

# Baker & McVeigh Equine Hospital CAPE (PTY) LTD

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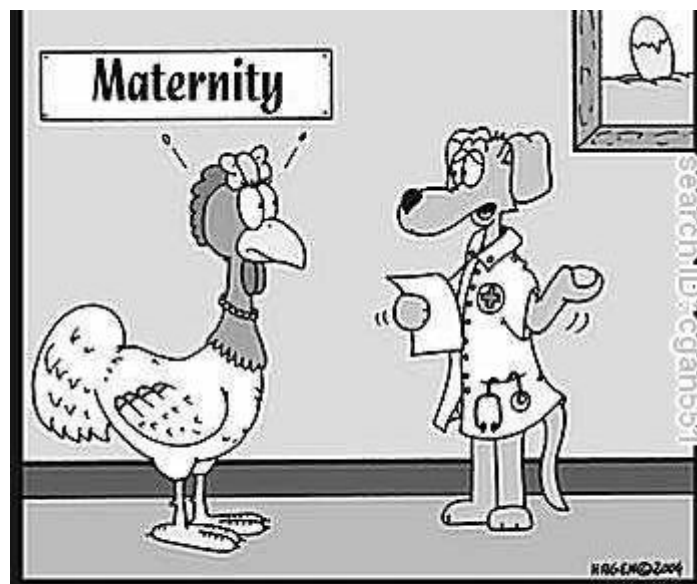
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## Ultrasound-Lots of black, grey and white squiggles!

Ultrasonography- the second of the imaging modalities to be covered- can just seem like a black and white blur! It is a great tool and can be used to help diagnose all kinds of problems in horses, ranging from lumps to damaged tendons to bladder stones! This information sheet will hopefully shed some light on how ultrasound works, why and when veterinarians use it, and how it can help vets diagnose issues in your horse.



The ultrasound looks fine, but I really don't think you should count your chickens before they've hatched...

## WHAT IS ULTRASOUND?

**Ultrasonography** is an ultrasound-based diagnostic imaging technique used for visualizing body structures including tendons, muscles, joints, vessels and internal organs for possible pathology or lesions. It can also be used in the horse for pregnancy diagnosis.

In physics, the term "ultrasound" applies to all sound waves with a frequency above the audible range of normal human hearing, about 20 kHz. The frequencies used in diagnostic ultrasound are typically between 2 and 18 MHz.

With all imaging modalities, ultrasonography has its list of positive and negative attributes.

## **Strengths**

It images muscle, soft tissue, and bone surfaces very well and is particularly useful for delineating the interfaces between solid and fluid-filled spaces. It can be used in the horse to assess ligaments and tendons, bone surfaces, muscles, eyes, lungs, heart, the gastrointestinal system, lumps and bumps, kidneys and bladder and the reproductive tract.

It renders "live" images, where the operator can dynamically select the most useful section for diagnosing and documenting changes, often enabling rapid diagnoses. Live images also allow for ultrasound-guided biopsies or injections, which can be cumbersome with other imaging modalities.

It shows the structure of organs.

It has no known side effects and rarely causes any discomfort to the patient.

Equipment is widely available and comparatively flexible.

Small, easily carried scanners are available; examinations can be performed out and about at yards.



## **Weaknesses**

Ultrasound waves cannot penetrate bone.

Sonography performs very poorly when there is a gas between the transducer and the organ of interest, due to the extreme differences in acoustic impedance. For example, overlying gas in the gastrointestinal tract often makes ultrasound imaging of deeper structures within the abdomen very difficult. Only the surface of the lungs can be imaged as the lungs are normally filled with air.

Even in the absence of bone or air, the depth penetration of ultrasound may be limited depending on the frequency of imaging. Consequently, there might be difficulties imaging structures deep in the body, especially in larger, fatter horses.

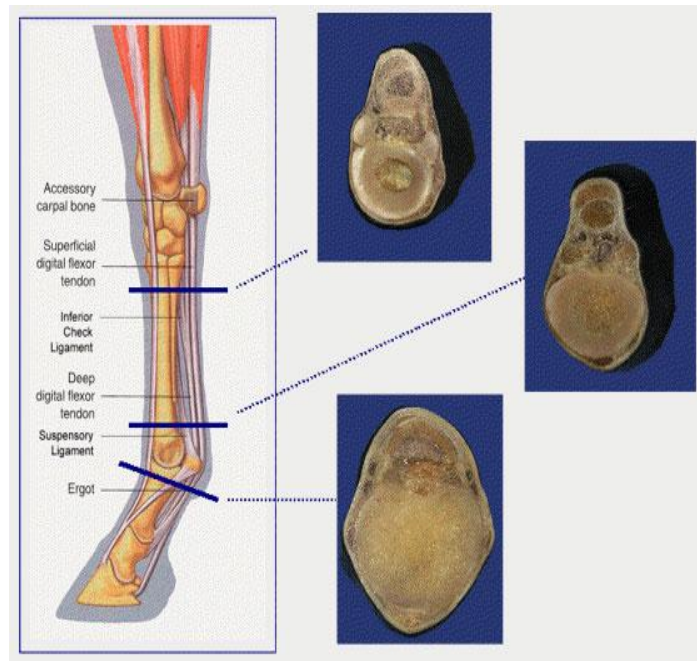
The method is operator-dependent. A high level of skill and experience is needed to acquire good-quality images and make accurate diagnoses.

## What can we see and how do we use ultrasound in the horse?

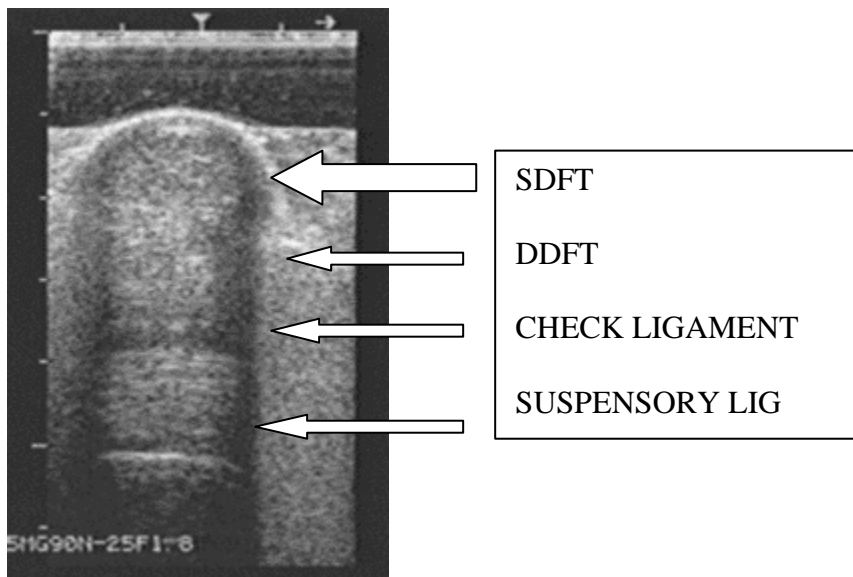
### Lameness

Ultrasound can be used in the horse to help diagnose the cause of lameness and follow the progression of lesions. Tendon and ligament scans are performed under light sedation and can be done on the farm/yard due to the portability of the machine.

Tendon and ligament damage can be assessed and monitored. Tendon size, structure, lesion size, the presence of inflammatory fluid, surrounding structures, core lesions, and avulsion fractures into ligaments can all be used to monitor damage and progress.



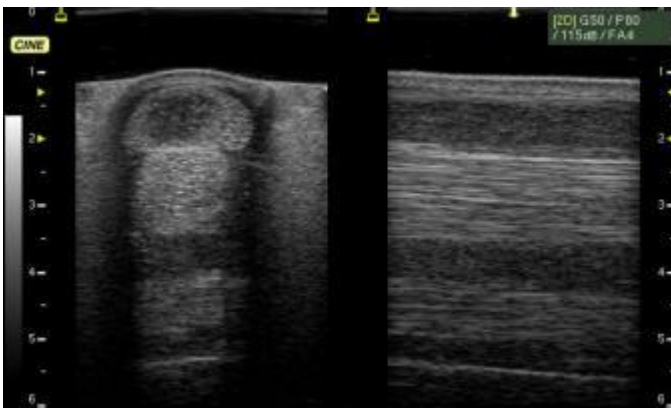
*A reminder of the anatomy of the leg*



*The normal anatomy of a tendon scan*



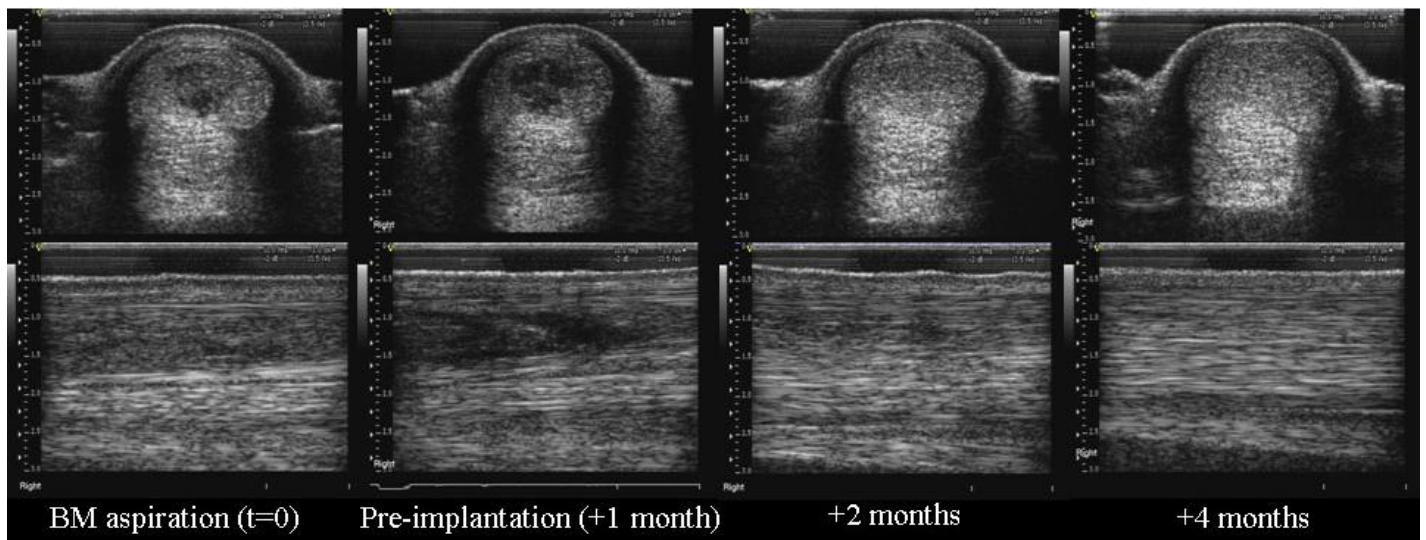
Damaged SDFT on the left image with normal on the right. Note the increase in size of the damaged tendon with 'loss of fibre structure and pattern', seen as blackness within the tendon due the accumulation of inflammatory fluid.



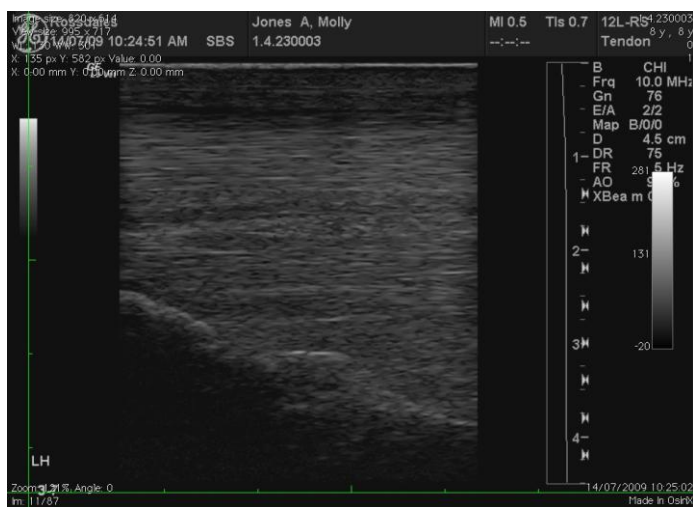
A core lesion injury within the SDFT seen on cross section on the left and long section on the right. Cross sectional views of the tendon are like cutting your cucumber into circles, long section is like cutting the cucumber onto long length wise strips.



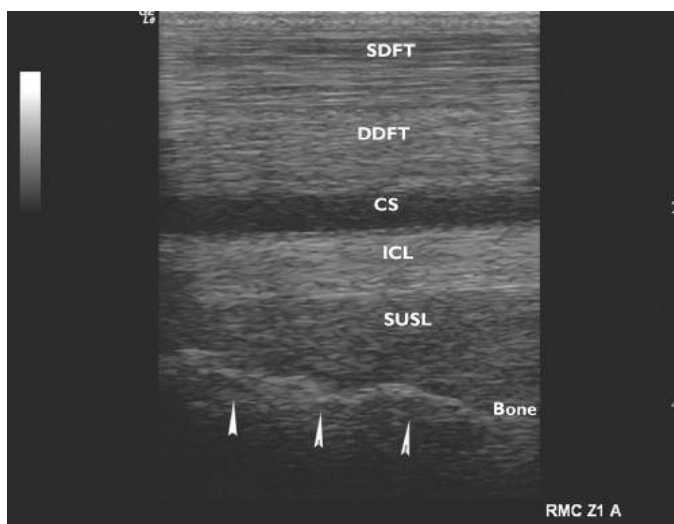




*A core lesion in the SDFT that has been treated with intralesional PRP (Platelet rich plasma- see info sheets on website) and followed through by ultrasound to monitor progress.*



*A normal suspensory ligament origin*



*A damaged suspensory ligament origin with enthesiophytes ( see September Xray info sheet)*

## Colic

Ultrasound is a very useful tool when assessing colics (see earlier info sheet July 2012). The gastrointestinal tract can be assessed for impactions, blockages, distension, foreign bodies, sand, worms, enteroliths and gut wall lesions. Ultrasound can help make the decision as to whether a horse with colic needs surgical intervention or not.

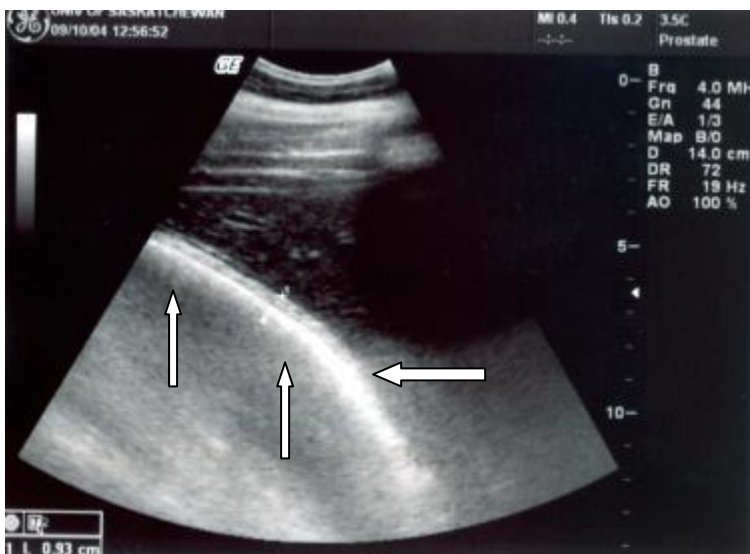
The ultrasound can also be used to sample peritoneal fluid, the fluid that bathes the abdominal organs, and assess the abdominal organs, including the liver, spleen, kidneys, bladder and uterus.



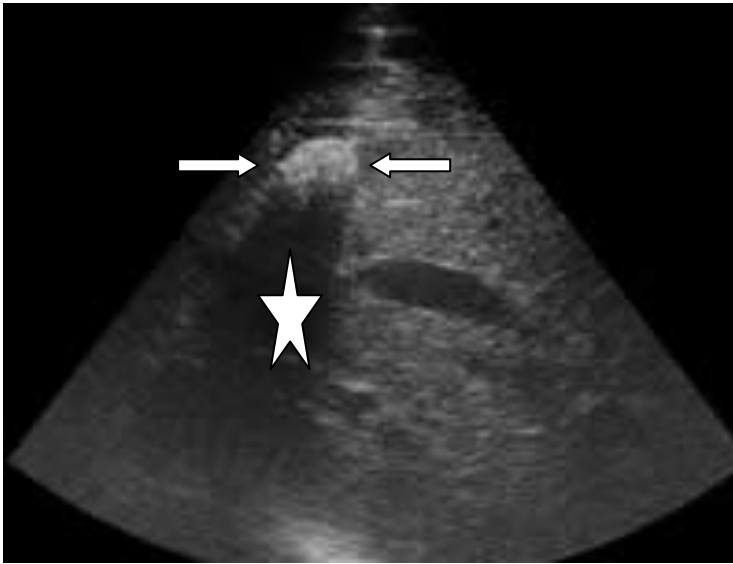
*Distended loops of small intestine in a horse with colic*

### **Chronic diseases**

Ultrasound is used when assessing horses with weight loss, poor performance, low grade repetitive chronic colic, pyrexia of unknown origin, liver and kidney disease to name but a few. The ultrasound is used to assess all the vital abdominal organs, and help to take accurate biopsy samples when required.



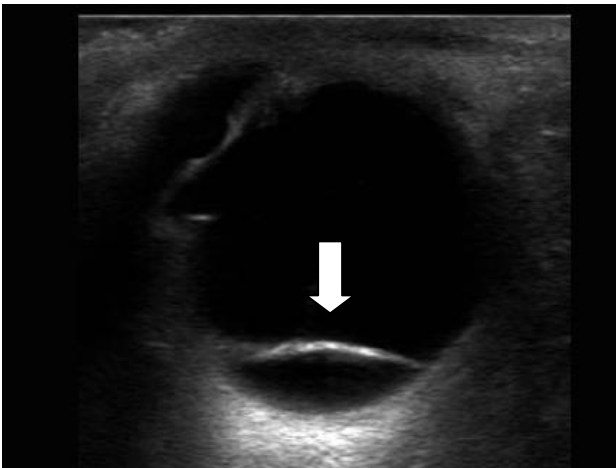
*Image of the wall of the colon in a horse with right dorsal colitis due to bute toxicity. Note the thickened inflamed wall of the colon (arrows)*



*Image of the liver. This horse has a liver stone, 'Cholelith' blocking its liver (arrows). Note the lack of image below the stone as the sound waves can't penetrate through the stone (star).*

### **Eye injuries**

Ultrasound is very useful to examine the back of the horses eye when injuries are such that the horse cannot open its eye, eg. Due to pain.



*A horses eye with retinal detachment. Note the retina floating freely at the back of the eye (arrow)*

### **Cardiovascular assessment**

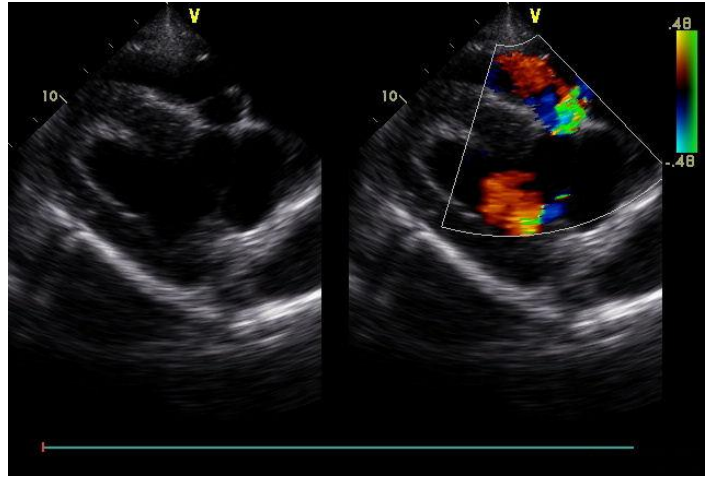
Ultrasound can also be used to assess the horses heart and lungs.

Only the outer surface of the lungs can be assessed as the normal lung is filled with air which won't propagate a sound wave. But this information is invaluable when working up respiratory cases.

The heart and its associated valves can also be assessed using ultrasound. The heart is a huge organ to scan in the horse, but its properties lend well to good ultrasonographic images. The blood flow through the heart can also be monitored using Doppler ultrasound and a special technique called M mode ultrasonography.



*The left ventricle of the heart.*



*Colour flow doppler to assess blood flow and valve function of the heart.*

In summary, ultrasound is a hugely useful tool used in a whole range of veterinary cases to aid in making diagnoses, treating cases and following progress of pathologies.