

ULTRASOUND EXAMINATION OF THE FEMALE MINIATURE DONKEY REPRODUCTIVE TRACT

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INTRODUCTION

This presentation describes the technique for examination of the female donkey reproductive tract. The reproductive exam is not difficult for a veterinarian to perform once some basic landmarks and procedures are learned. It is also safe for the animal, in my opinion, having performed this technique hundreds of times on many different animals. The techniques described below are useful for estimating stage of estrus, determining the optimum time for artificial insemination or hand breeding, deciding to stop breeding after ovulation of a follicle has occurred, or determining the pregnancy status of a particular animal.

REPRODUCTIVE ULTRASOUND EXAMINATIONS

A veterinarian can tell the stage of pregnancy accurately and early on by using commonly available ultrasound equipment. A 5 MHz linear probe is adequate for such examinations (Fig. 1). Transrectal and transabdominal techniques are possible and well tolerated by most jennets without sedation. During estrus, the examiner can follow follicles as they mature and regress, and also identify corpora hemorrhagica and the corpora lutea produced successively on the ovary at the ovulation site.



Figure 1: Equipment for Donkey Reproductive Ultrasounds.

A = 5 MHz linear probe; B = PVC extension for transrectal exams in smaller donkeys.

Transrectal examination can detect pregnancy as early as 16 days after breeding. I am currently developing tables for miniature donkeys to relate the diameter of the conceptus to the stage of pregnancy. The fetal heartbeat may be seen approximately 25 days of pregnancy. Transabdominal examinations are easily performed after 70 to 80 days (Fig. 3), yet it is more difficult to estimate stage of pregnancy after 90 days. I have pending pregnancy ultrasound and reproductive cycle studies that aim to refine the diagnostic accuracy.

EQUIPMENT SETUP

ANIMAL HANDLING

One of the keys to performing a safe and thorough ultrasound examination is in the handling of the animal. Some basic handling rules must be followed since donkeys do not like to be hurried. What has erroneously been referred to as stubbornness is actually caution and a donkey's typical evaluation process. Donkeys will tolerate a non-painful procedure if the people involved are patient in their approach. Donkeys tend to stop or back up and they should be offered time to look the situation over rather than being pushed or lifted, which just frustrates and tires the humans and frightens the animals. Donkeys can sometimes be backed into a convenient location to perform an examination.

Most examinations are performed in a chute arrangement (Fig. 2) with the animal tied to the front end with a halter and lead rope. One excellent motivator to entice a donkey to enter the chute is to offer a dish of sweet feed at the front end. A donkey's first trip in may take a while, but subsequent entry is usually faster with the food incentive present. Reproductive exams do not take much time so eating keeps the animal occupied and quiet. There may be trouble leading one animal into the examination chute from a holding pen of many as all will try to get to the food! Many exams are performed without a chute by standing a haltered animal next to a solid wall or tying her to a solid object. An assistant can also position a donkey with its rear end adjacent to a stall door and the ultrasound equipment located just outside. Food distraction also works well with these methods.



Figure 2: Chute Setup for Performing Ultrasound Examinations on Miniature Donkeys.
Note the grain feeder placed at the front of the chute.

The internal anatomy of the female reproductive tract of the donkey, miniature included, is comparable to that of a 1000-pound horse in regards to size of the uterus, ovaries, and length of the tract. This must be kept in mind when performing transrectal examinations so as not to mistakenly

search for the ovaries at a location based on scaling down the size of the animal. Examinations should be performed in a quiet, but not necessarily isolated, location since donkeys are comforted by the presence of other animals within close proximity. It is helpful if other animals are located in an adjacent pen or stall. Good lighting encourages the animals to enter the proper location, but it is also useful to be able to reduce light intensity to allow for easy viewing of the ultrasound screen. The machine can be placed on a portable cart or hay bales in close proximity for ease of viewing by the operator and operation of machine controls, such as those for freezing the picture for measuring or to capture it as a digital or printed image.

ULTRASOUND EXAMINATION TECHNIQUES

TRANSRECTAL EXAMINATIONS

Transrectal examination of the miniature donkey uterus and ovaries is most often performed by attaching a 5 MHz ultrasound probe to a ¾ inch diameter, slotted PVC extension arm of approximately 14 inches in length (Fig. 3). This is necessary because size limitations constrain most veterinarians from introducing hand and arm fully into the rectum as is possible in the full-size equine. A gloved and lubricated hand is first used to evacuate manure with three fingers just inside the anus. Then, 120 ml of water-soluble lubricant is gently infused through the anus into the rectum using a catheter tip syringe. This aids in introducing the probe safely into the proper position for the examination, and it provides good contact between the probe and the rectal wall for improved imaging of the uterus and ovaries. The rectum does not have to be completely evacuated for the exam. In larger donkeys where the rectum will safely accommodate the hand, probe, and arm of the examiner an extension arm is not needed. The rectum should be emptied using copious amounts of lubricant in this case.

If resistance is encountered or feces interfere with transmission and reception of the ultrasound waves when slowly advancing the probe in a miniature or small donkey, manure should be removed – an enema of 300 ml warm, soapy water can be administered. The animal is returned to the holding area, and the exam is recommenced after the animal evacuates the manure. This is necessary for less than 10 % of transrectal exams. The ultrasound probe is further lubricated with external application of lubricant before introduction into the rectum.

The probe is initially advanced through the anal sphincter in a 45-degree upward direction to allow for the tilt of the donkey pelvis. At 4-6 inches inside the rectum, the urinary bladder is visualized at the 6 o'clock (bottom) position, a convenient landmark to locate and visualize the uterus, which is found just in front of the bladder. The body of the Y-shaped uterus is seen as a linear structure as the probe is advanced (Fig. 4). A cross-sectional view of the uterine horns is obtained as the probe is advanced and rotated to the 5 and 7 o'clock positions at approximately 12-14 inches in from the anus. The probe may have to be moved gently in and out or rotated slightly to find the right and left horns for examination. Once the smallest diameter of the respective horn is found, the probe is rotated to either the 3 or 9 o'clock positions at that depth of insertion to locate the ovary. Again slight rotation, insertion, or withdrawal of the probe may facilitate viewing of each entire ovary (Fig. 5).

At times, examination of one side or the other may not be possible due to the presence of manure between the probe and the rectal wall. The probe may be used to gently rotate the manure out of the way for a clearer view. On some occasions, the ovaries just cannot be found or the uterus cannot be fully examined due to interference from intestine moving between the rectum and the reproductive organs. It is best to stop the exam and try another time. If the animal strains at any time during the examination procedure, terminate the exam immediately. Damage to the rectum is a slight risk with an ultrasound exam, and careful and slow examination minimizes this possibility.



Figure 3: Extended Ultrasound Probe Inserted into the Rectum for Performance of Examination.

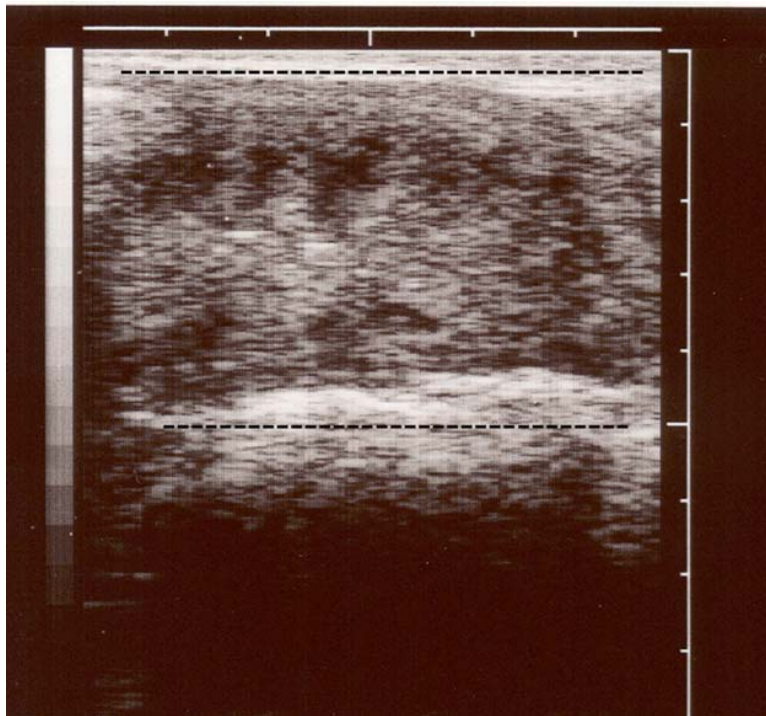


Figure 4: Longitudinal, Transrectal Ultrasound Image of the Uterine Body in a Miniature Donkey During Estrus. Note anechoic mottling representative of edema in the uterine lining during estrus. Scale: 10 mm per division.

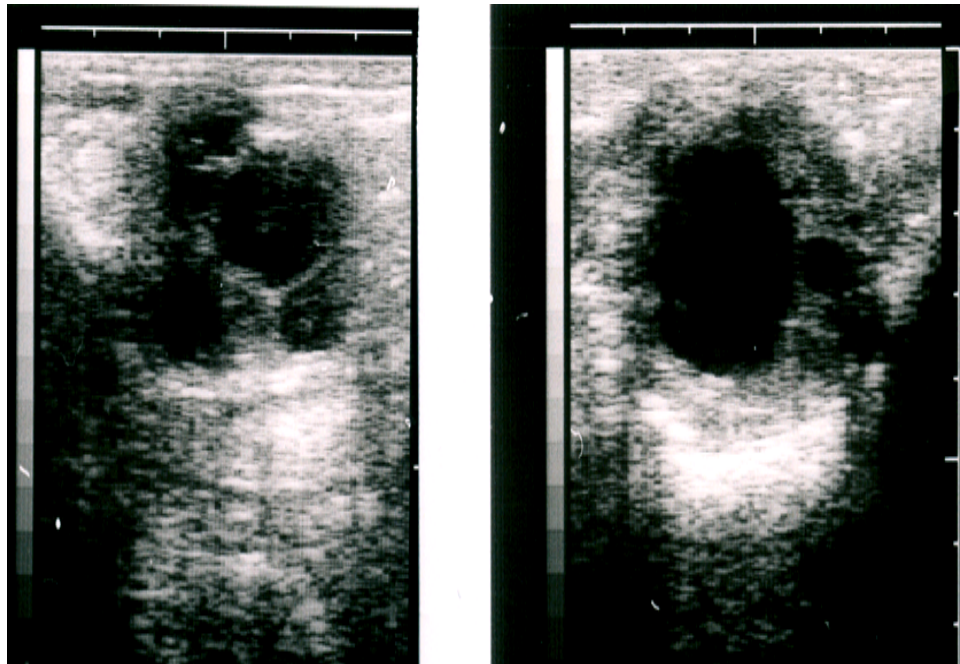


Figure 5: Ultrasound View of Both Ovaries of a Miniature Donkey During Estrus. Scales are 10mm per division. Note multiple follicles (large, black areas) in the left image and the large, dominant follicle in the right image.

Ultrasound pregnancy examinations are performed using either a transrectal or transabdominal technique depending on the gestational age of the fetus. The conceptus may be found using the transrectal technique from as early as 16 days of pregnancy (Fig. 6), at which time it is usually located in the 6 o'clock position just forward of the urinary bladder. The distance of probe insertion depends on the amount of filling of the bladder. The conceptus is generally identified between the 5 and 7 o'clock positions as pregnancy progresses. The depth of probe penetration varies with age of the jennet; multiparous females usually require a deeper reach. For example, a 37 day pregnancy (Fig. 7) may be found as far as 15 inches forward of the anus. The extended probe may have to be deviated fully downward at the front end to visualize the fetus. The fetal heartbeat, first seen at approximately 25 days, appears as an on-and-off flicker of fluid density as the heart fills and contracts.

The maximum gestational age at which the miniature donkey fetus may be found using the transrectal technique is still under investigation. It is expected to vary based on the number of previous foals of the jennet, and on the body type of the animal. There is usually a time period in most species when the pregnant uterine horn is drawn down over the brim of the pelvis and into the lower abdomen by the weight of the fetus, pulling the fetus out of range for ultrasound detection. However, fetal fluids and the placenta may be visualized at a later stage without being able to visualize the actual fetus.

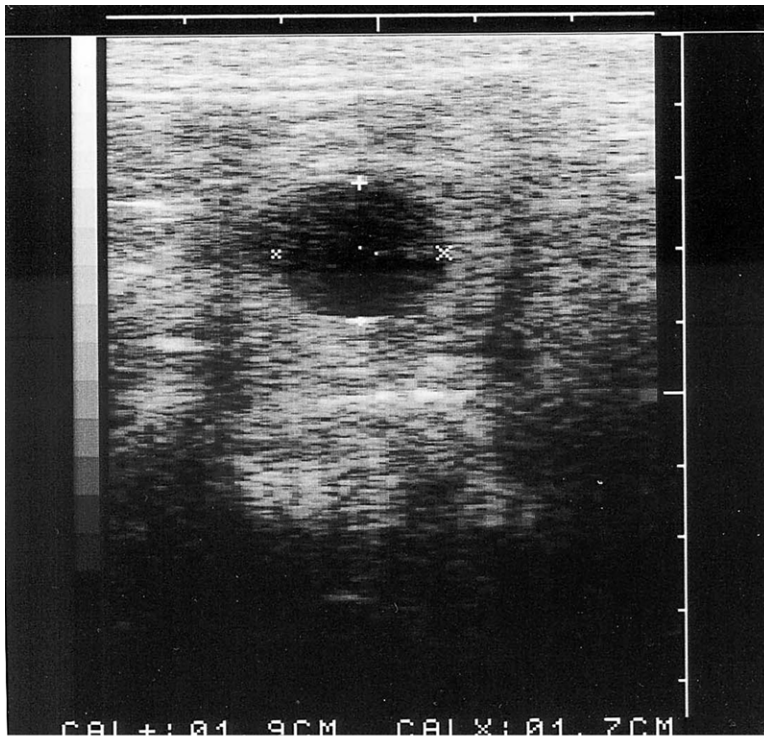


Figure 6: An 18 Day Pregnancy in a Miniature Donkey. The black circle represents the area of embryonic fluid associated with the pregnancy.

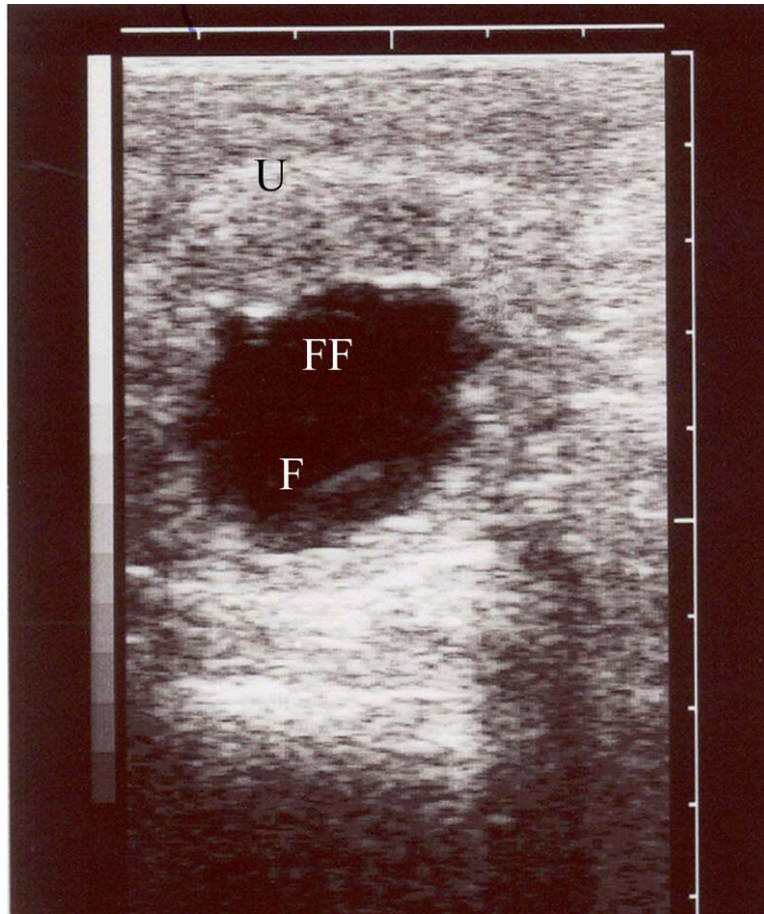


Figure 7: 37 Day Pregnancy in a Miniature Donkey.

F = fetus; FF = fetal fluids; U = uterine wall.

TRANSABDOMINAL EXAMINATIONS

At approximately 70 to 80 days of gestation, the miniature donkey fetus may be visualized using the transabdominal technique near the midline of the rear portion of the abdomen (Figs. 8 and 9). As in the transrectal technique, a coupling medium is needed for good transmission and reception of the ultrasound waves between the probe and the tissue to which it is applied. Water-soluble methylcellulose lubricant or alcohol serves this function by liberal application to the donkey's abdomen. Abdominal hair does not have to be clipped, and I have found that alcohol tends to give a clearer picture than gel. Application of additional alcohol or gel to the probe and skin during the exam is likely to be needed to maintain the best picture quality.

As pregnancy progresses, there is relatively less fluid and more soft tissue density seen when examining the fetus (Fig. 10). Fetal movement is consistently seen 90 % of the time. If a few minutes are allowed beyond the initial look, fetal movement is usually seen, characterized by jerking or twitching. This movement is different from that of movement of digestive organs and their contents. If in doubt, the discovery of the fetal heartbeat finalizes the diagnosis. In the last trimester of pregnancy, the fetal heartbeat is usually found on the ventral abdomen adjacent to the umbilicus. Currently, I am performing examinations on pregnant miniature donkeys at various stages of gestation to obtain detailed information on the appearance of the fetus throughout gestation.



Figure 8: 5 MHz linear probe applied to the caudoventral abdomen of a miniature donkey for performance of transabdominal ultrasound uterine examination at 70 to 80 days of pregnancy and beyond.

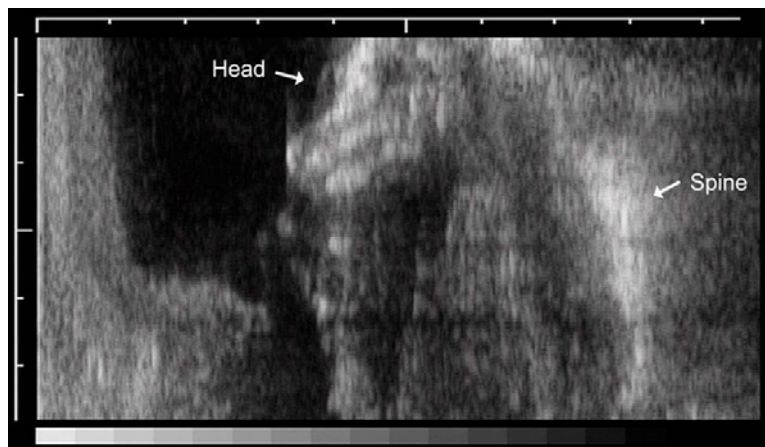


Figure 9: Ultrasound Image of a 72 Day Miniature Donkey Fetus.

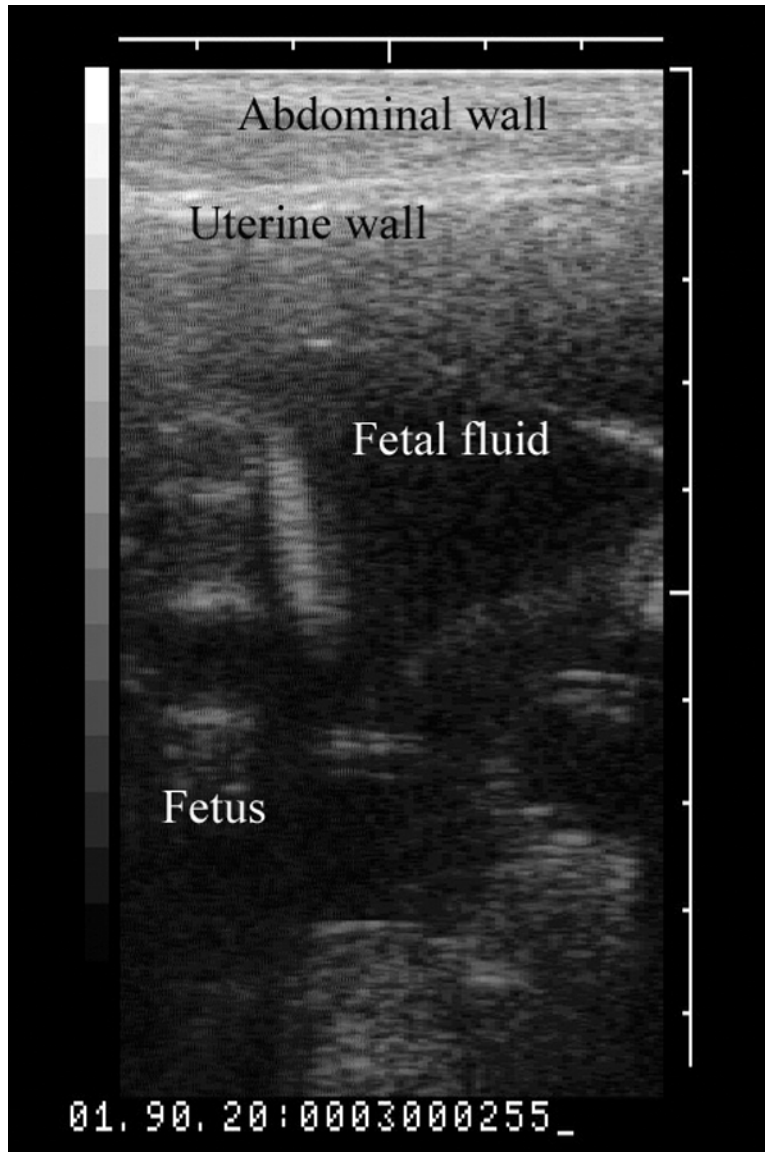


Figure 10: Ultrasound Image of a 255 Day Miniature Donkey Fetus.

SUMMARY

In summary, ultrasound examination of the female donkey reproductive tract is a safe and reliable procedure, and donkeys are tolerant of the examination procedure. It is not difficult for a veterinarian familiar with ultrasound reproductive examinations to accomplish it successfully. Confidence level and accuracy increase rapidly with the number of examinations performed. Useful information that improves reproductive efficiency is easily obtained using basic ultrasound equipment.

REFERENCE:

1. Purdy, SR. Ultrasound Examination of the Reproductive Tract in Female Miniature Donkeys. *Veterinary Care of Donkeys*, Matthews N.S. and Taylor T.S. (Eds.). International Veterinary Information Service, Ithaca NY (www.ivis.org).