‘How To’ Veterinary Ultrasound Booklet Index

Liver

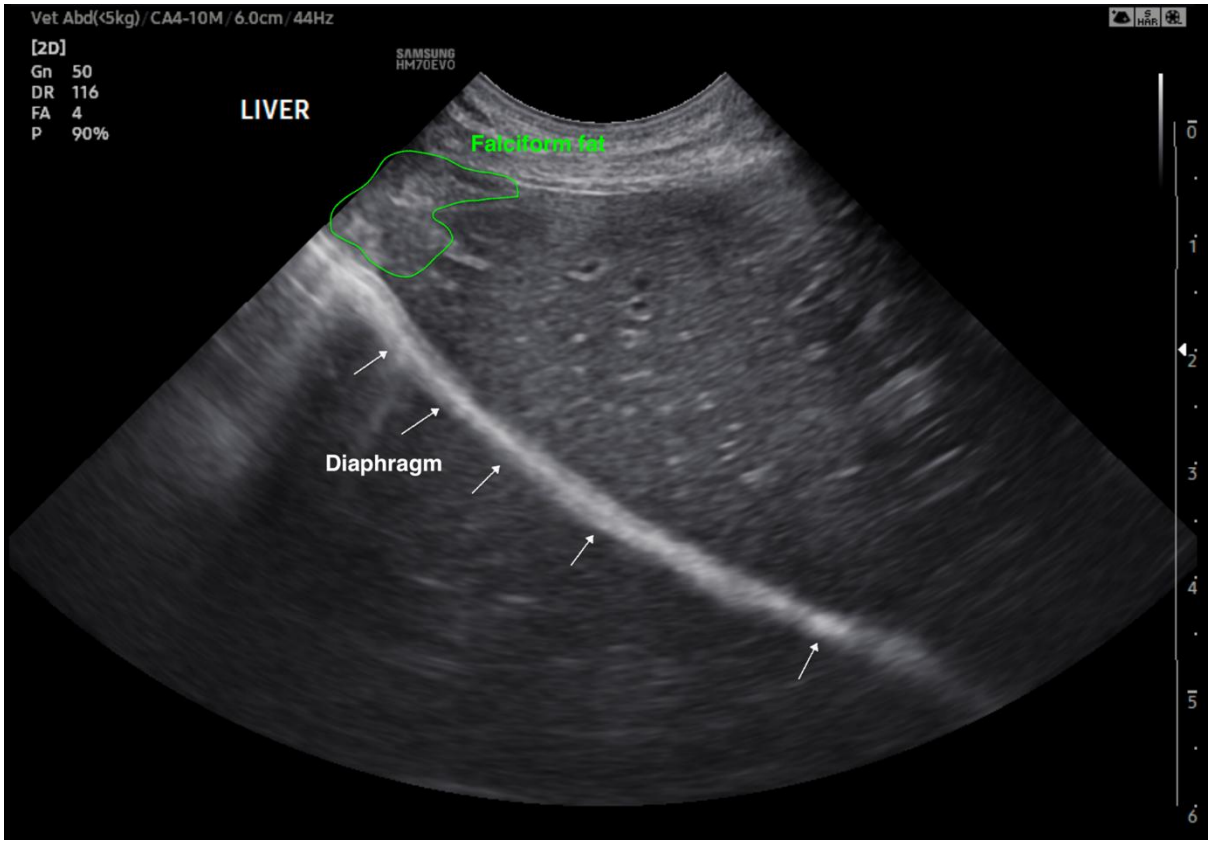
The microconvex probe, with its small footprint, is the probe of choice for the majority of your patients. The convex probe may be more appropriate for very large dogs (e.g. >45Kg)

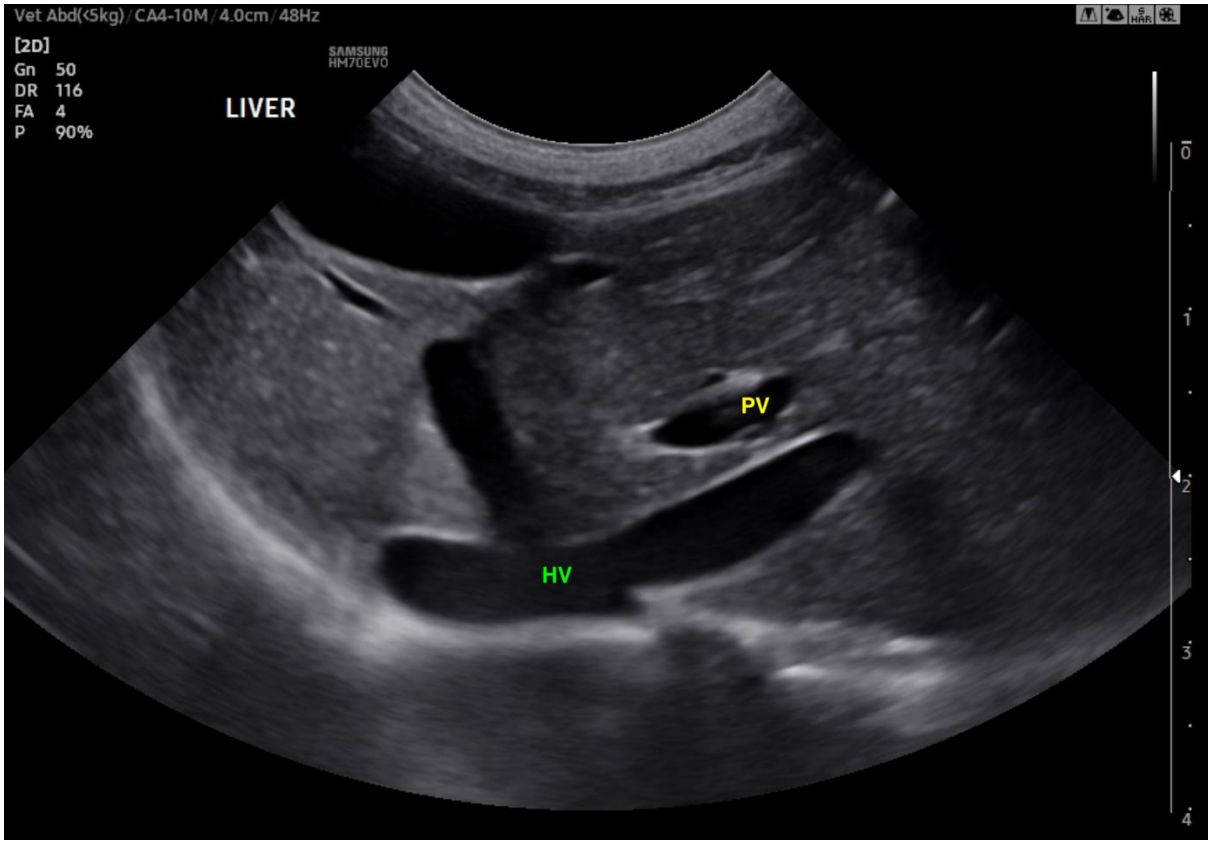
Scanning Sequence and Technique

The liver should be examined with your patient in right lateral recumbency and left lateral recumbency. This will ensure that none of its portions will be overlooked by the clinician.

1. With the probe in the **subxiphoid long-axis** position, **angle leftward** to examine the **left liver division**, cranially bordered by the **diaphragm-lung interface**.
2. **Sweep back to midline**, then angle right to evaluate the **gallbladder** region.
3. **Rotate the probe 90°** into transverse orientation. The probe notch should now point to the **patient's right**. Use slow, controlled **tilts ventrally and dorsally** to evaluate the depth and extent of liver tissue.
4. **The intercostal approach is most likely needed in dogs weighing more than 10kg**

- Tips/Note: **Fat in the falciform ligament**, especially in cats, can sometimes mimic liver echogenicity, making boundary delineation difficult.





Gallbladder and common bile duct

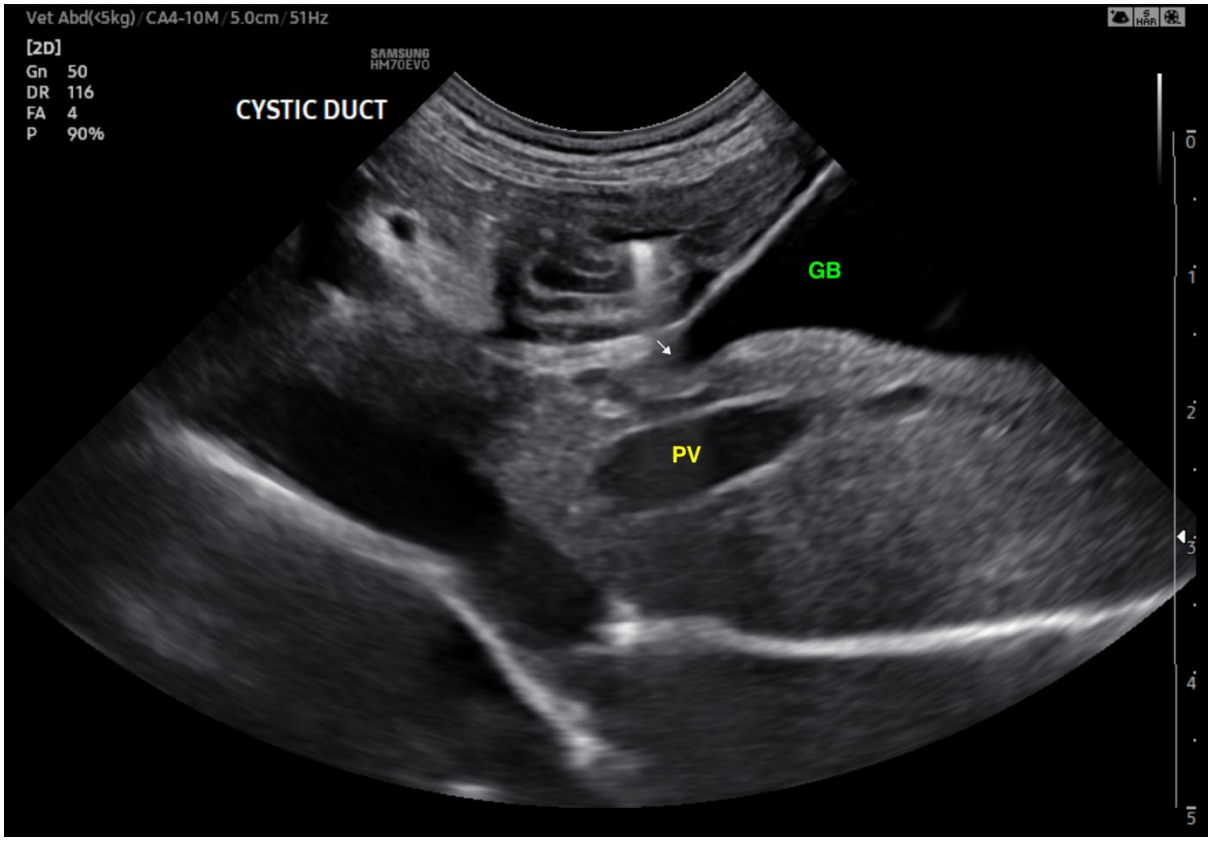
The **gallbladder** lies in the **fossa between the quadrate and right medial liver lobes**, positioned slightly to the right of midline in most dogs and cats. It is often partially or fully enclosed by hepatic parenchyma and is closely associated with the **porta hepatis**, where the hepatic vasculature and biliary ducts converge.

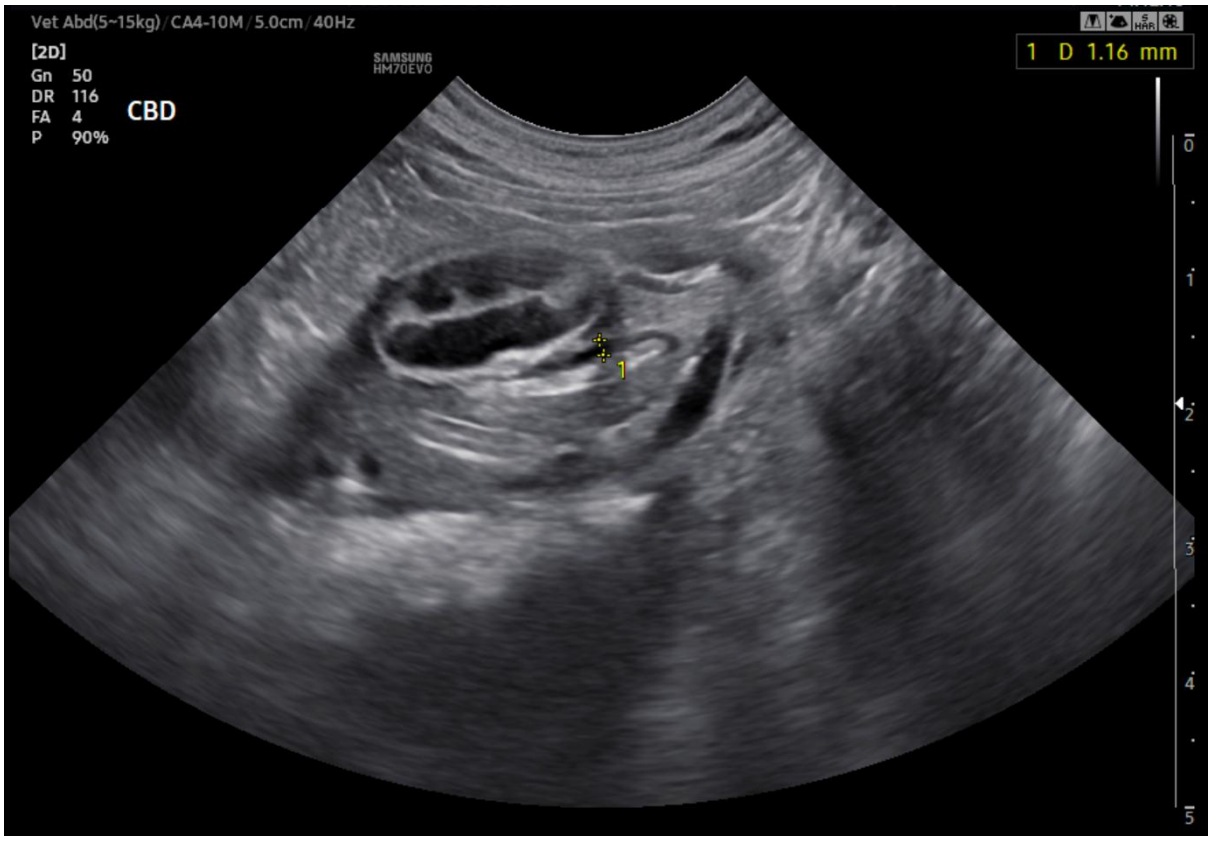
Scanning Sequence and Technique

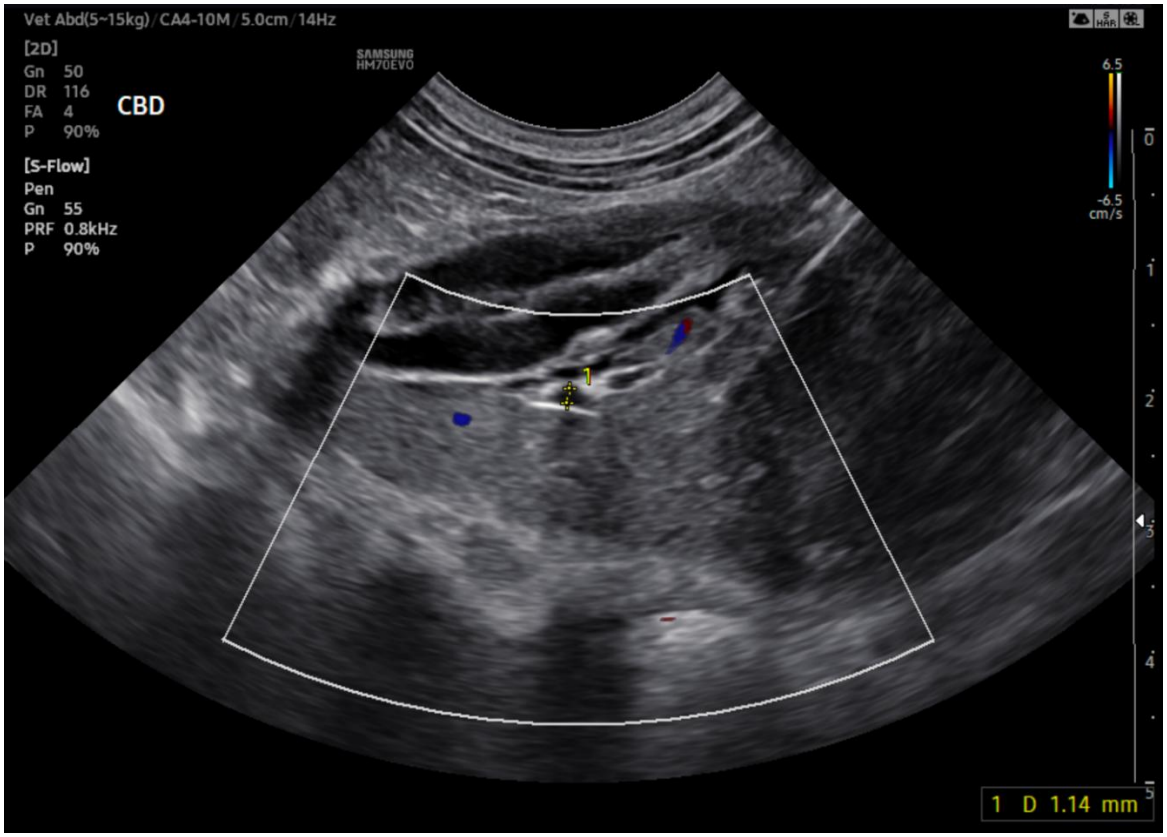
To better visualise your gallbladder and common bile duct, place your patient in left lateral recumbency

1. **Begin at midline** just caudal to the xiphoid in longitudinal orientation.
2. **Angle slightly to the right**, and fan dorsally – the gallbladder often appears just below the diaphragm.
3. Use **colour Doppler** to help differentiate bile ducts (non-vascular) from hepatic vessels (vascular flow visible).
4. For better visualisation of the **common bile duct,** use **oblique or intercostal views** around the **porta hepatis** and place the animal in a left lateral recumbency. Start by visualising the gallbladder neck, follow it into the cystic duct and then into common bile duct.

Tips/Note: In cats the common bile duct will be tortuous, use your Doppler to differentiate it from surrounding vessels. In dogs the common bile duct is not always followable.







For your GI tract you will use a combination of microconvex (especially for stomach), convex or linear probe.

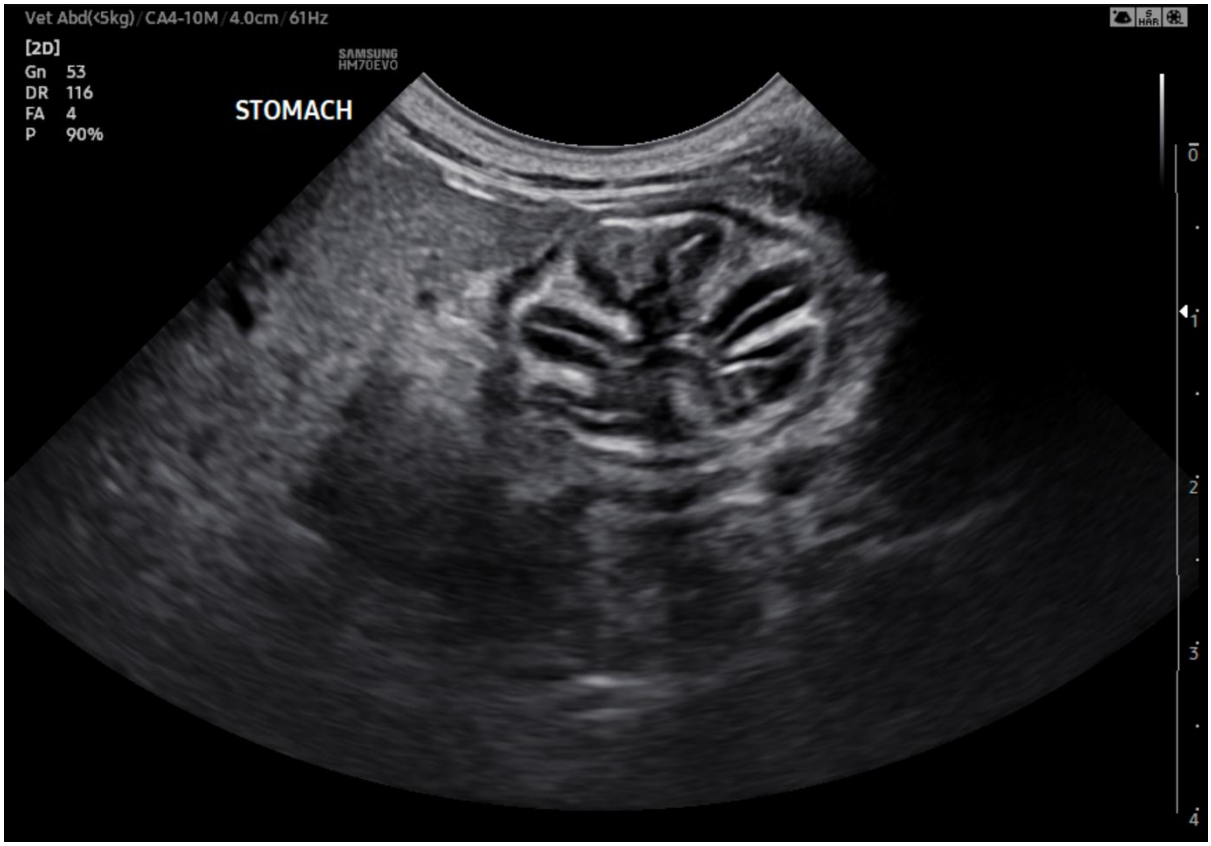
<u>Stomach</u>

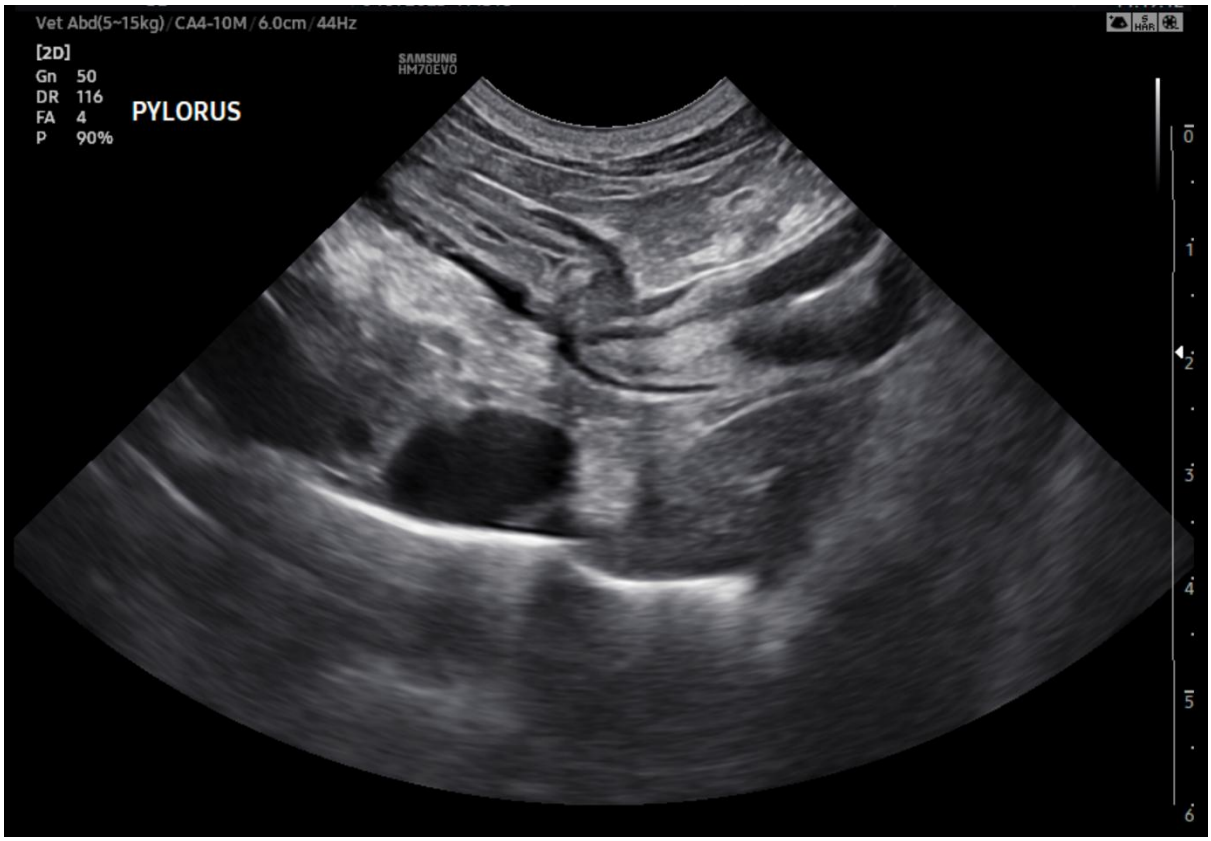
Scanning Technique

Evaluation of the stomach begins with the transducer placed in a **long-axis orientation relative to the patient**, producing a **transverse view of the stomach**. The scanning should progress from **left to right** across the cranial abdomen, allowing for a sequential assessment of the stomach's anatomical regions:

- **Fundus**: Located in the **left craniolateral abdomen**, just caudal to the **left hepatic lobes** and medial to the **spleen**. This is the starting point for imaging.
- **Body**: As the probe is swept medially toward midline, the gastric body comes into view.
- **Pyloric antrum and sphincter**: These structures are positioned more to the **right cranial quadrant** and may extend laterally or caudally depending on gastric distension.

Tips/Note: In **cats**, the **pylorus and pyloroduodenal junction** tend to be positioned **near midline**, whereas in **deep-chested dogs**, these regions may lie more dorsally, requiring a **right intercostal approach** for optimal visualisation. Occasionally, the **gastroesophageal junction (cardia)** may be seen, especially with careful dorsal scanning and appropriate probe angling.





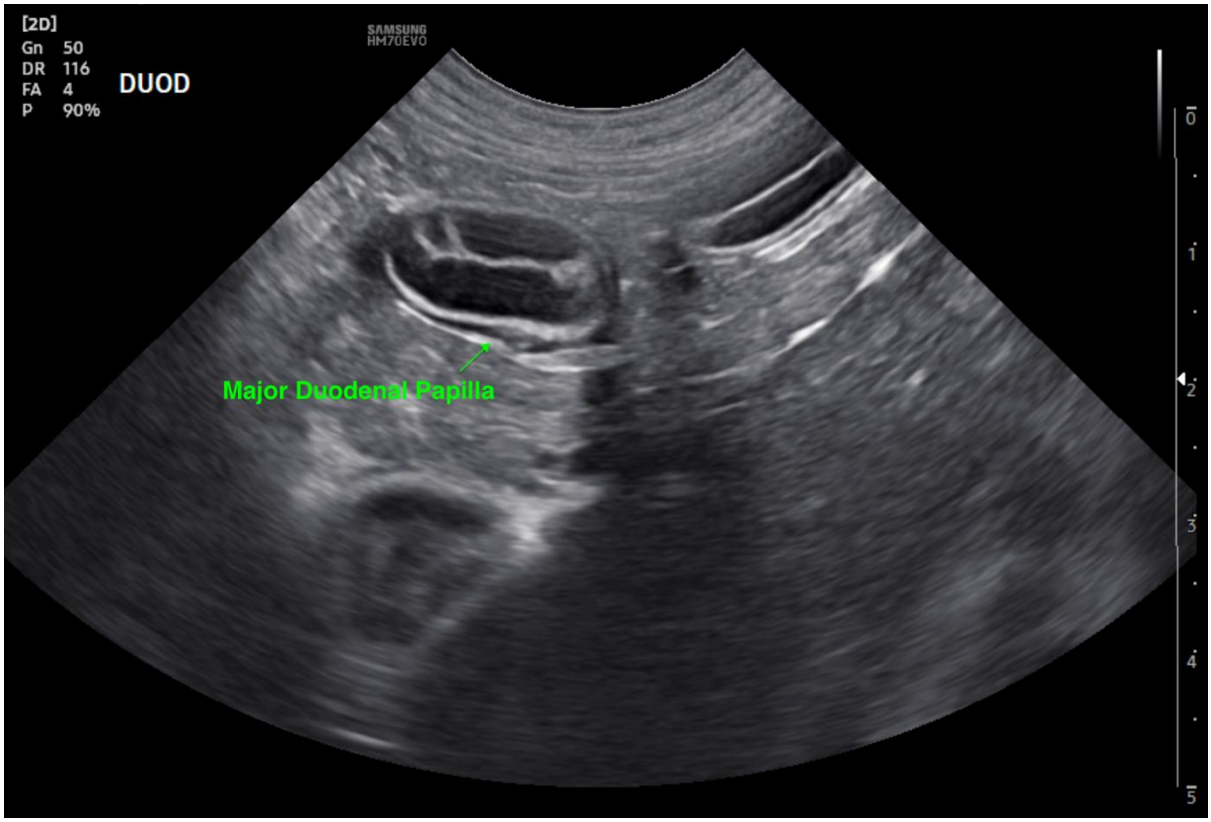
Duodenum

Scanning Technique

Once the **pyloroduodenal junction** is visualised, the **proximal descending duodenum** is traced caudally. In dogs, this segment runs along the **right lateral abdominal wall**, and maintaining a **long-axis view** helps follow its course accurately.

- A **right intercostal scan window** is often helpful to assess the **cranial portion** of the duodenum, particularly in larger or deep-chested breeds.
- In cats, the duodenum is typically located **just to the right or near midline**.

Tips/Note: With your patient in left lateral recumbency, place your transducer intercostally, the most cranial loop is almost certainly duodenum.



Jejunum

Scanning Technique

The **jejunum** is assessed using a **sliding motion** of the transducer across the abdominal cavity, moving **side-to-side** and gradually shifting **cranially to caudally**. Due to **gas artifacts**, it is often not possible to trace the jejunum continuously.

Tips/Note: The area cranial to the bladder in the mid abdomen is where most of your jejunal loops are located.

Colon

The **colon**, composed of the **ascending, transverse, and descending segments**, is the final portion of the gastrointestinal tract and is generally the **thinnest-walled**.

Scanning Technique

- Place your patient in right lateral recumbency
- Visualise your urinary bladder longitudinally
- Rotate your probe 90 degree with the marker towards you
- Your descending colon will be positioned at 4 o'clock on your screen.
- Follow it caudally until is no longer visible into your pelvic canal
- Follow it cranially until it merges with the transverse colon then continue following it into ascending and ICJ/ICCJ

Tips/Note: In cats is almost always possible to visualise your ICCJ with the patient in right lateral recumbency. In dogs it is often necessary to change the patient recumbency from right to left.

Ileocecocolic/ Ileocolic Junction

These junctions serve as **key anatomical landmarks** for orientation.

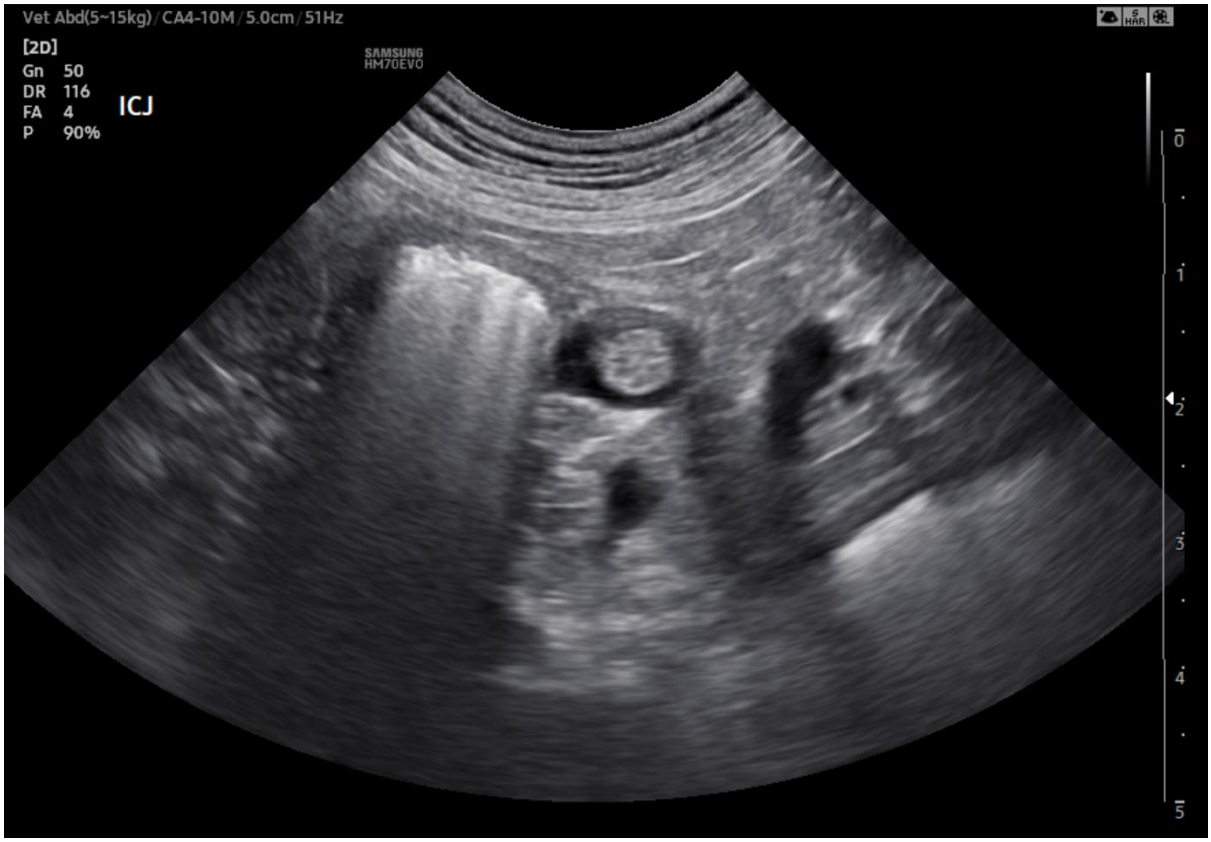
Scanning Technique

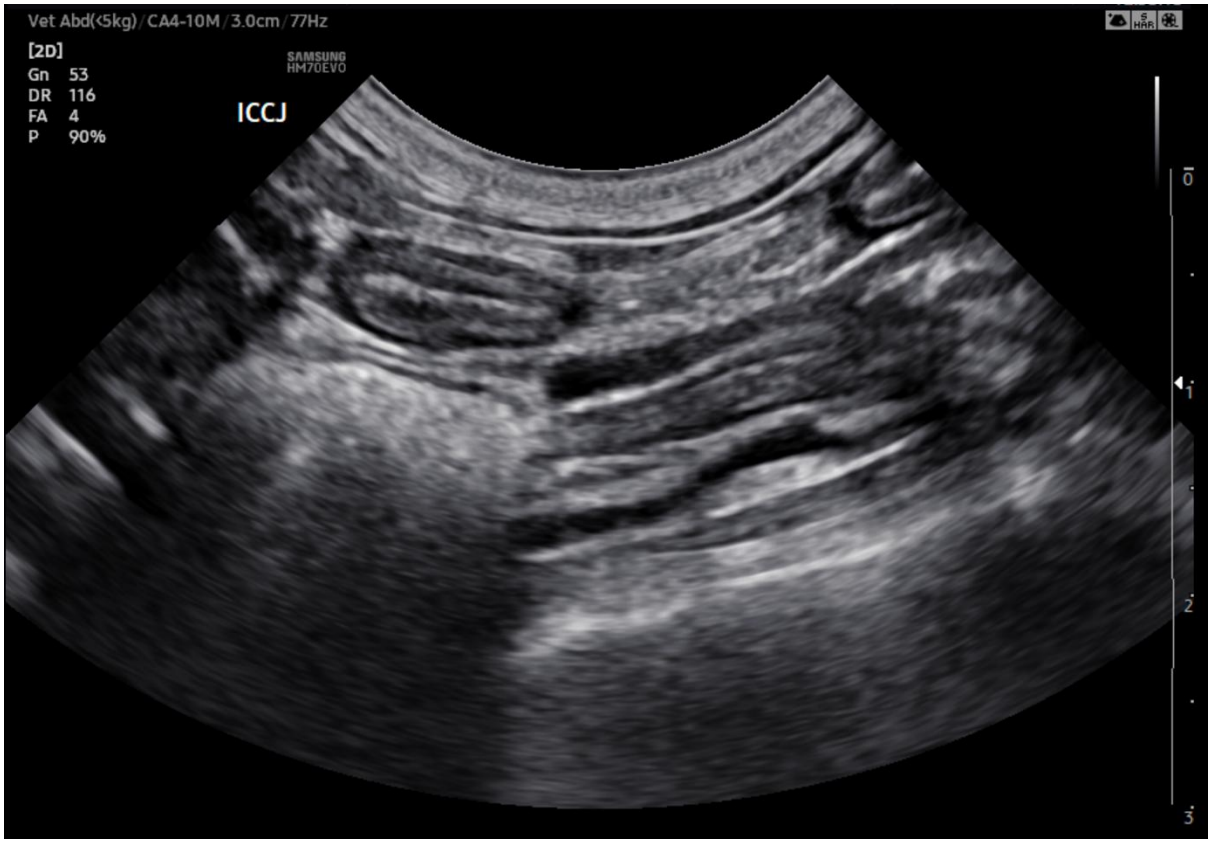
- Dogs (ileocolic junction)
    - Patient in left lateral recumbency
    - Located **medial to the right kidney**, typically in the **cranial right abdomen**.
    - In **dogs**, separate openings, the **ileocolic** and **cecocolic**, exist for the respective intestinal segments.

Tips/Note: Visualise your right kidney longitudinally, fan medial and aim for your patient left elbow. Once you come across your colon follow it until you visualise your junction.

- Cats
    - Patient in right lateral recumbency or left lateral recumbency.
    - Follow your colon starting from descending colon and it will lead to your ICCJ
    - In **cats**, the junction is termed **ileocecocolic**, where the ileum leads directly into the cecum and colon.

Tips/Note: In very large cats use a left lateral recumbency as per dogs.





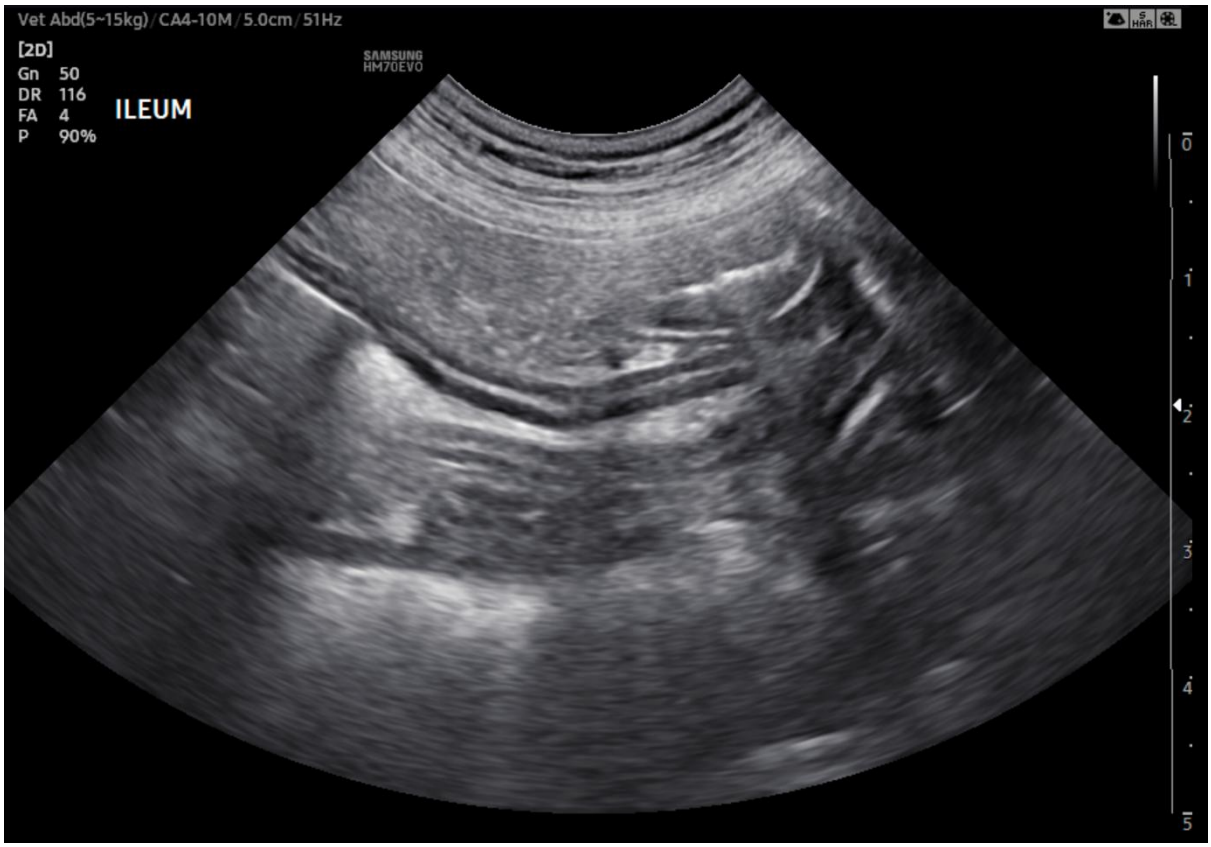
Ileum

In both dogs and cats, the **ileum** is a short, terminal portion of the small intestine, typically located **medial to the right kidney** in the **right cranial to mid-abdomen**.

Scanning Technique

- In cats, the **ileum is more consistently visualised** due to less interfering gas.
- In dogs, identification is more challenging due to **gas within the adjacent cecum**, which often obscures the view.
- A practical approach includes tracing the **transverse colon**, found just caudal to the stomach, toward the **right abdomen** to reach the **ascending colon**. From there, tracking cranially leads to the **ileocolic or ileocecocolic junction**, which helps guide identification of the ileum.

Tips/Note: The feline ileum can have a "wagon wheel" appearance in cross-section due to its prominent folds, particularly the thick submucosa and muscularis layers, which project into the lumen, mimicking the spokes of a wheel



Pancreas

The pancreas is a slim, lobulated organ with a soft triangular shape, composed of three main parts: the **right lobe**, **left lobe**, and **body**. In healthy dogs, visualising the pancreas is often a challenge due to its echogenicity and texture closely resembling adjacent mesenteric fat and surrounding soft tissue. In cats, the pancreas is expected to be hypoechoic to the surrounding mesenteric fat (isoechoic to the liver), making it easier to identify.

Knowledge of regional anatomy is vital for localising the pancreas, especially when the gland is not distinctly visible. Identifying adjacent organs such as the duodenum, stomach, and portal vein can help orient the operator to the pancreas's expected location. Note that pancreatic anatomy varies between cats and dogs.

In dogs, the **right lobe** is the most prominent part of the pancreas. It runs parallel and adjacent to the descending duodenum.

In cats, the **left lobe** of the pancreas travels toward the left cranial abdomen, positioned **between the stomach and transverse colon** and commonly adjacent to the **splenic vessels and hilum**.

The pancreatic **body** lies near the **pyloroduodenal junction**, ventral to the portal vein and common bile duct.

In cats, the body and pyloric junction are generally aligned closer to the midline, making them easier to scan using a midline or slightly right paramedian approach.

Scanning Technique

- Dogs
    - Place your patient in left lateral recumbency
    - Intercostal approach or subcostal approach (ventral, medial to the 13th right rib)
        - For a ventral scan, place the probe just medial to the 13th right rib, directing dorso cranially to visualise the right kidney, then fun medially to locate the descending duodenum. The pancreas lies just medial to this bowel loop.
        - For intercostal scan place the probe on the 10th intercostal space, move cranially or caudally, slide ventrally or dorsally (following the rib space) until you visualise your duodenum. With the duodenum imaged in a transverse view, the right pancreatic lobe is visible as a **triangular structure adjacent to the bowel**.

Tips/Note: A helpful anatomical landmark in dogs is the **pancreaticoduodenal vein**, which is nestled between the duodenum and the right pancreatic lobe

- Cats
    - Patient in right lateral recumbency
    - Position your probe (linear probe very helpful here) longitudinally to your patient
    - On your screen obtain in the same frame, spleen in the near field and in the centre, stomach on your left, colon on your right. The pancreas is located in-between these structures.
    - Adjust your probe to the long axis of the pancreas

Tips/Note: In cats the pancreatic duct is visible most of the time as anechoic tubular structure in the centre of the pancreas and is visible most of the time. Use your Doppler to differentiate it from splenic vessels.

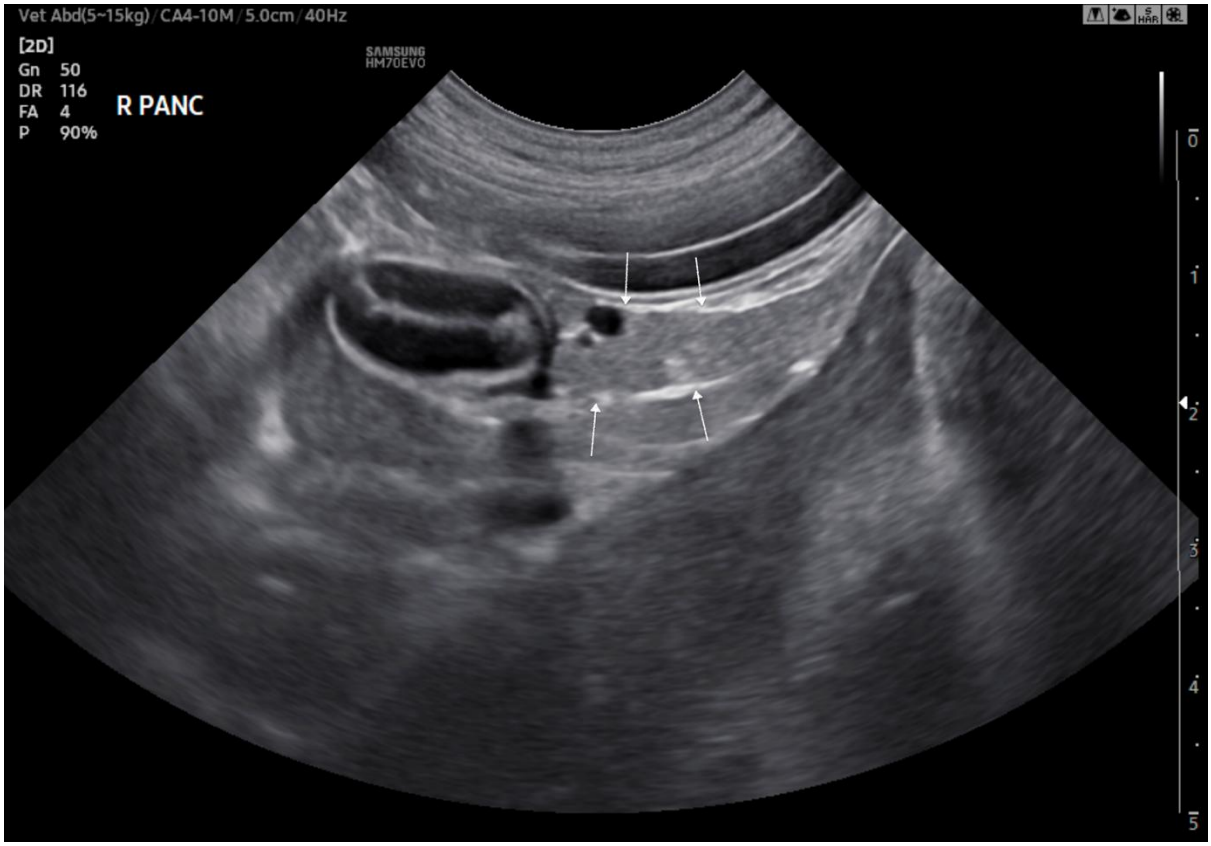


Figure 1 Dog Right pancreatic lobe

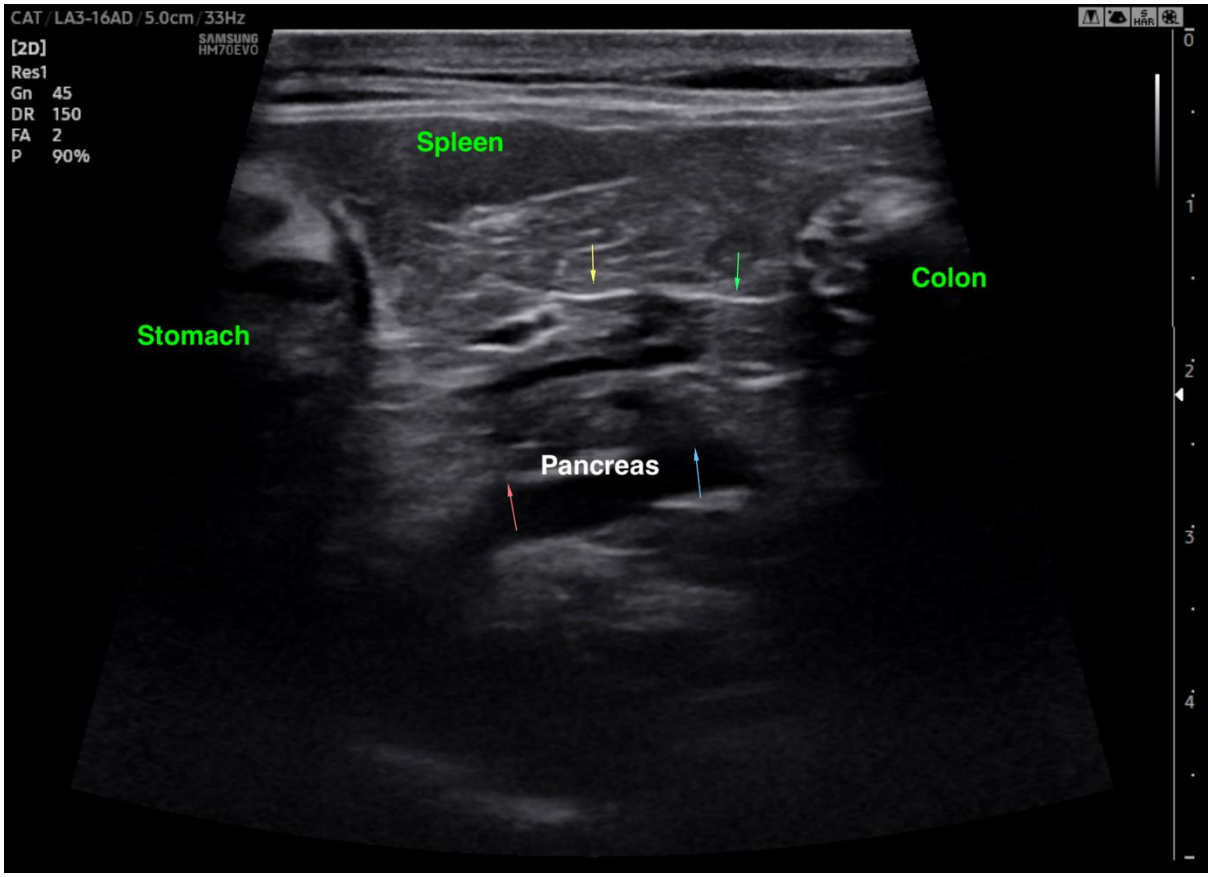


Figure 2 Cat Left pancreatic lob. The pancreatic duct is visible in the centre as anechoic tubular structure.

Spleen

In canines, the spleen position is highly variable, while in cats it is fairly consistently positioned lateral to the left kidney. The spleen can be divided into three sections: **Head, Body and Tail.**

Along its visceral surface, the spleen contains a **hilus**, which is embedded in fat and serves as the entry and exit site for splenic vessels. The **splenic veins** course from this hilum and can be tracked sonographically between the stomach and colon as they converge into the portal vein.

Certain canine breeds, such as German shepherds and greyhounds, naturally possess larger spleens.

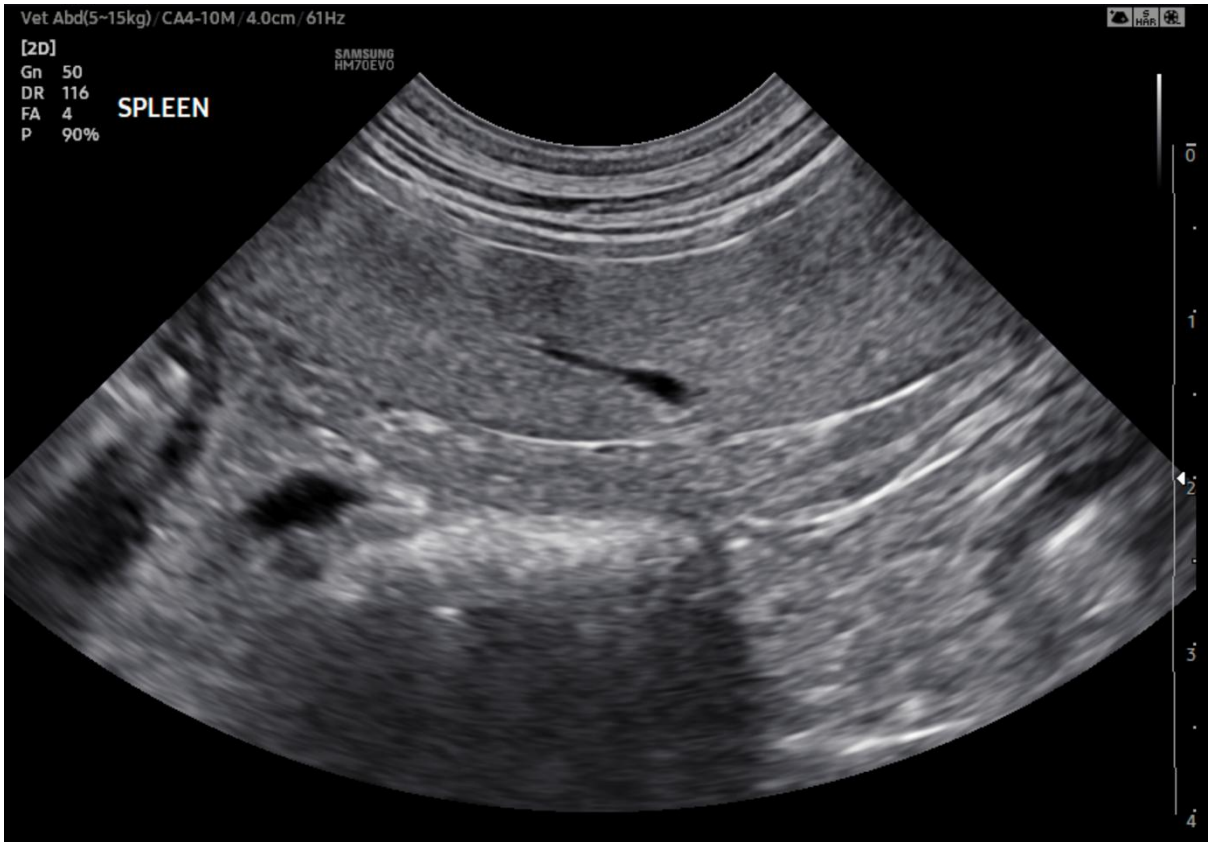
Scanning Technique

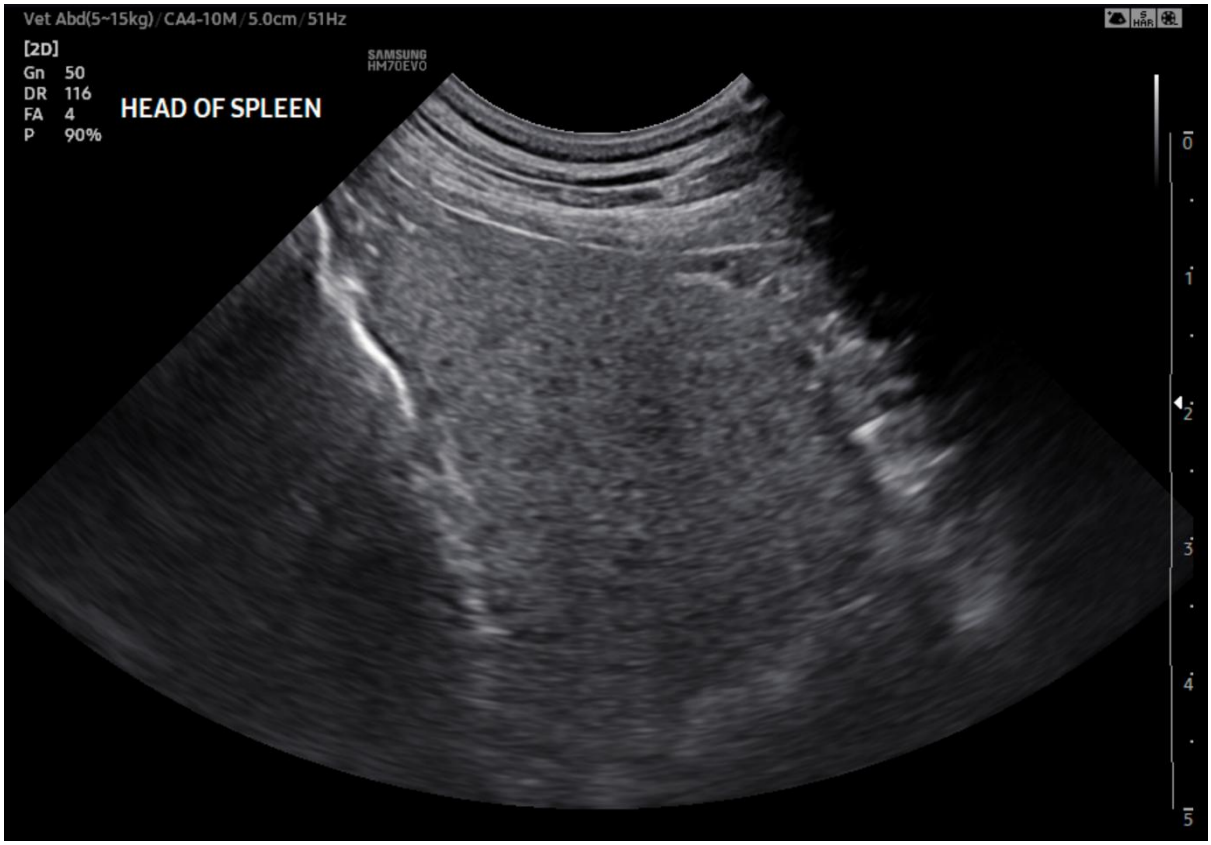
- Patient in right lateral recumbency
- Apply gentle pressure to avoid pushing it away
- Position the transducer over the **left cranial abdomen**
- Perform a systematic **distance motion splide** from cranial to caudal, ensuring to not miss any portion.

- The head of the spleen is often located under the left hypochondrium and visible as triangular structure (India's map). In **deep-chested dogs**, intercostal access via the 11th or 12th rib spaces may be necessary
- In **cats**, the entire spleen can often be visualised from a superficial left cranial abdominal approach.

Note/Tips: Sonographic Landmarks

- **Stomach**: Cranial and medial to the spleen
- **Colon**: The left colic flexure and transverse colon lie dorsal, medial, and caudal to the spleen's body
- **Left kidney**: Dorsomedial and caudal relative to the spleen





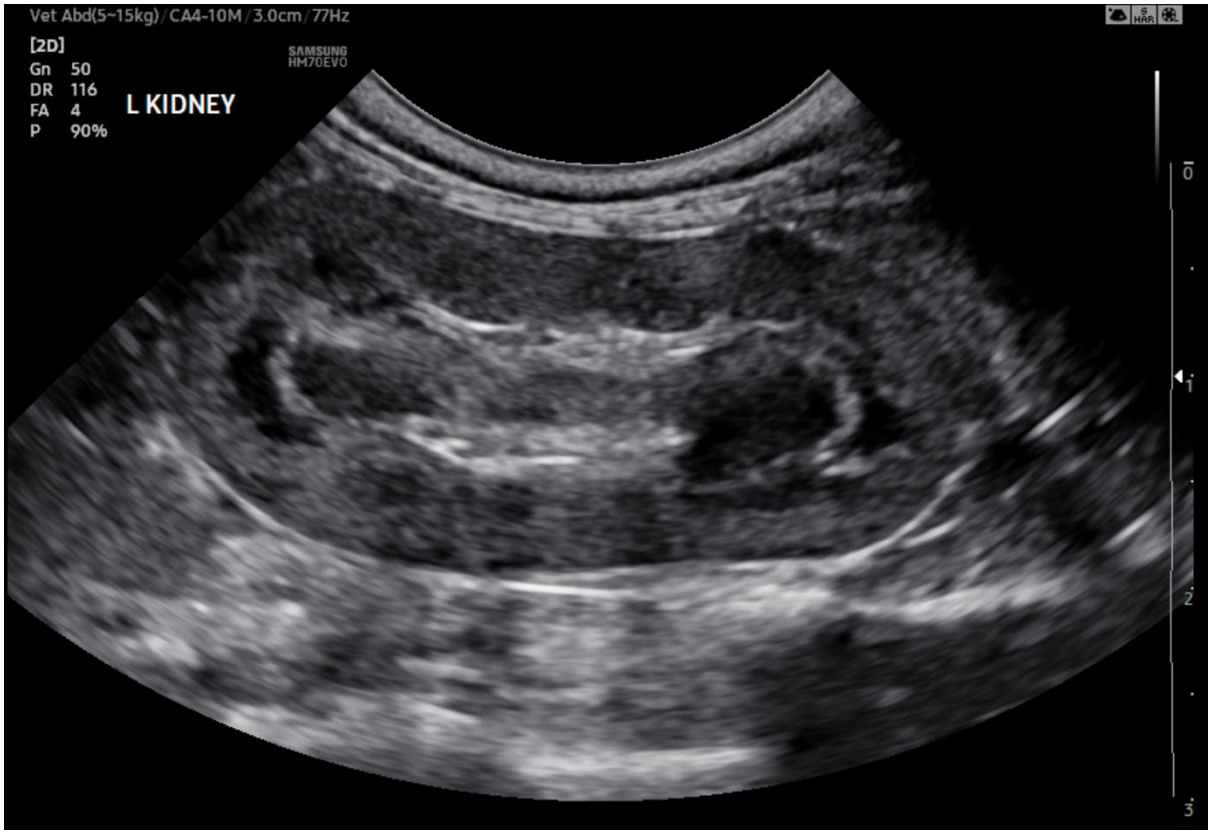
Kidneys

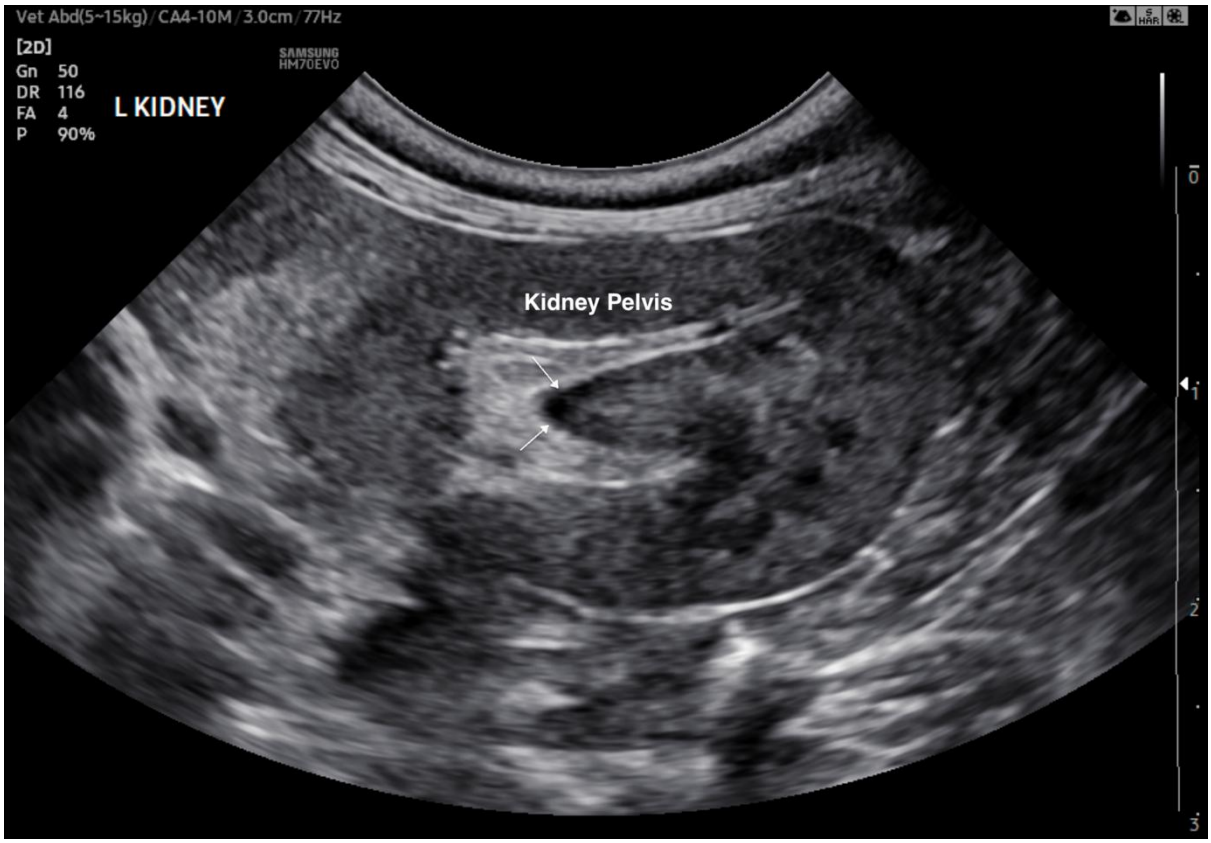
Scanning Plane

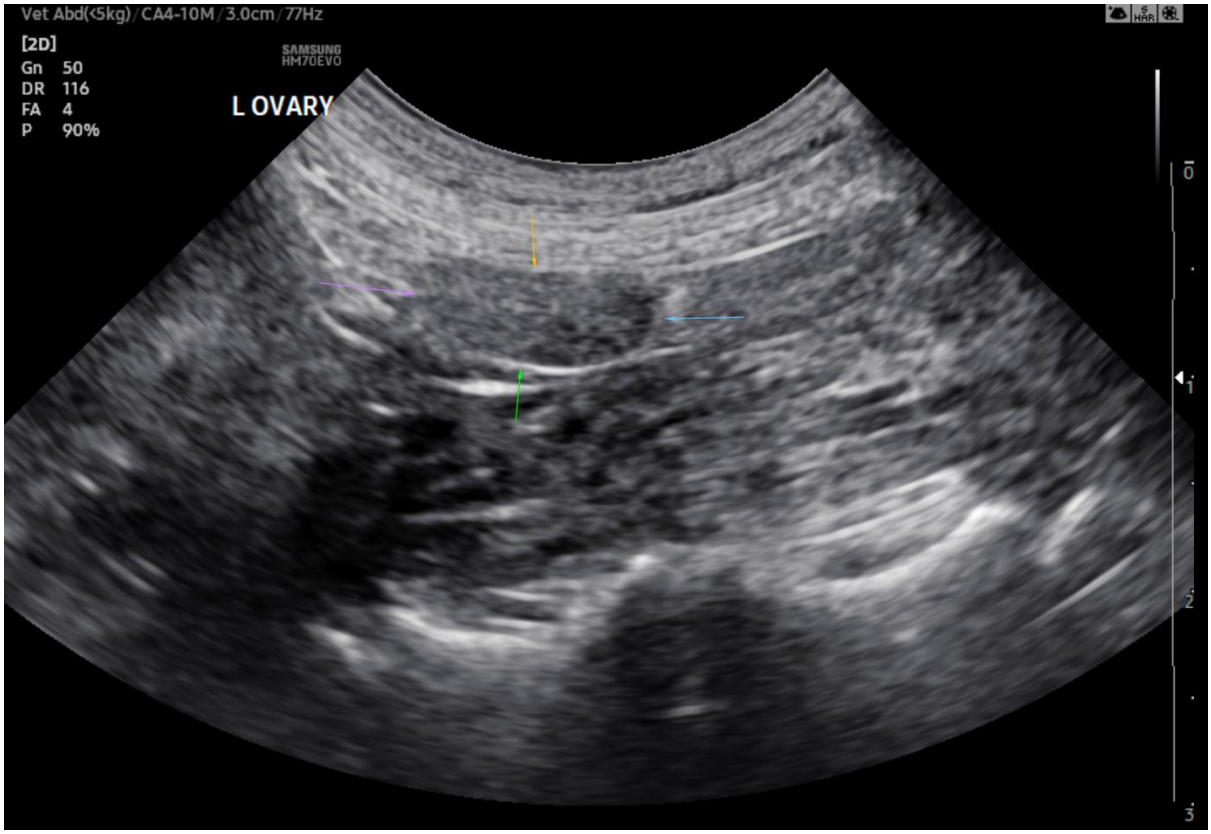
- **Dorsal (long axis)** views best visualise the renal pelvis in the far field.
- **Sagittal (long axis)** views align with the kidney's true length but may exclude the pelvis.
- **Transverse** images are obtained by rotating the probe 90°, offering a cross-sectional view that is optimal for assessing **pelvic dilation**.

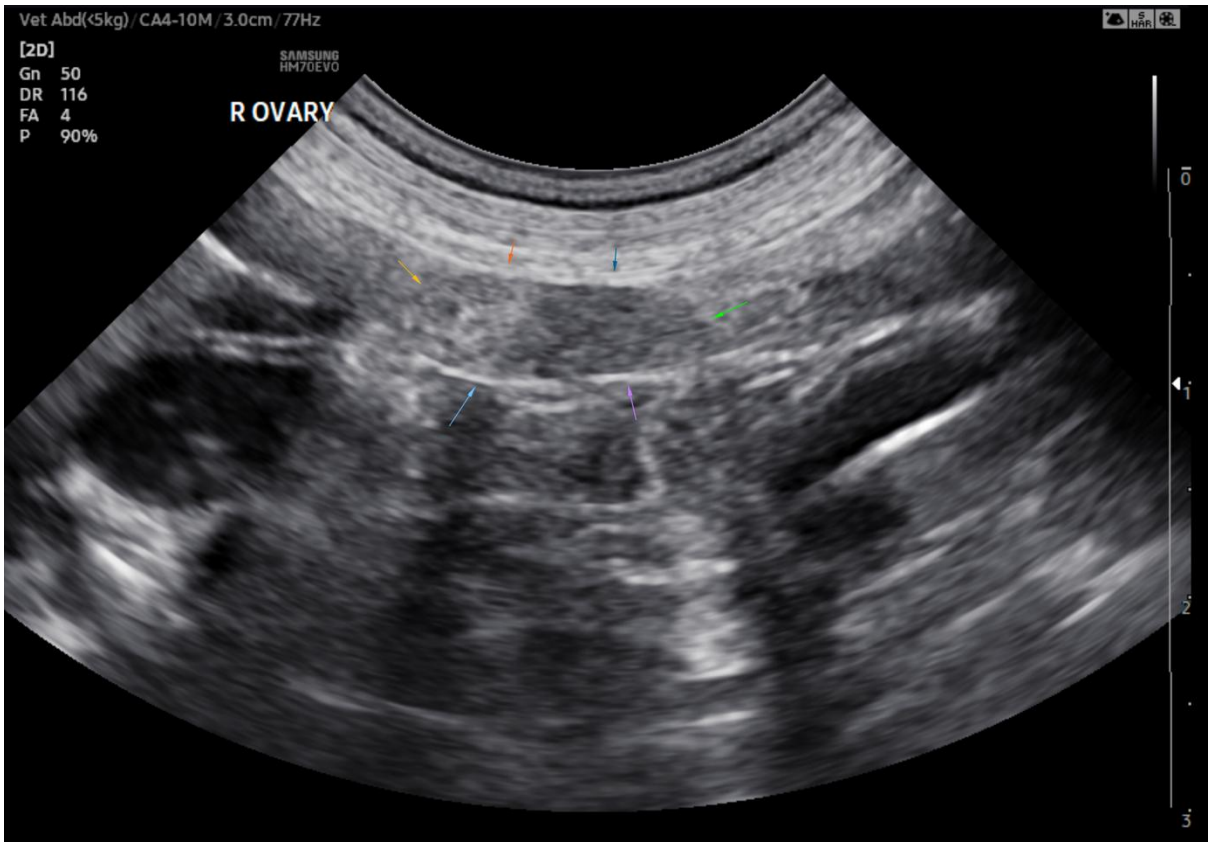
Scanning Technique

- Left Kidney
  - Patient in right lateral recumbency
  - Typically more accessible due to its lateral position. Often found just caudal to the stomach and spleen.
  - **In long axis**: from **medial to lateral** or **dorsal to ventral**
  - **In short axis**: from **cranial to caudal**
- Right Kidney
  - Patient in left lateral recumbency
  - More challenging to image, especially in **deep-chested dogs**, due to its craniodorsal placement. A **dorsolateral subcostal approach** is generally required, although **intercostal imaging** between the 11th and 12th ribs may provide better access in certain breeds.
  - **In long axis**: from **medial to lateral** or **dorsal to ventral**
  - **In short axis**: from **cranial to caudal**









Urinary Bladder

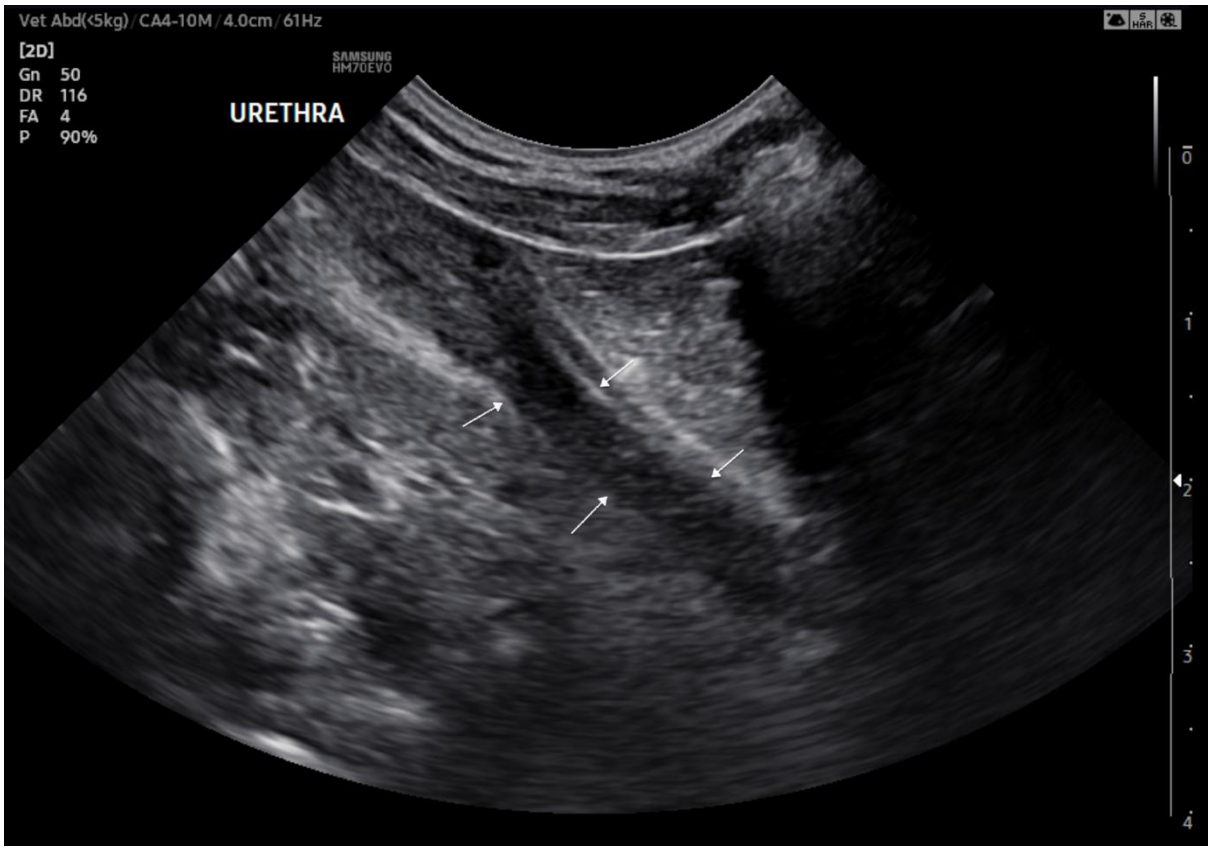
Scanning Technique

- Position the ultrasound probe longitudinally, aligned with the long axis of the patient.
- Glide the transducer caudally until it reaches the region between the two most caudal mammary glands.
- The bladder should be assessed in both sagittal (longitudinal) and transverse (short-axis) views.
- Pay particular attention to the **trigone**, where the bladder tapers into the urethra**.**

Urethra

To visualise the **proximal urethra**, or the **prostatic urethra** in males:

- Maintain the transducer in a sagittal (long-axis) orientation at the level of the bladder.
- Slowly advance the probe caudally until the trigone area is seen.
- Once the pubic bone obstructs further movement, tilt the transducer caudally to extend the field of view beyond the bony pelvis.
- If the bladder is underfilled, its caudal portion may extend into the pelvic canal, which will make its evaluation impossible.



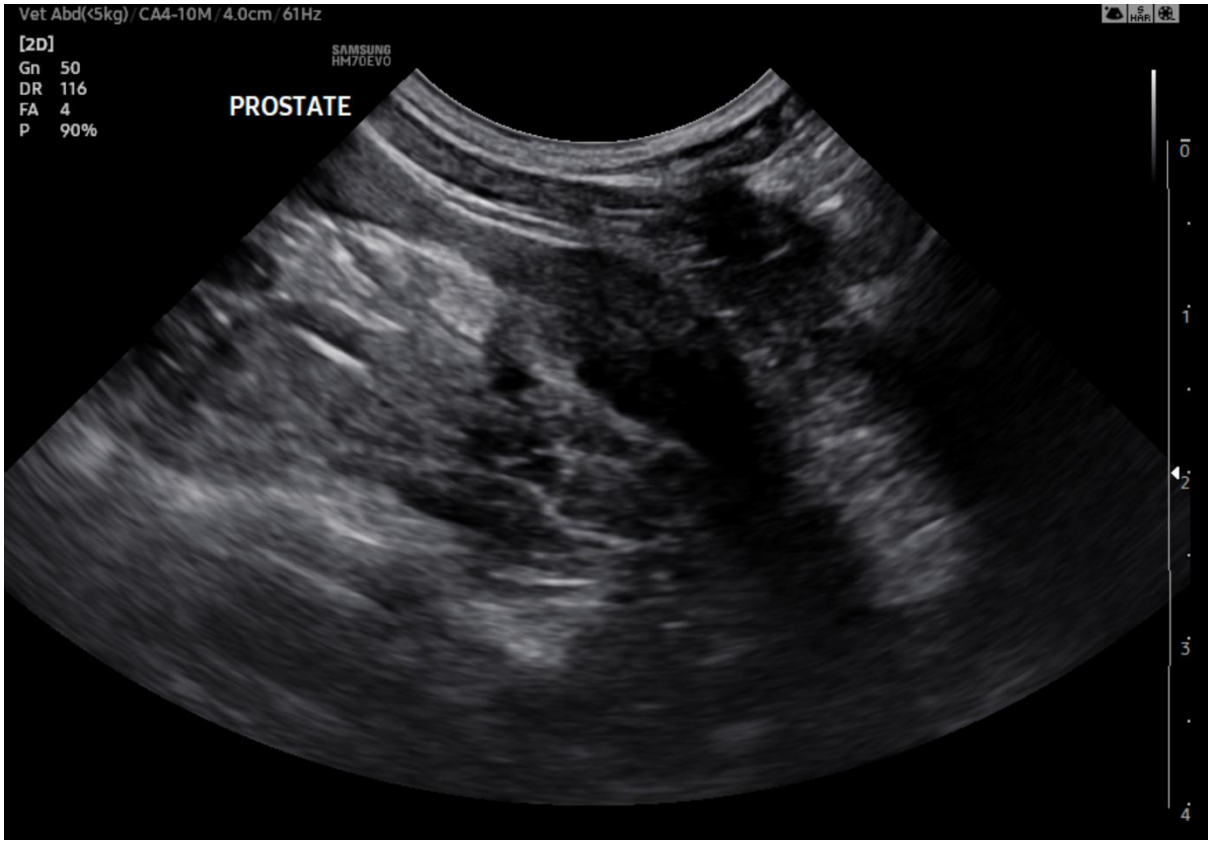


Figure 3 Prostate neutered dog

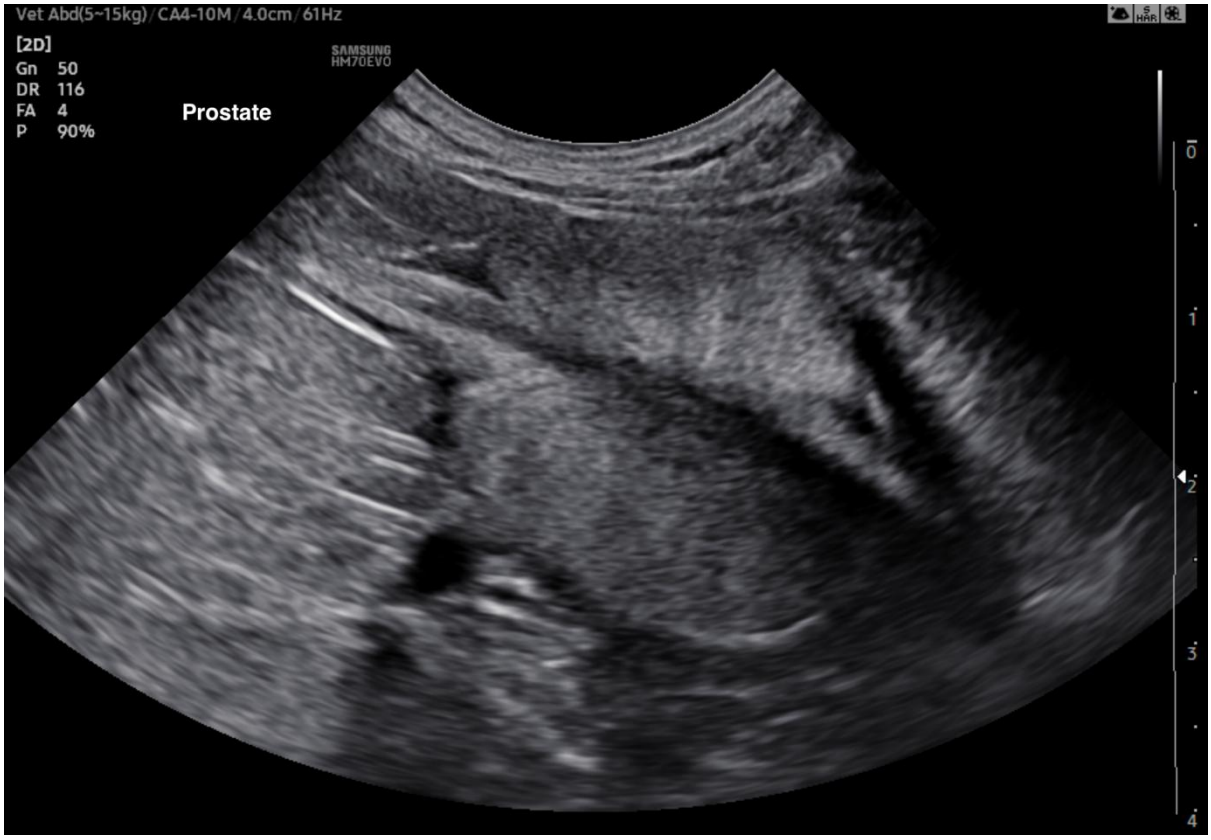
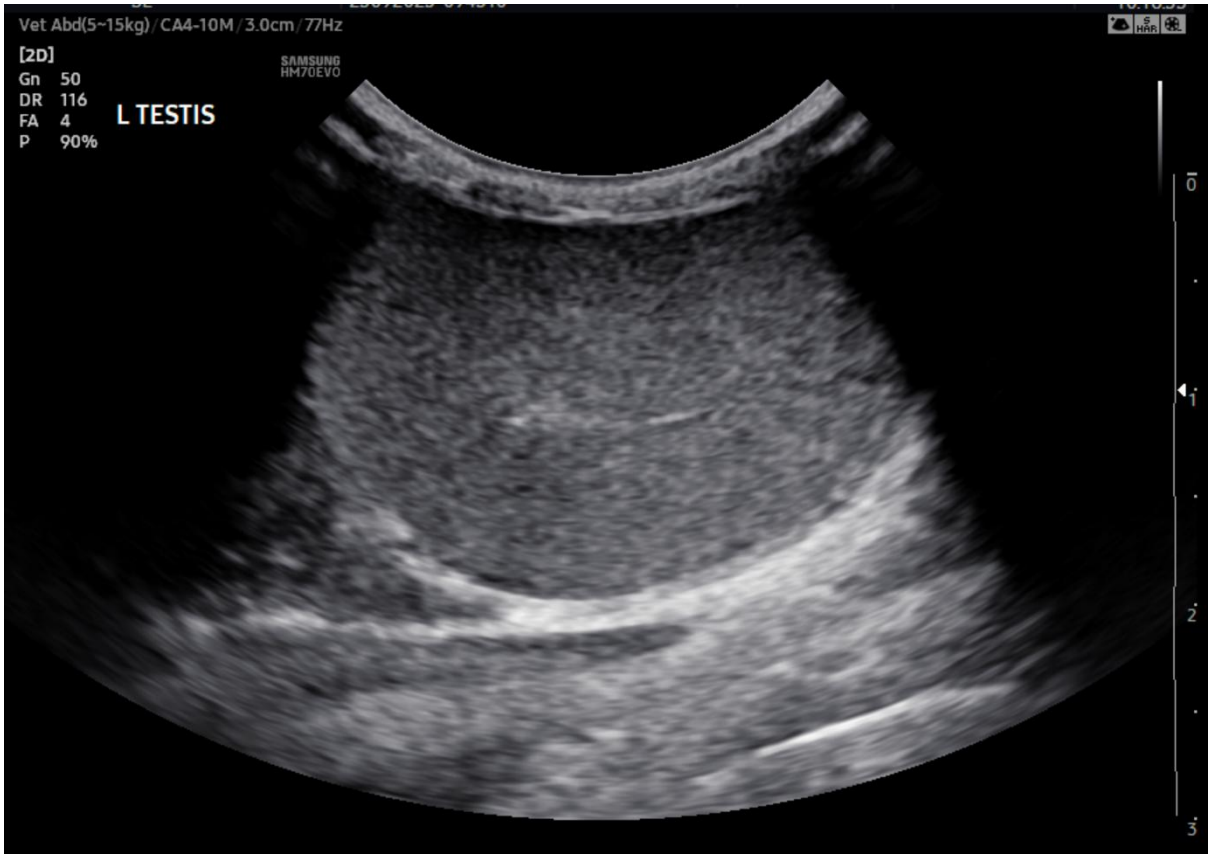
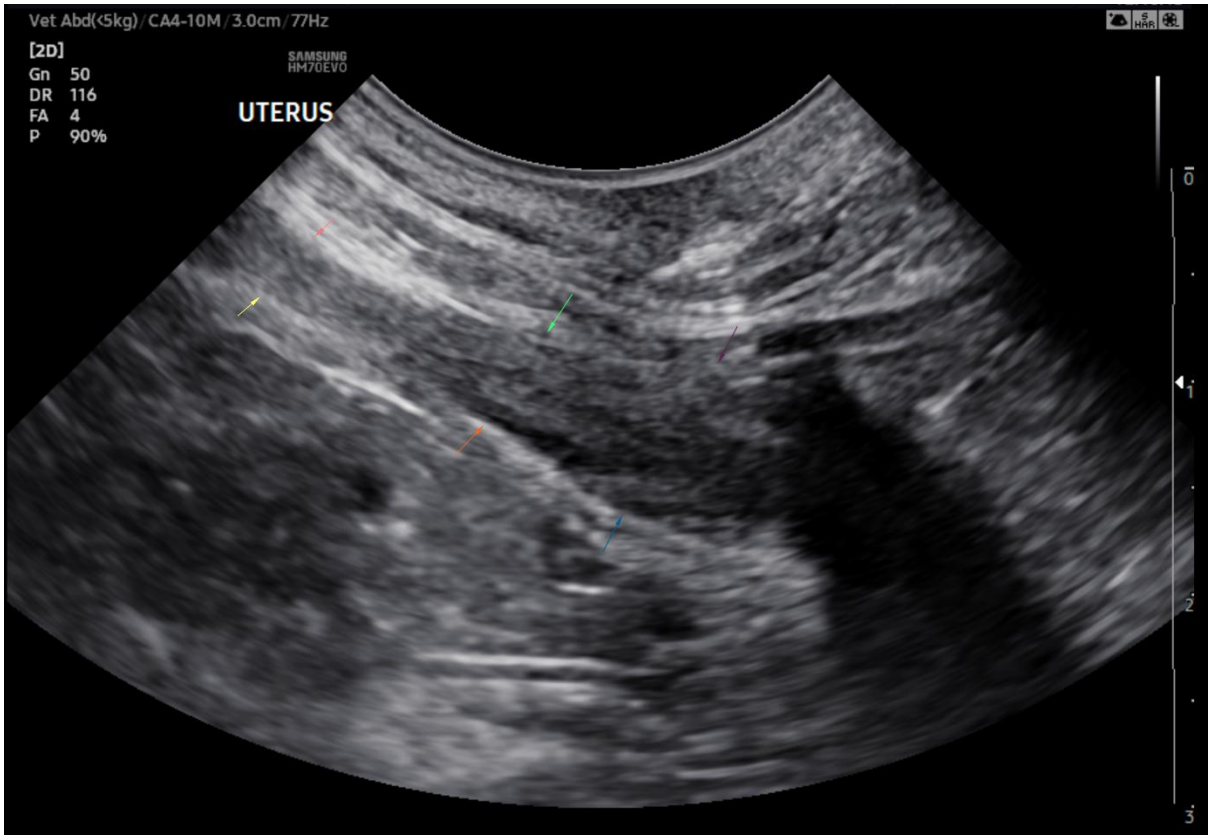
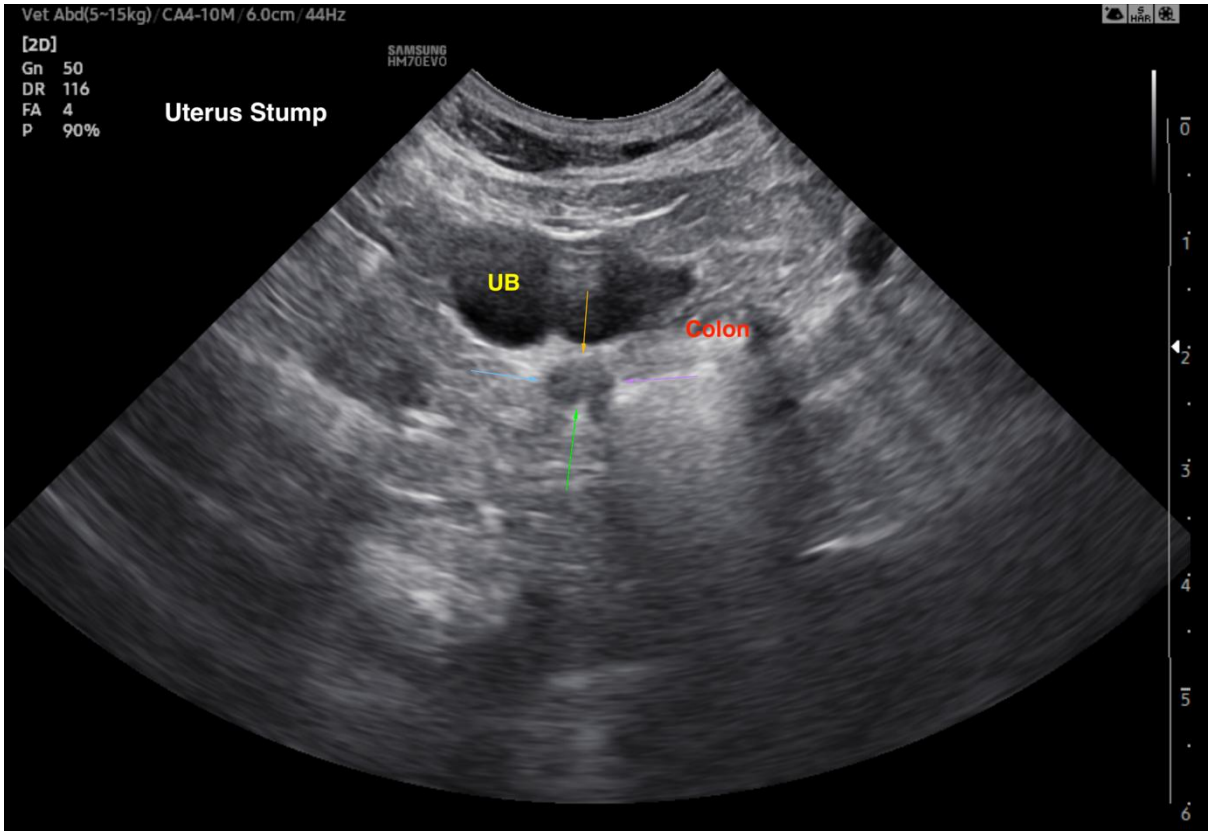


Figure 4 Normal prostate entire male







Adrenal glands

To accurately locate the **left adrenal gland** during ultrasonographic assessment, several anatomical landmarks are helpful:

- **Lateral reference**: Left kidney
- **Medial reference**: Abdominal aorta
- **Cranial boundaries**: Celiac and cranial mesenteric arteries
- **Caudal landmark**: Left renal artery
- **Dorsal boundary**: Left phrenicoabdominal artery

The left adrenal gland lies craniomedial to the left kidney, though its position can shift if the kidney is displaced under probe pressure, due to the kidney's relatively mobile suspension via renal vessels and ureter.

The gland sits lateral and ventral to the aorta, typically just caudal to the celiac and cranial mesenteric arteries. The **caudal pole** often aligns cranial to the origin of the **left renal artery**, which hooks off the lateral margin of the aorta. The **phrenicoabdominal vein** may cross the gland's midpoint ventrally.

Scanning Technique Left Adrenal

- Patient in right lateral recumbency
- Start laterally at the long axis of the left kidney

- Tilt the transducer medially and ventrally toward the aorta to identify the celiac and cranial mesenteric arteries, seen as paired, round, anechoic structures. The left adrenal gland appears hypoechoic within the retroperitoneal fat caudal to these vessels and cranial to the left renal artery.

Note/tips: A slight clockwise probe rotation (~10°) can align the gland in its long axis. The **phrenicoabdominal vein** may cross the gland's midpoint ventrally and can aid identification when colour Doppler is used.

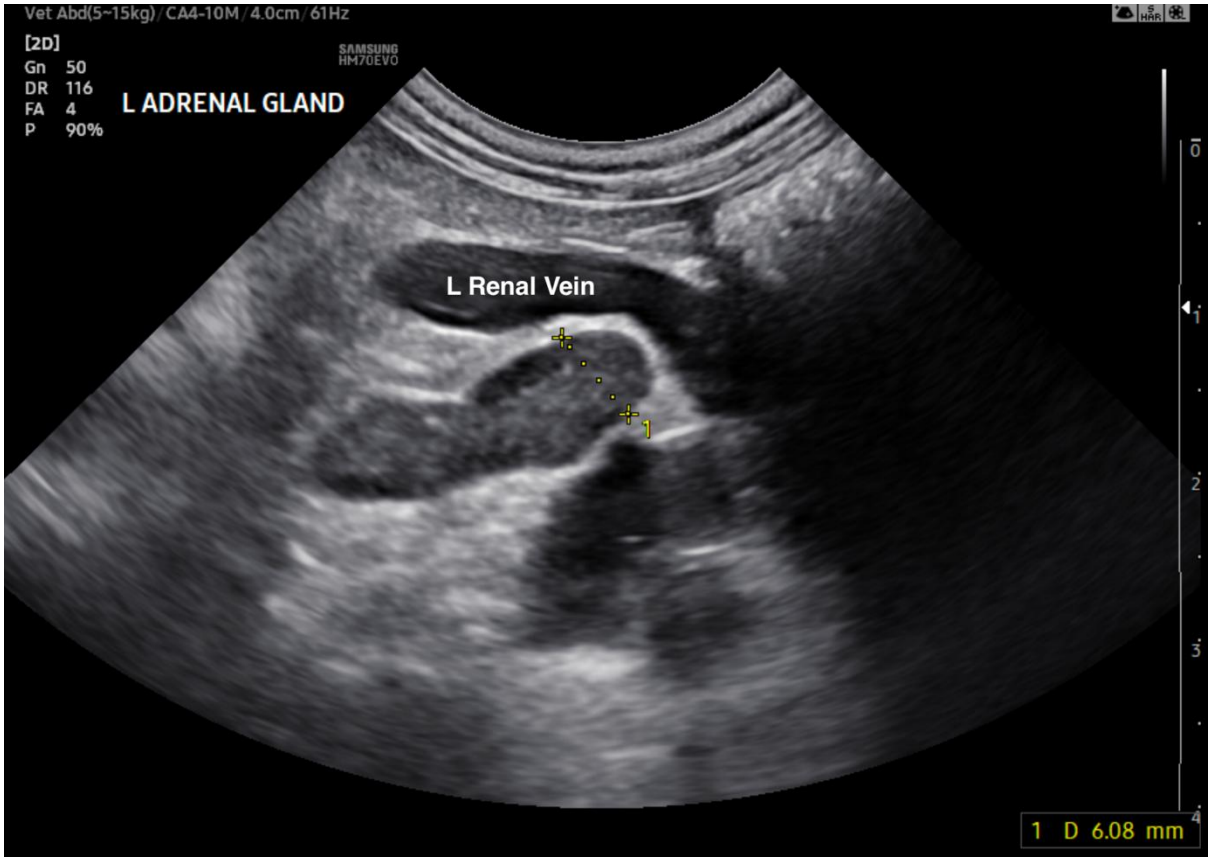


Figure 5 Left Adrenal gland dog

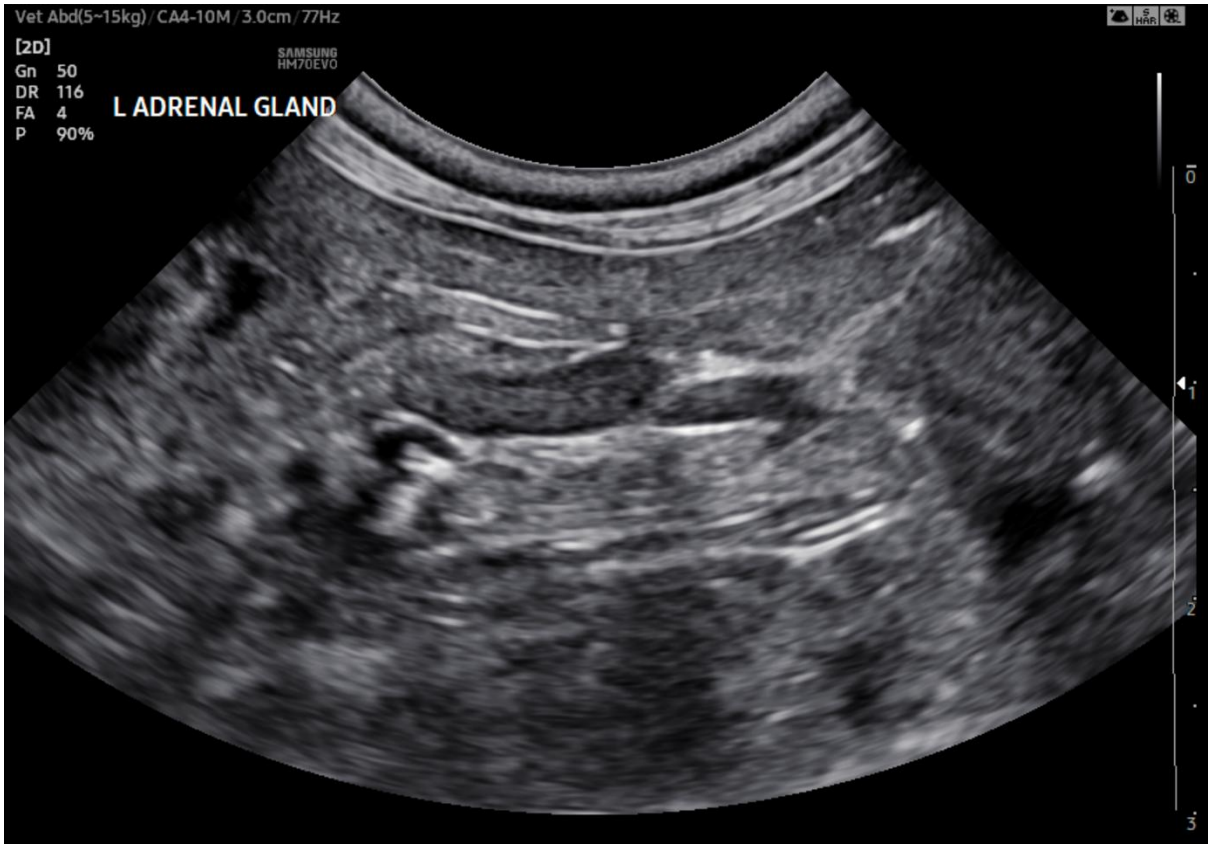


Figure 6 Left Adrenal gland cat

The **right adrenal gland** is situated **dorsal to the caudal vena cava (CVC)**. In dogs, it is often in direct contact with the CVC, while in cats, retroperitoneal fat typically separates the gland from the vessel.

Its position is **medial to the right kidney in dogs**, and **craniomedial to the kidney in cats**, nestled between the CVC and the caudate liver lobe. The right phrenicoabdominal vein may be seen ventral to the gland but is less frequently visible than on the left side.

Scanning Technique Right Adrenal

- Patient in left lateral recumbency
- With the right kidney in longitudinal view, fan the transducer medially and dorsally to locate the CVC (aim toward the spine). Look in the area where Aorta and CVC diverge.
- The right adrenal appear as hypoechoic arrow-head shaped structure located dorsal to the CVC
- In cats, it's more consistently oval or bean-shaped

Note/Tips: Micro tilt your probe until you get a nice long axis of your right adrenal. In cats it is possible to visualise the right adrenal with the patient in left lateral recumbency. It will be located cranial to the left adrenal and dorsal to the CVC.

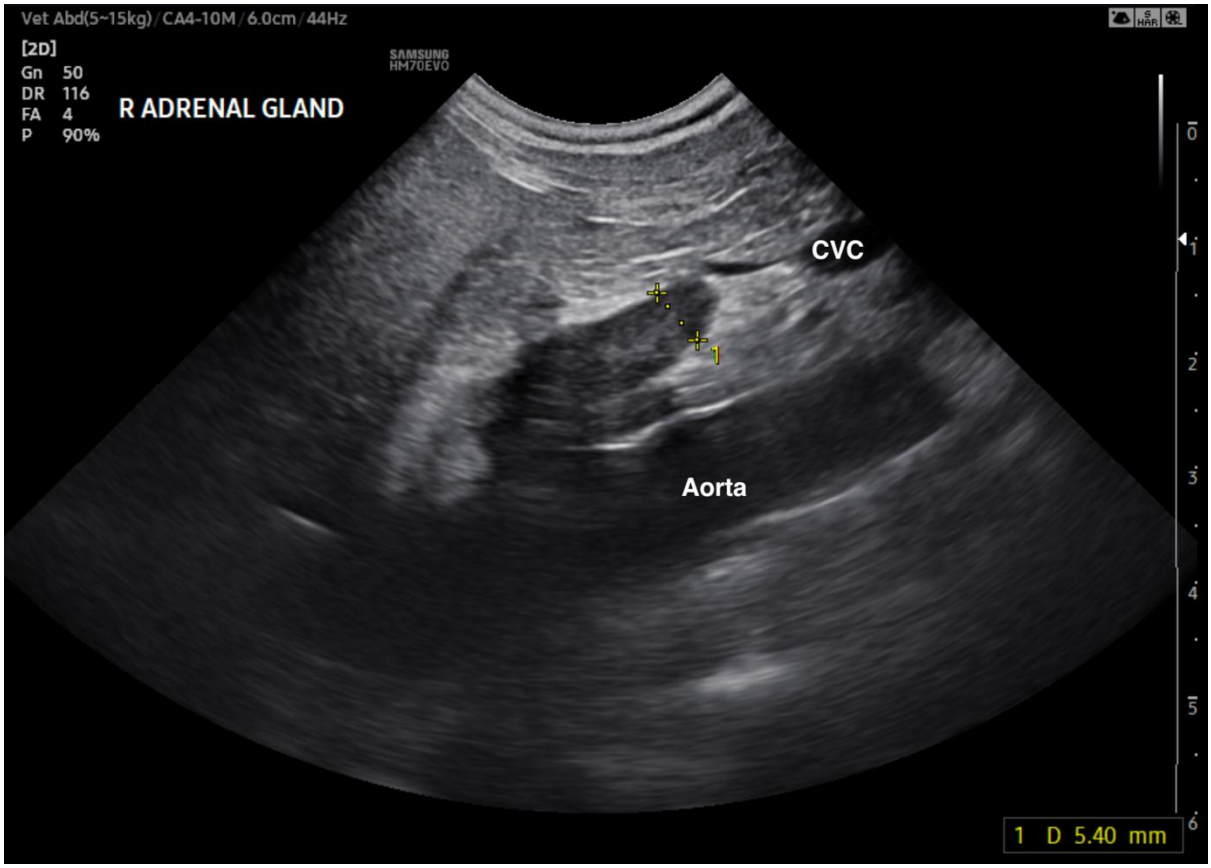


Figure 7 Right Adrenal gland dog

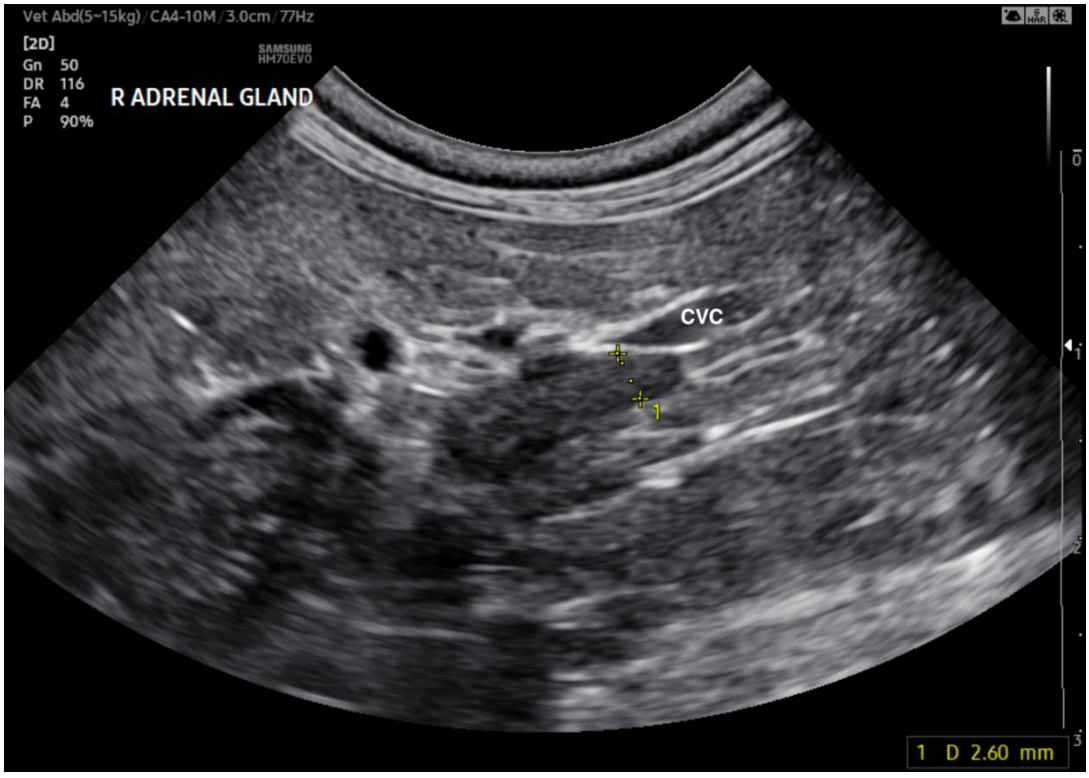


Figure 8 Right Adrenal gland cat

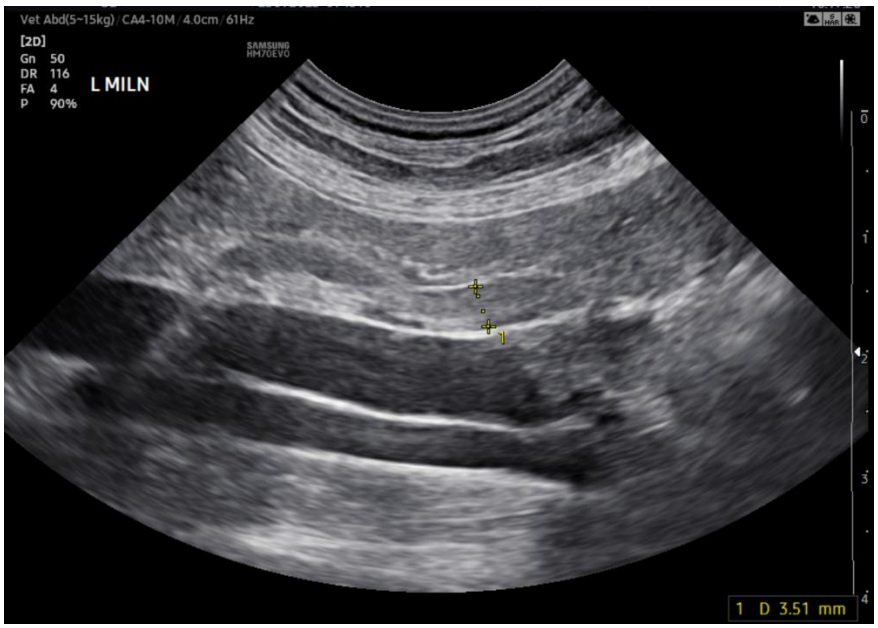
Medial Iliac Lymph Nodes (MILN)

Location: Alongside the **terminal abdominal aorta** and **caudal vena cava**, near the **aortic trifurcation**.

Typically seen **bilaterally**, but may be **unilateral** depending on pathology or anatomic variation.

Scanning Technique

- Patient in left later for your LMILN and right lateral recumbency for your RMILN
- Visualise your aorta longitudinally and follow it until you visualise your aortic trifurcation.
- Fan the transducer slightly in the area of the trifurcation, both dorsally and ventrally.



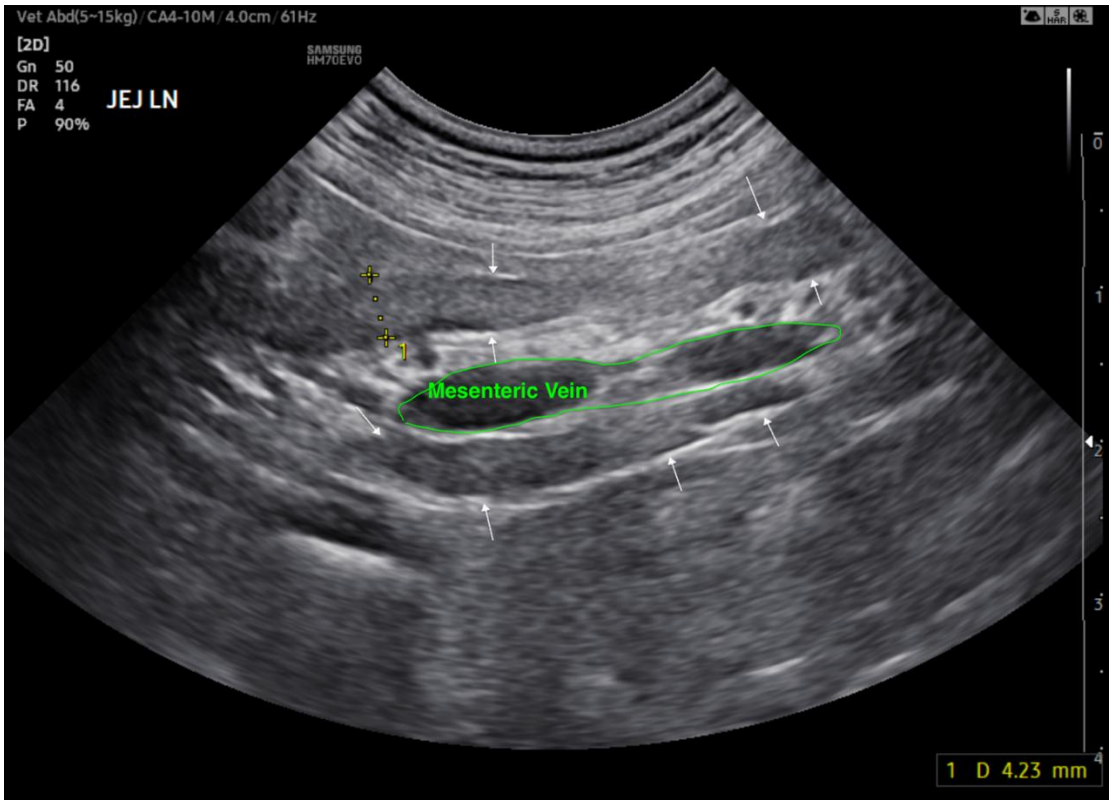
Jejunal Lymph Nodes

Location: In the **mid-abdomen**, scattered within the **mesentery** along with the jejunal vasculature.

These nodes can appear as a **cluster of fusiform structures**.

Scanning Technique

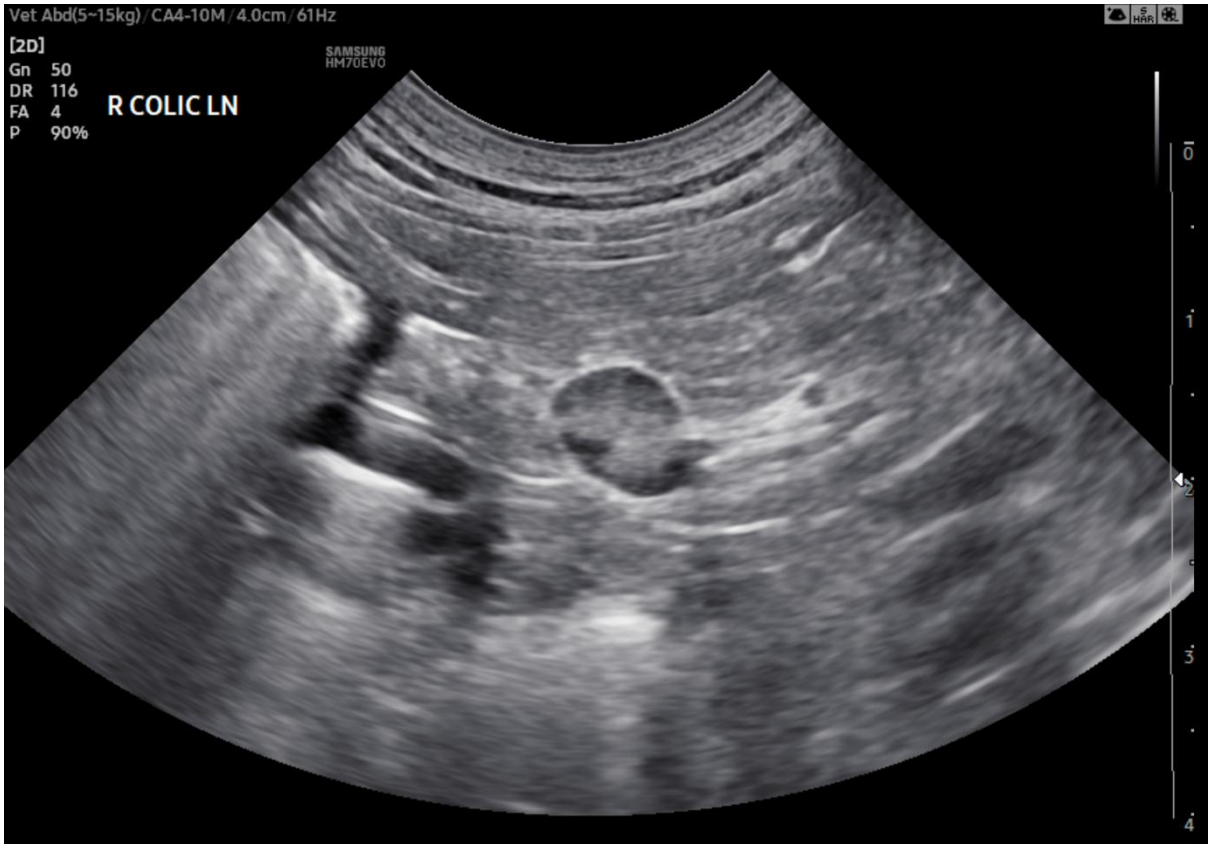
- Patient in left lateral recumbency
- Visualise your ICJ/ICCJ
- This lymph node group will be medial and superficial (apply gentle pressure)
- The mesenteric vessel will run in between your lymph nodes.



Colic and Caecal Lymph Nodes

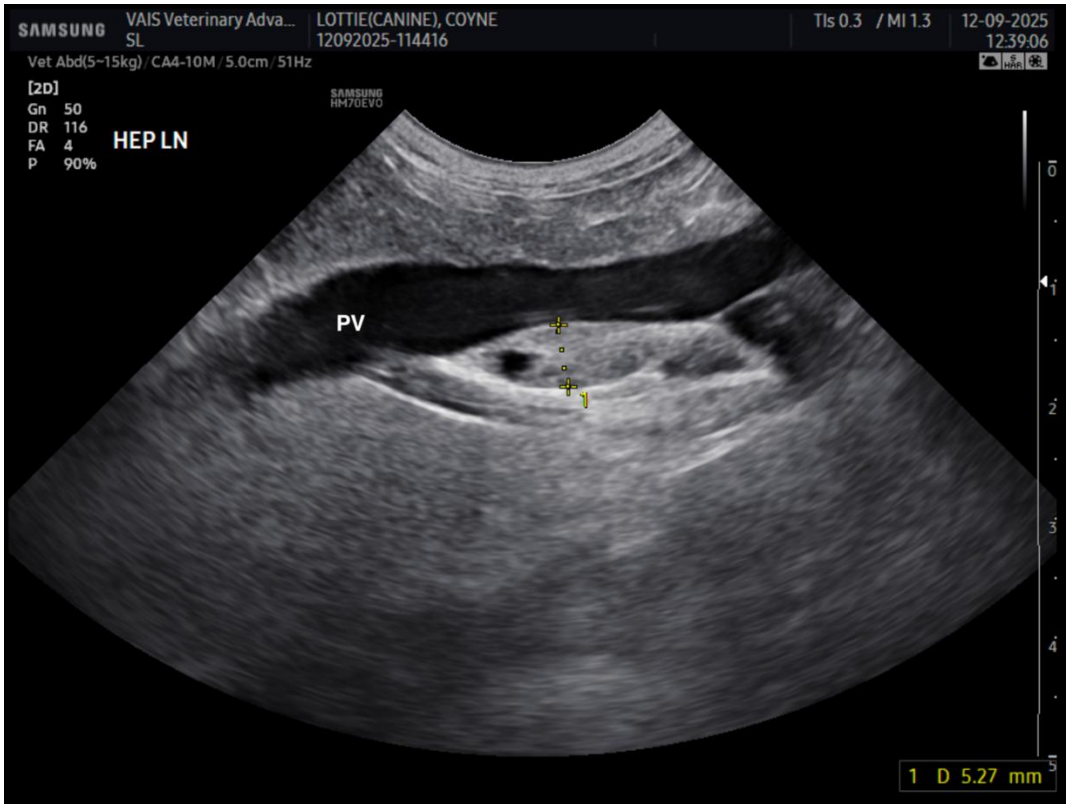
Location: Near the **colon and cecum**, typically in the **right mid-to-caudal abdomen**.

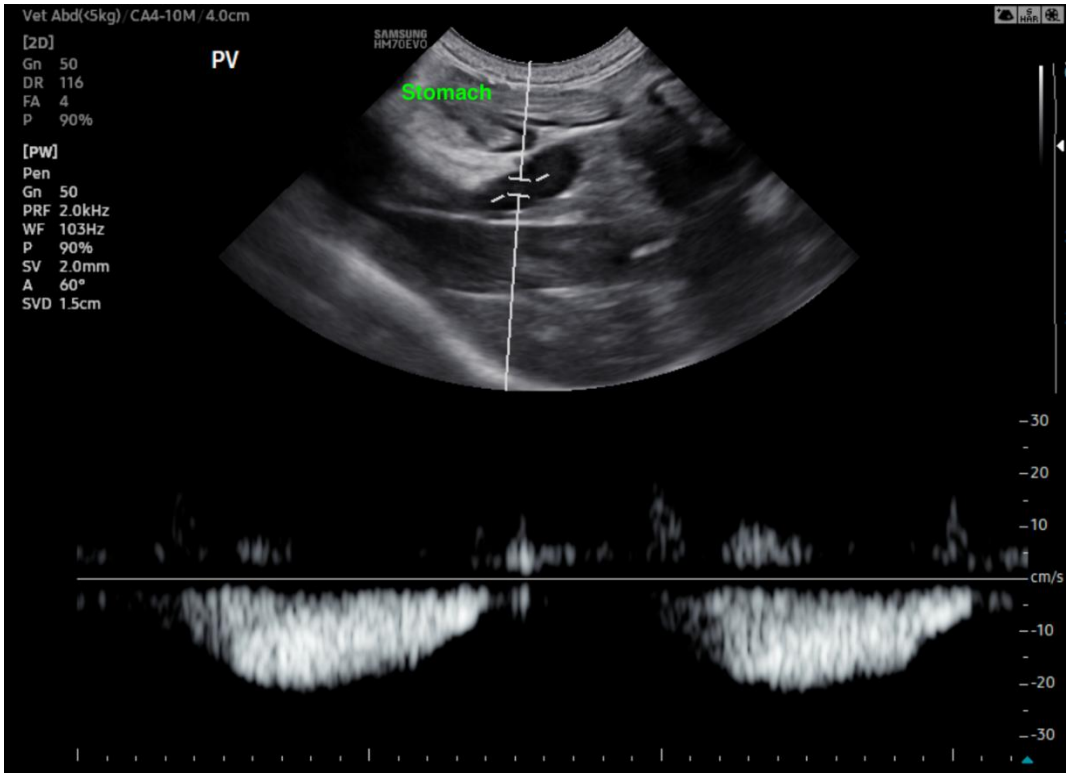
It may be more difficult to detect unless enlarged.

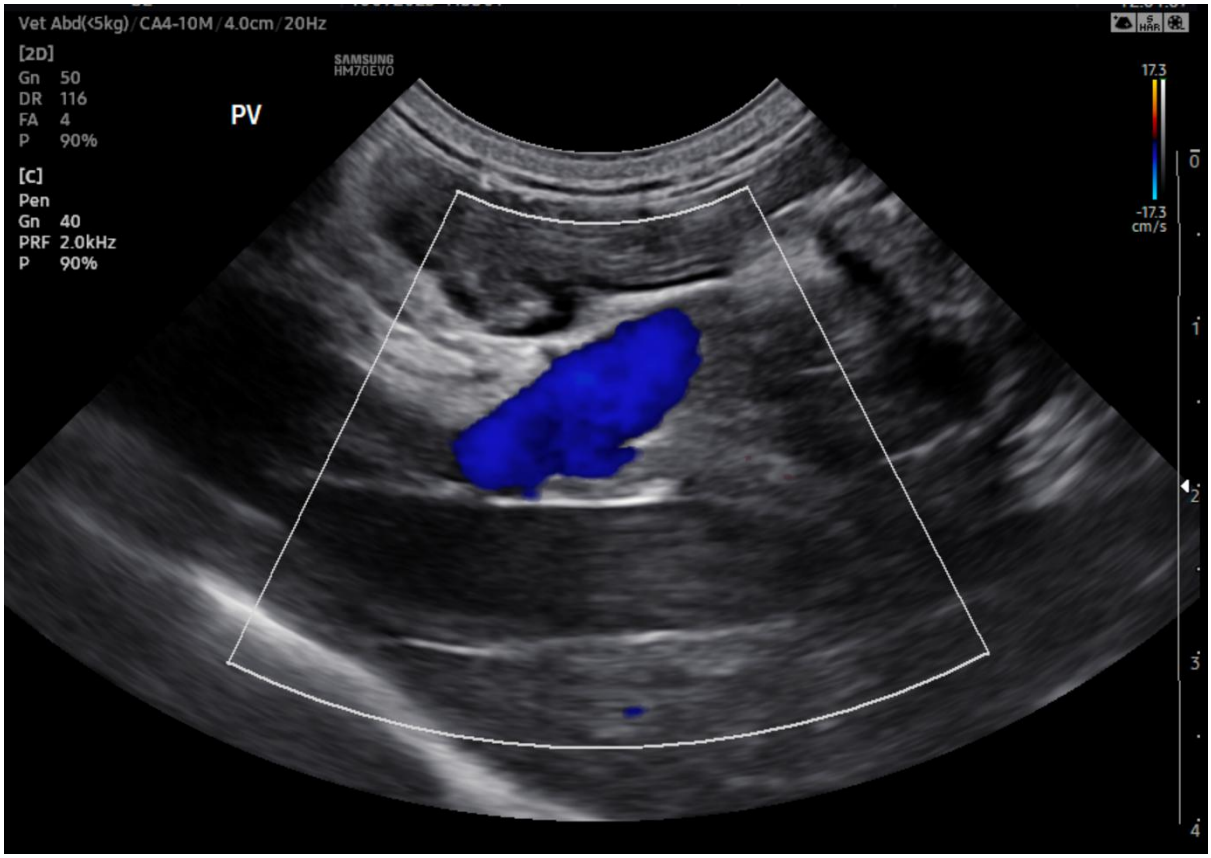


Gastric and Hepatic Lymph Nodes

Location: Adjacent to the **stomach, liver, and portal vein**. These can be visualised when enlarged, especially during the staging of hepatic or gastric disease.







Duodeno-pancreatic Lymph Nodes

Location: In the **cranial right abdomen**, near the **pancreas** and **duodenum**.