

# Diagnostic Ultrasound; New Features, Better Images!

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Ultrasound is a highly technical and very economically rewarding form of imaging available to all levels of veterinary practice. This presentation will cover the breadth and depth of veterinary ultrasound and discuss the economical aspects of introducing it into your practice.

## **Machinery**

Ultrasound machine systems are available from a plethora of manufacturers and distributors. Whether you decide to buy a used or new system, provides another level of complications. Many newer systems come as “portable” machines, indicating the ability to pick up the machine easy and transport to another room or separate practice. “mobile” systems are larger and whilst able to roll into adjacent rooms, are generally limited to one practice or building setting. Refurbished or used systems can be quite a good investment, but be wary of older technology. Older, analog systems will have poorer image quality, often without the capability to send DICOM images to an outside reviewer.

## **Saved image capability**

Do not expect that printed images will allow a high level of consultant opportunities. Similarly, saving images on disc drives (CD or DVD) does not allow quick efficient outside interpretations. Better, but still not optimal would be the capability to save images as jpeg's via a usb or other drive capability. The only really practical method to obtain quick, efficient and high quality outside consultation is via direct connection with the consultant and communications with DICOM images.

## **Probes**

Most manufacturers are building systems for the human market. Therefore they will have probes for abdominal, echo and small parts indications. I usually avoid all intra-cavitary probes as impractical for veterinary medicine. These include intra-rectal and intra-vaginal probes.

For 90% of small animal work, two probes will suffice for abdominal, small parts and non-cardiac thoracic indications in cats and dogs. This would include a “medium” frequency (range 4-8 MHz) curvilinear and the highest possible linear transducer. If economic are very limiting, consider just the curvilinear transducer as a sole probe system, but realize that you will be limited, especially for small parts, especially cat intestines and pancreas.

If you want to provide echo services, then I recommend at least a 3 MHz probe for general purpose large dog and Doppler use and a 7.5 (or higher) MHz probe for smaller dogs and cats. Dedicated echo probes have better image quality, frame rates and Doppler sensitivity than abdomen probes. Again, if economic are very limiting, consider just the curvilinear transducer as a sole probe, but realize that the Doppler won't include CW and the frame rates are often too slow in cats. CW (continuous wave) Doppler is essential for the diagnosis and staging of for most congenital and many acquired cardiology diseases.

The basic emergency practice has a different set of goals and the 2-probe system that seems to work well for us here at UIUC, is the curvilinear and one medium frequency general echo probe. Using this system the emergency faculty and residents can pretty quickly perform flash scans for heart disease (or pericardial effusion), evaluate the patient for masses in the abdomen, pleural and peritoneal free fluid, bladder stones, pyometra and other obvious lesions.

## **Service**

Most buyers assume that all manufacturers and distributors provide equivalent service. I have found this not to be the case. Some “human” manufacturers only provide speedy service when you purchase a very expensive special service package. Some even require that you ship the machine back to them, promising it would be repaired within a couple of weeks (Just Say No!). In my opinion, you really need to research the service record of the company from which you are purchasing the unit and the durability track record of the ultrasound machine system. Don't assume that “it is just like a car”. It is not! I used one company in private practice that would ship a machine over night (!), to replace then one being shipped back for maintenance. They were awesome! Physically bigger units need to be serviced at your practice. How fast will they come for a service call and how much will it cost? Get references from the sales representative and be sure to shop around.

## **Training**

When purchasing a machine, strongly consider a training component to the overall package. Ultrasound is an extremely “user dependent” modality. The most common mistake made in diagnostic ultrasound is the error of omission; “If you do not find it (=see it) then we can not diagnose it. Do not expect that outside consultants will be able to see lesions that you miss. Bad information in = Bad information out.

Including training opportunities is essential to building appropriate skills. Most companies provide weekend classes with didactic and wet-lab components. The most important component is the wet-lab (=hands on) portion. The classroom component is often just regurgitated knowledge readily obtained in an ultrasound textbook. Hands-on training is essential. Repeated hands-on training should be assumed and taking a basic or intermediate course more often than once should be expected.

Does the manufacturer have a “program” for training you or is the training similar to a menu, where you choose whatever you want. At the UIUC we have a 2-year training system (the Executive Veterinary Program) where we take veterinarians through the program as a cohort, covering all basic-advanced abdomen and basic-intermediate echo didactic and hands-on components. This training has a casebook requirement and examination at the conclusion. Similar programs are available in other sites.

## **Economics**

After the initial purchase and training (hopefully in one package price), the net incremental cost is extremely small. Gel, isopropyl alcohol, needles, syringes, microscope slides and a little electrical current will suffice. Diagnostic ultrasound has the highest Profit:Cost ratio of any single service in our hospital. Our machine was paid off in approximately 6 months and machines generally last between 4 and 8 years, depending on the practice needs, quality of the initial machine, ability to add additional probes and other new technology as you and the practice grows.

The quality of the general practice grows, too. The ability to perform in-house diagnostic ultrasound means more in-house income, less loss to referral institutions and improved point of service care.

## **Conclusion**

If the practice is willing to purchase a high quality machine, with sufficient transducers and DICOM connectivity, and train their associate (s), then ultrasound has the capability to improve the practice’s state-of-care and be economically very rewarding.