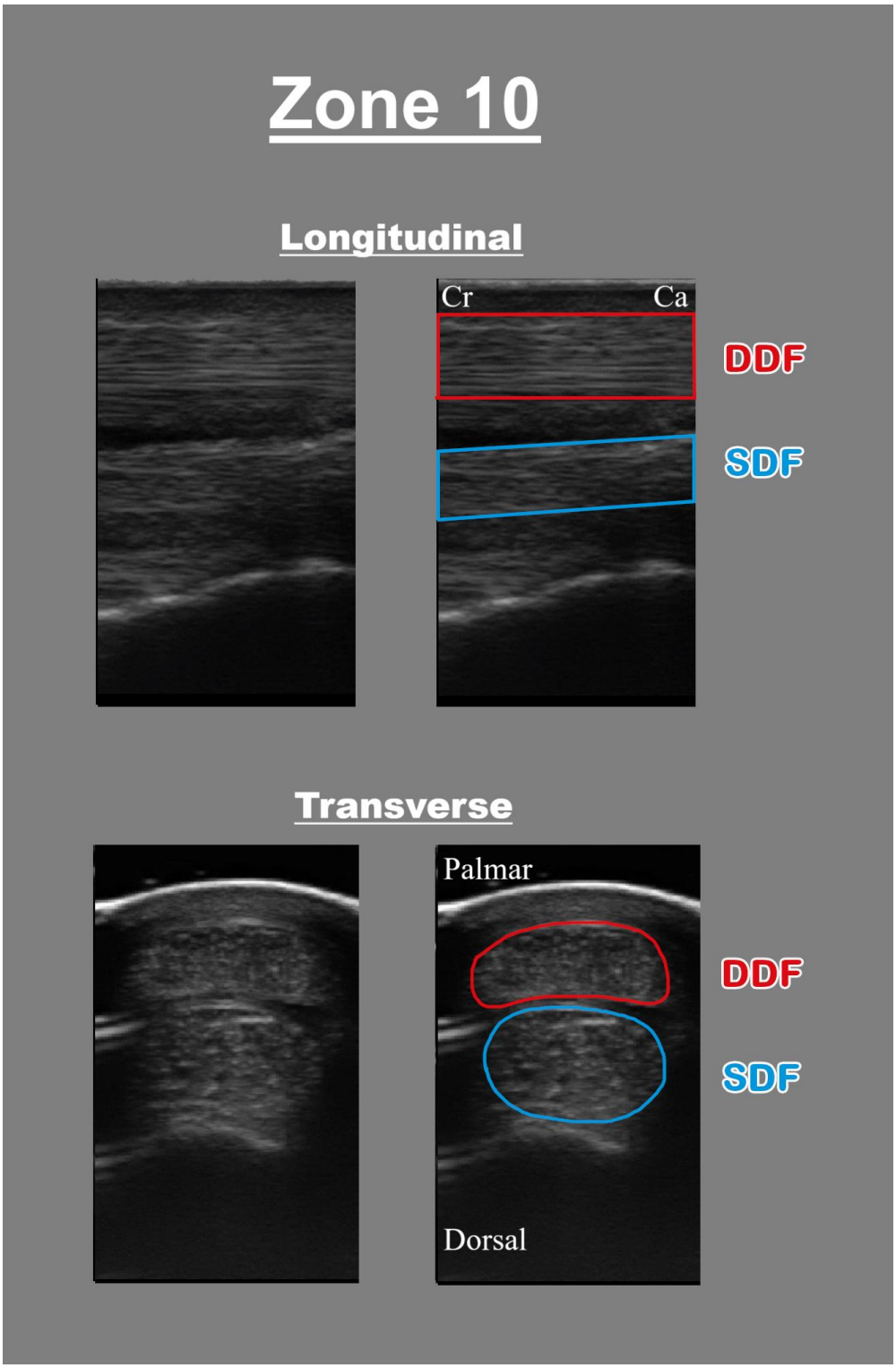




At this point, the check ligament has fused with the deep digital flexor.



This region is known as the pastern. Attached to the proximal sesamoid bones are three ligaments: the Straight Sesamoid Ligament (SSL), the Oblique Sesamoid Ligaments (OSL), and the Cruciate Sesamoid Ligament (not shown above). These ligaments can be seen in **Fig. 3**.



At this point, the SDF moves dorsally to attach to P2 while the DDF continues down a little further before attaching to P3. It may sound strange, but for a brief moment, the DDF is superficial, and the SDF is deep. This concept is best visualized on **Fig 2**.

Additionally, this region is beyond the attachment site of the three sesamoid ligaments, leaving only the SDF and DDF remaining.

Disclaimer: *The anatomy of the equine distal limb is very complex and intricate. While this anatomy guide can be a helpful way to learn equine limb anatomy, it is mainly intended to teach what the user should see on ultrasound specifically. In other words, there may be structures that are not depicted in this guide simply because it is not relevant to ultrasound of the equine limb. If one wishes to learn more intricate details about the equine distal limb anatomy, we encourage the user to refer to other sources in conjunction with this anatomy guide, as opposed to using this guide alone.*

Additionally, the structures seen with ultrasound of the equine distal limb often vary to a certain extent. While the images in this anatomy guide are accurate and serve as a good reference for equine limb anatomy, it is possible that the user may encounter slight differences between patients and the appearance of their limb on ultrasound.

Educational Product Disclaimer

IMPORTANT NOTICE — PLEASE READ BEFORE USE

The products offered by SIMON Education Systems, LLC are educational simulators designed solely for instructional and demonstrational purposes. These simulators are intended to help users, including students, educators, and curious learners, better understand the concepts and basic techniques of medical diagnostic procedures. They are not medical devices, and they do not provide real-time diagnostic data or clinical assessments.

Ultrasound Simulator Disclaimer

This product is a non-functional simulation tool. It does not produce ultrasound waves or interact with body tissues. It relies on RFID (radio-frequency identification) technology to display pre-recorded or pre-selected videos on a computer or tablet when scanning specific areas of a physical model. It is meant to help users understand probe placement, basic scanning techniques, and image recognition in an engaging, hands-on format.

- **This device does not diagnose, monitor, treat, or prevent any medical conditions.**
- **It is not a substitute for real ultrasound equipment or professional medical training.**
- **It should never be used in a clinical or emergency setting.**

The anatomy of the equine distal limb is complex. While this anatomy guide can be a helpful way to learn equine distal limb anatomy, it is mainly intended to teach the user about major structures they should see on ultrasound. In other words, structures like nerves and vessels have not been depicted in this anatomy guide simply because they aren't as relevant on ultrasound. If one wishes to learn more intricate details about equine distal limb anatomy, we

encourage the user to refer to other sources in conjunction with this anatomy guide, as opposed to using this guide alone.

Additionally, the structures seen with ultrasound of the equine distal limb often vary to a certain extent. While the images in this anatomy guide are accurate and serve as a good reference for equine distal limb anatomy, it is possible that the user may encounter slight differences between live patients and the appearance of their distal limb on ultrasound.

General Use and Safety

- **These products are intended for use by students, educators, and general learners in educational environments such as classrooms, labs, science fairs, or home learning.**
- **Children should use these products under adult supervision.**
- **SIMON Education Systems, LLC makes no medical claims and accepts no responsibility or liability for misuse of these products outside of their intended educational scope.**
- **Do not modify the devices or attempt to use them in any way other than as directed by accompanying materials and instructions.**

By using this product, you agree to the following:

- **You understand that it is a simulation and not a functional medical device.**
- **You agree to use it exclusively for educational and demonstrational purposes.**
- **You acknowledge that SIMON Education Systems, LLC is not liable for any outcomes, interpretations, or uses of this product outside the intended scope.**

For questions about the proper use of this educational tool, please visit www.simonedu.org.