

High-Quality Intramuscular Fat Images

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The old adage is, "Practice makes perfect." Close but not quite right. Practice makes permanent. More correctly stated, "Perfect practice makes perfect."

I respectfully ask that each of you take stock in your Intramuscular fat (IMF) image quality (IQ). As we all work to be efficient, it shouldn't be at the expense of accuracy. Here are the most prominent IQ issues we are seeing: duplicates, near duplicates, blurs, narrow and images collected below the longissimus dorsi. No matter your level of experience, I have seen all of you struggle with these at one time or another. So, to really shed a bright light on this, I want to communicate what a good IMF image should look like.

What is an acceptable IMF image:

- The calf must be clean and hair clipped to less than ½ inch. Dirt, hair, feed, manure impede ultrasound penetration.
- A longitudinal view of the longissimus dorsi (LD) muscle taken above the thirteenth, twelfth, and eleventh ribs running just slightly off parallel to the spine.
- Spinalis dorsi muscle and/or acorn fat showing no more than one third of the way across the image from the eleventh rib side.
- A bright and clearly focused image throughout from top to bottom and left to right. Fat lines, striations, intercostal muscle boundaries and ribs as bright and focused as possible.
- No duplicate images. Each image is a unique sample of the LD.
- Collected with maximum depth starting just below the acorn fat.
- Repeating lines below the back fat/LD interface removed or minimized.

Ribs:

The size of the animal will dictate how many and how wide ribs will appear within the image. Obviously, we need to image ribs 13 and 12 and in nearly all cases rib 11. Small animals may even show the 10th rib. No matter how many ribs we see, they should be round and not pointed. Rolling the transducer to the proper angle of incidence will make them round. Intercostals will also show when you are at the correct angle. The appearance of "extra" or "double" ribs is due to incorrect angle. Roll the probe up so the ultrasound beam is pointed nearly straight down towards the rib cage and the chute floor.

Our software requires ribs to be no less than 5 cm deep. Ultrasound monitors have tic marks indicating each cm of depth. Rib depth should be even, or level. We have to reject IMF images that lack enough LD depth to place our interpretation box completely within the LD muscle. We see the most rejections for depth when ribeye area is less than seven square inches.

Small, lean, and immature cattle challenge our ability to get depth. Usually, the hide and back fat together measure 1 cm or less. With ribs at 5 cm, we have about 4 cm of LD. Just enough to get a good accurate reading. Larger cattle have more muscle and fat depth so we need more depth to the ribs. So, to keep it simple in all cases, collect images just below the acorn fat to maximize depth.

The presence of a lumbar vertebrae automatically triggers a marginal designation. If you are scanning small animals, it may be necessary to include a lumbar in order to get enough depth. A data point is more important than a marginal, so if you need depth pull the first lumbar into the image.

Hide and fat lines:

The brightness of the hide and fat interfaces at the top of the image indicate quality of contact. Lack of oil, wrong angle, dirt, hair, brands, insecticide burns, scabs, breed, hide, etc. can impact contact.

There are times we see artifacts, we call repeating lines, at the top of the LD just below the fat. They sometimes appear as more of a blurred area. Do your best to remove them by rolling the probe to the correct angle of incidence, but don't give up contact/brightness. Maximum LD depth helps us here too. We avoid placing our interpretation box on repeating lines.

Acorn fat, spinalis dorsi, and second fat layers:

We don't need or want acorn or spinalis dorsi in IMF images. Avoid them. Acorn fat is clear/black for the most part in the image. The spinalis dorsi is usually fuzzier due to the marbling within it.

A second layer of fat is often confused with acorn fat. They are not the same. As you slide away from the spine you will see acorn fat depth change dramatically, even with small movements. The second layer of fat depth will not change much at all until you drop too low. If you drop too low, you may end up with an image taken below the lateral end of the LD. This happens almost exclusively on fat and highly marbled cattle.

Fatter cattle can also present a double acorn. Handle it just like a second layer of fat. It can be in the image and it doesn't impact IMF readings.

A couple helpful hints: the second layer of fat is NEVER thicker than the first layer and I recommend taking a ribeye image first to get a good view of both acorn and backfat.

Depth and striations:

If you sense a running theme that I am hung up on IMF depth, awesome. Depth improves accuracy. Take IMF images just below the acorn and don't get fixated on bright and clear ribs and intercostals because increased marbling and fat cause attenuation of the ultrasound signal. So, animals with more marbling will have ribs and intercostals that are more faded. Really well marbled animals may have ribs that are nearly impossible to see. (Scan some Wagyu that have been on feed and you will know what I am talking about.) As IMF increases, the striations within the LD begin to look more like a snow storm than clearly defined lines.

Images taken too low, below the LD frustrate me because it is completely avoidable. We should NEVER have to reject an image for being below the LD. This is not an animal issue; it's a technician issue.

Duplicate images and proper sampling:

The idea behind taking 5 IMF images is to improve accuracy via a larger sample size. Saving an image that is essentially a duplicate of another reduces accuracy. While I understand time is money, I also know that 5 independent images can be taken quickly.

Blurs:

Any system can give us a blurred image so we know it will happen from time to time. Please slow down enough to make sure we aren't sorting through 10-20% blurred images. It wastes time for both of us. Scroll back if you have to, or just take another.

Side note: I have heard that Evo systems will not blur. While I agree it is more difficult, it can be done.

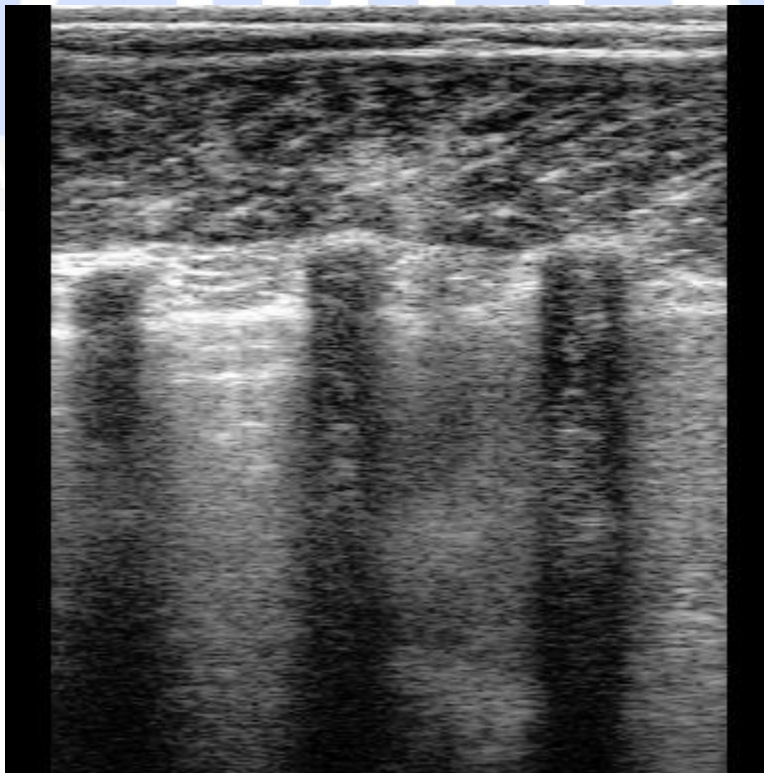
Final thoughts:

ExaGo, Evo and Ibex have replaced all but a handful of Aloka and Esaote systems. Breeders have seen their IMF data change. Almost universally we see the new machine models decrease average IMF year over year for bulls, no matter the breed.

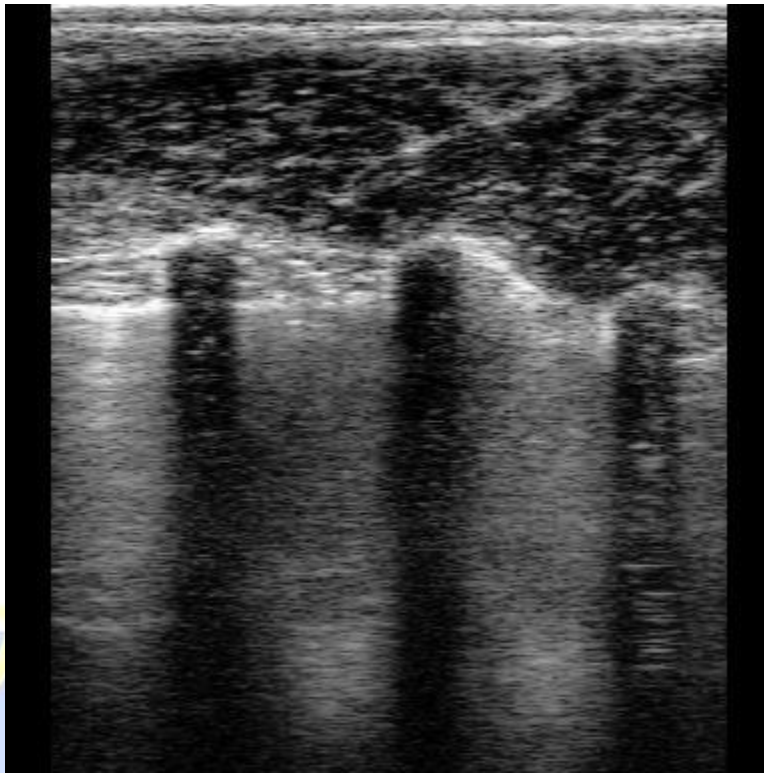
Don't fall into the trap of right vs. wrong when breeders want to compare old system data to new. We report IMF values from less than 1% to over 15% with all the new systems. With high quality images we will accurately report IMF. When IMF goes backwards and much lower than a breeder has ever seen before, I know it is frustrating. That is the time when you can step in as a consultant, rather than a vendor, and explain why more accurate data is going to help them in the long run. Ultrasound for selection first, then marketing.

The following are images that represent common IMF image issues. Feel free to contact us if any of this isn't clear and keep up the great work.

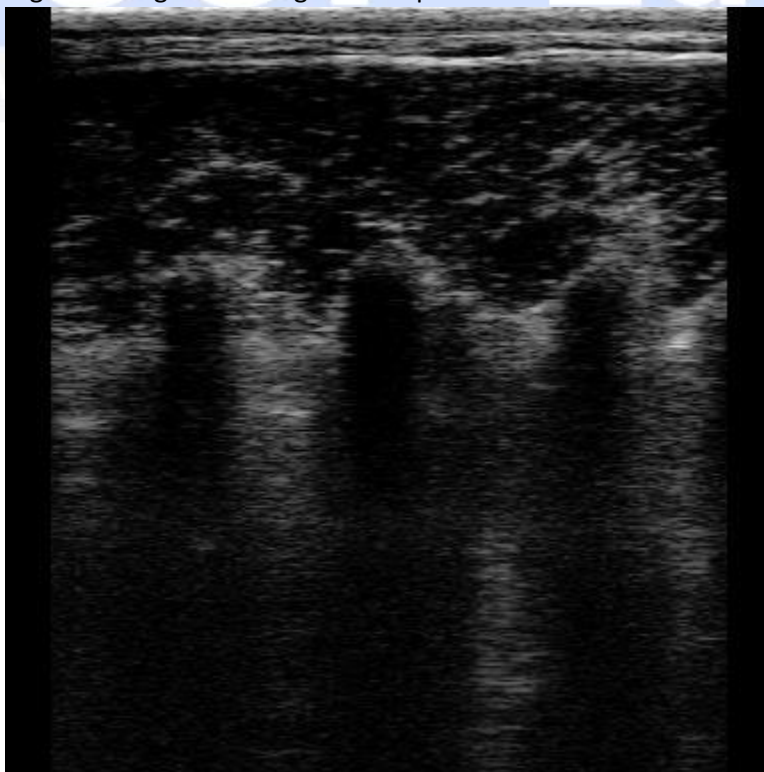
1. Acceptable IMF image.



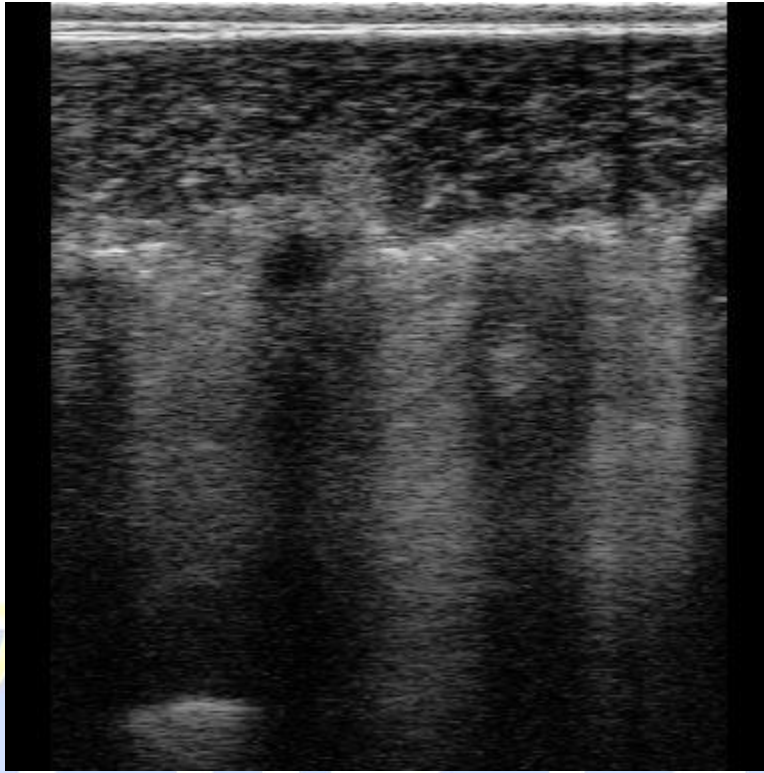
2. Marginal for the left side coming off the LD. Note the ribs are not level indicating the 11th rib side is too low and the transducer has too much angle.



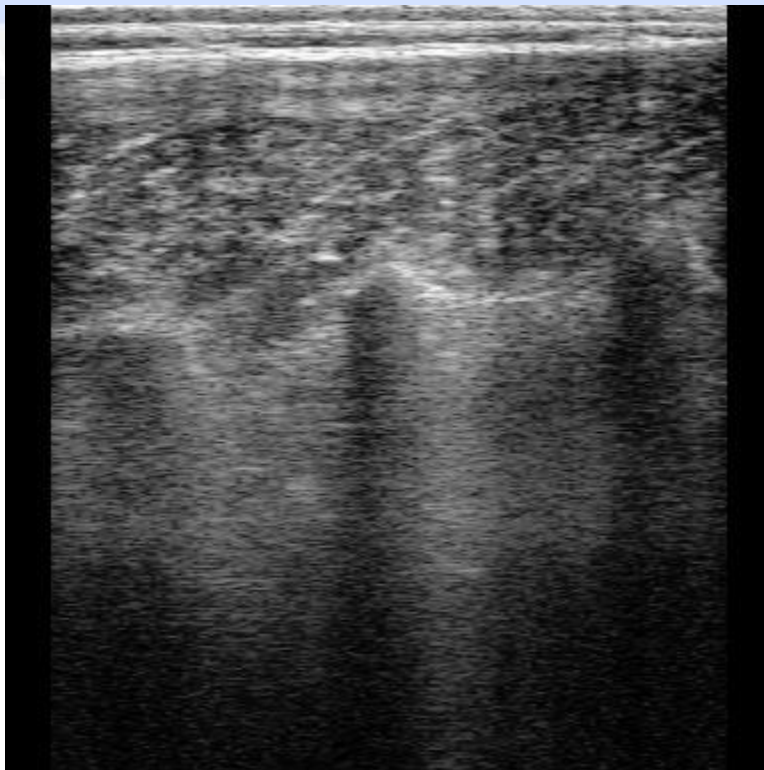
3. Poor contact. Image isn't bright left to right and top to bottom. Ribs should be round and bright.



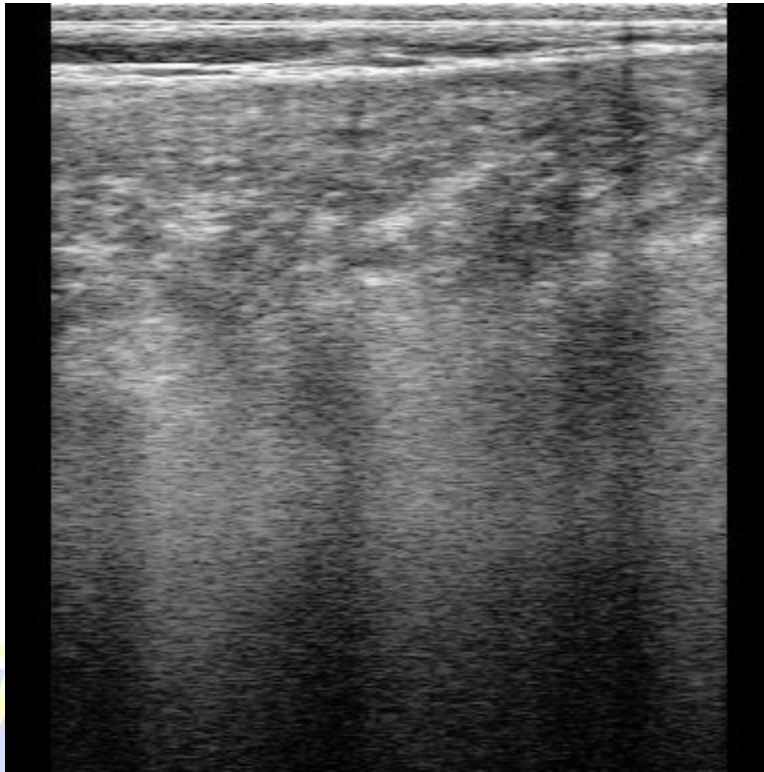
4. Marginal for a lumbar. But also, for ribs and intercostals not being defined. Ribs not being round.



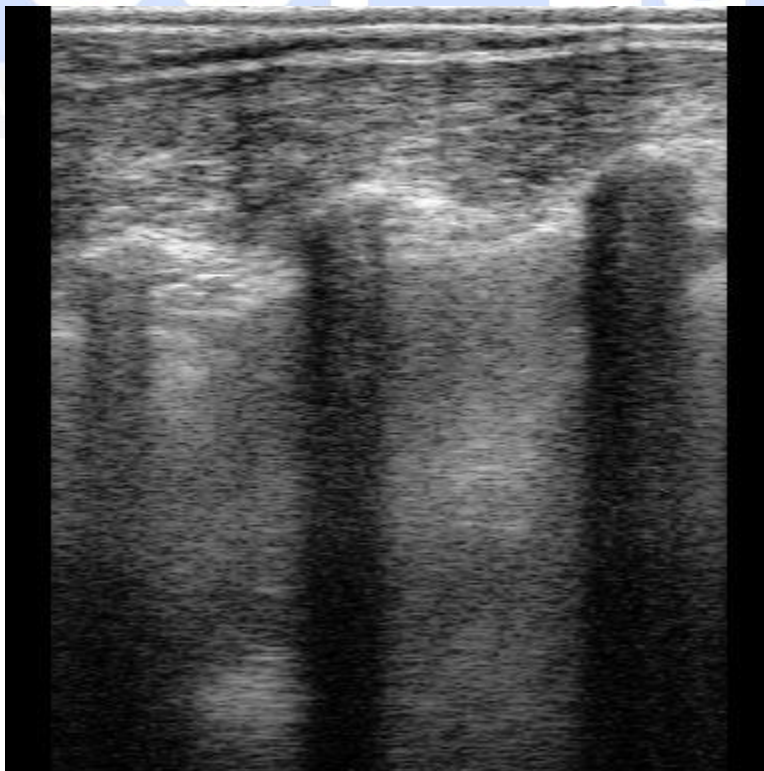
5. Repeating lines below the fat/LD interface. Rolling the transducer will reduce these and brighten ribs.



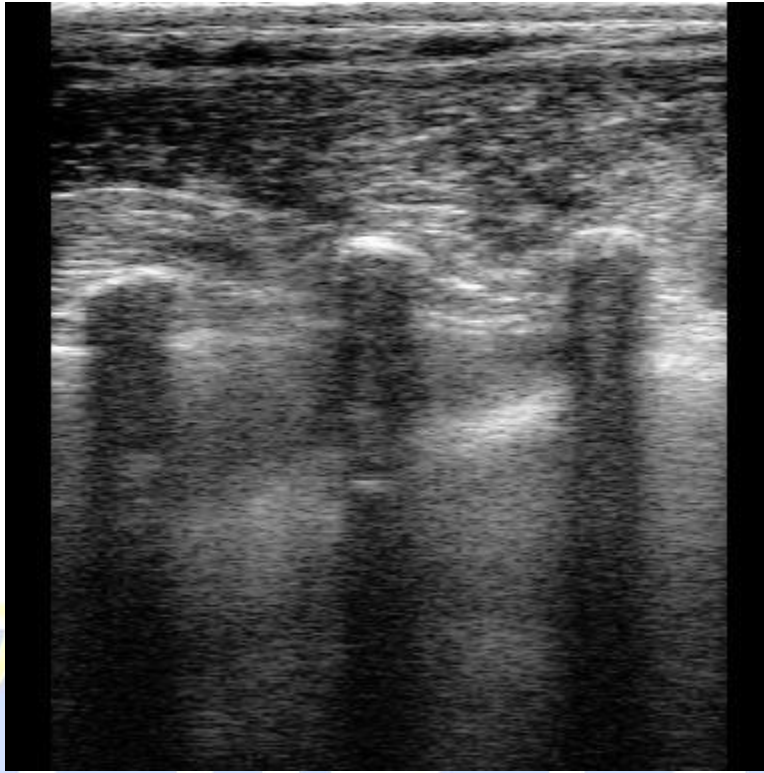
6. Blurred. Also, a drop-out on the right side, probably a connection issue of the probe to the machine.



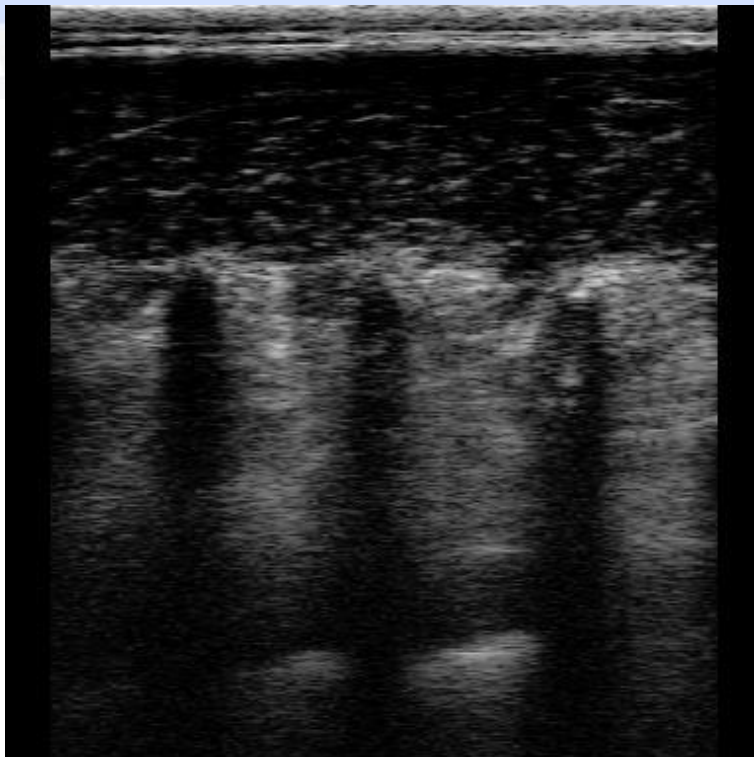
7. Too narrow. Also, blurred, drop-outs, and ribs are not level.



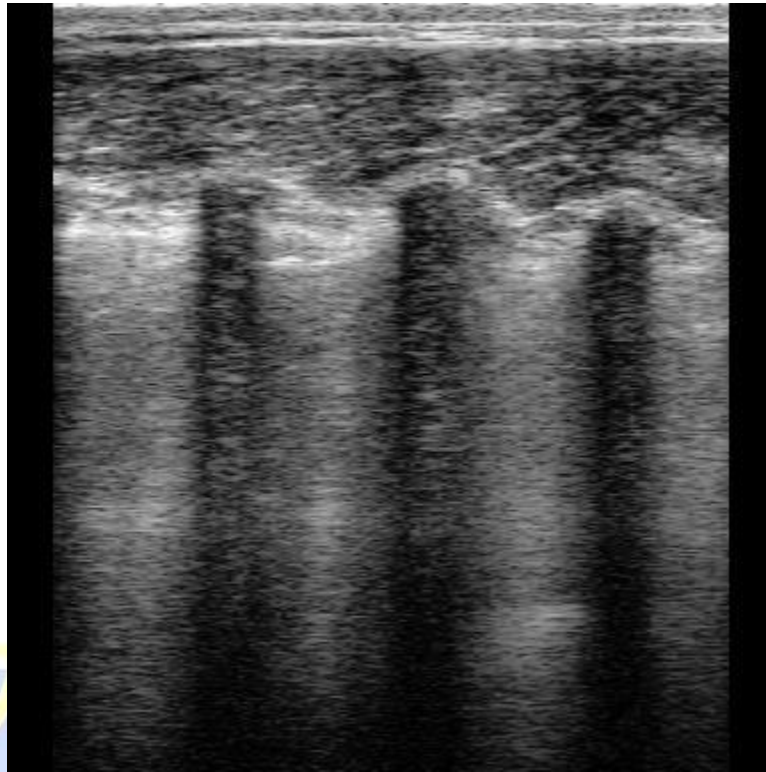
8. Off the LD on the left side. (Note the costarum above rib 11.) This animal had a 16 sq in ribeye. No reason for this to happen. Was the tech seeking better ribs or to remove the 2nd layer of fat? Both?



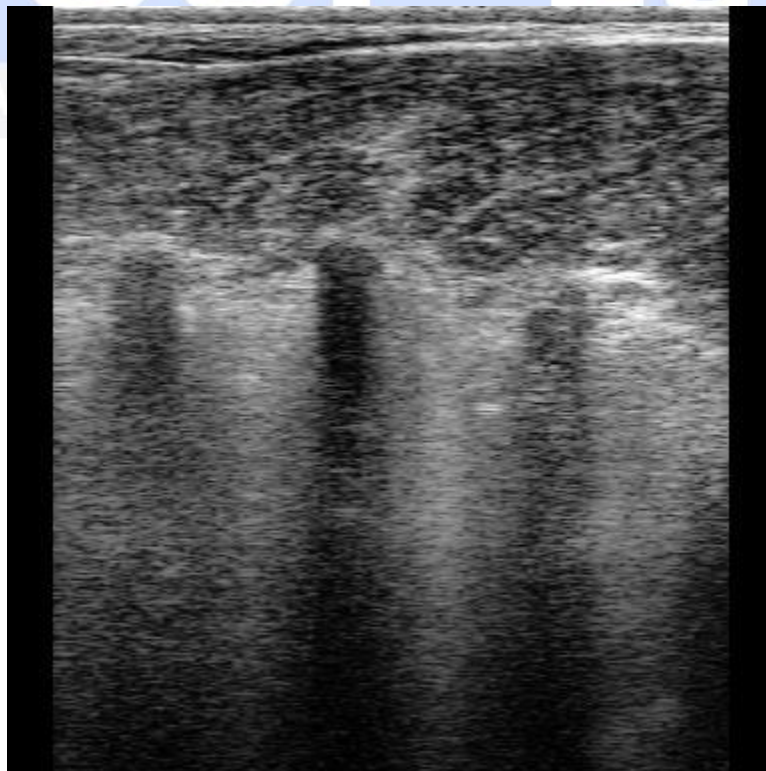
9. Ribs are not round. Roll the transducer to round the brighten the whole image.



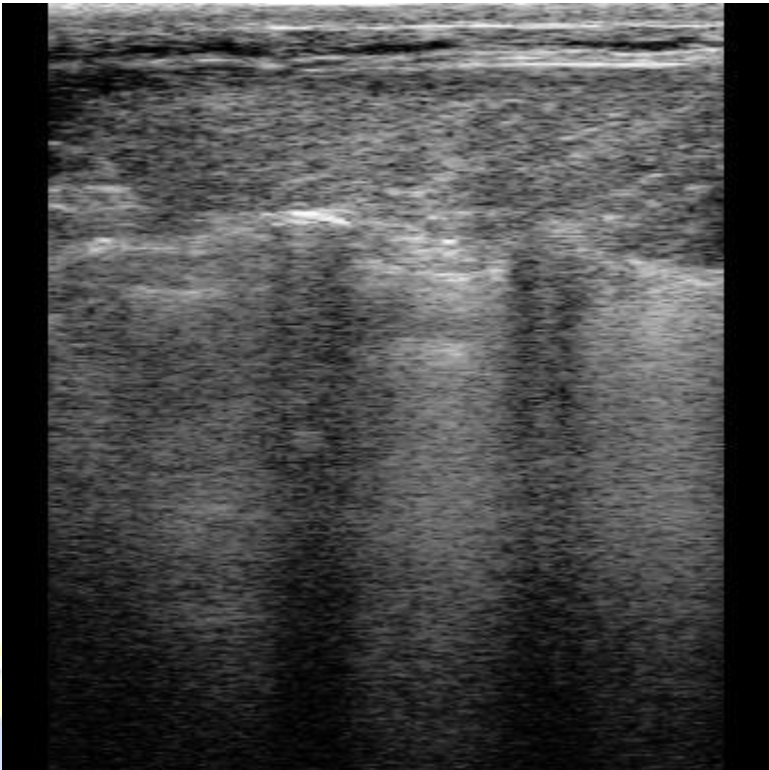
10. Narrow. Good image otherwise. This was from an animal with a ribeye that was less than 7 sq in.



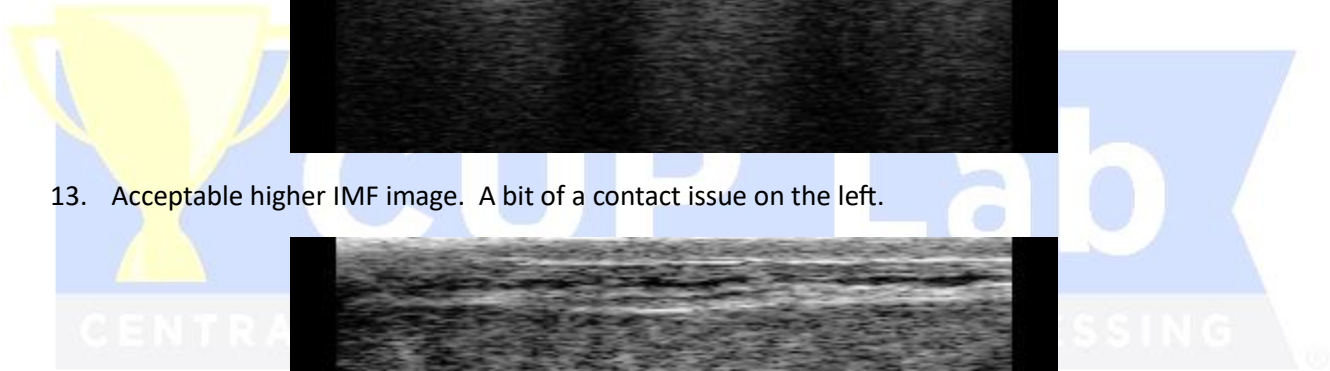
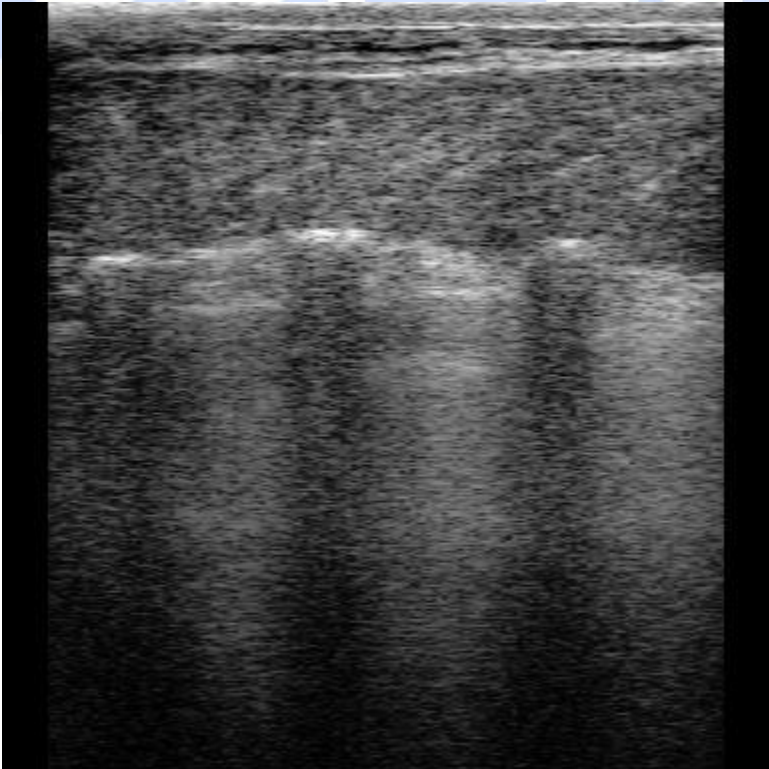
11. A bit of Acorn. Ribs are not level because of too much angle or a rib forward.



12. High IMF animal coming off the LD on the left side. Not rejected, but we are narrow and too low.



13. Acceptable higher IMF image. A bit of a contact issue on the left.



14. Low IMF image. Acceptable but a bit of a contact issue on the left side.

